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Institutional Determinants of Economic Performance in OECD Countries – An Institutions Climate Index

Theo S. Eicher and
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The Penn World Tables document dramatic differences in development among OECD countries. The per capita income gap between richest and poorest OECD countries was about 8 fold in 1970, and remains about 5 fold in 2000. Despite evidence in favor of convergence, such significant and persistent disparities are surprising. They raise interest in the determinants of the diversity of per capita income levels among the group of countries that is widely considered as "first world", "advanced" and "industrialized."

The recent literature on development accounting, which seeks to explain differences in per capita income levels, is separated into approaches that examine the contribution of either production factors or institutions. In his survey for the Handbook of Economic Growth, Caselli (2005) shows that factors of production explain only about half of the variation in per capita income. This production-factor based strand of the growth literature typically does not present an explanation as to *why* large differences in factor accumulation may exist across countries, or to what extent the underlying causes for the differences may rest in differences of economic policy and institutional design. It may not be surprising that 5 to 8 fold differences in per capita income across OECD countries cannot be explained solely by differential factor accumulation or technical change.

Alternatively, Acemoglu, Johnson and Robinson (2005, also for the Handbook of Economic Growth) survey a voluminous literature that supports the hypothesis that economic institutions explain significant portions of the observed differences in per capita incomes. This literature also uses the terms "economic institutions," "structural policies," "growth promoting policies," and "social infrastructure." Below we simply refer to "institutions," although Persson (2005) highlights that the literature's focus on institutions often associates identical measures with different labels. Hall and Jones (1999) use "social infrastructure," Acemoglu, Johnson, and Robinson (2005) refer to "economic institutions," Rodrik, Subramanian, and Trebbi, (2004) simply say "institutions," while Persson (2005) uses "growth promoting policies" or "structural policies." All of these terms are used to refer to identical or very similar fundamental data.

Besides explaining differences in per capita income, institutions have also been shown to account for variations in observed cross country growth rates. The institutions based literature on economic growth originates with the seminal work of Douglas North and Robert Thomas, who observed that the factors such as capital accumulation or innovation "are not causes of growth; they *are* growth" (North and Thomas, 1973, p. 2; italics in the original). Eicher, Garcia-Penalosa and Teksoz (2006) explore this hypothesis in a global cross-section to find that, indeed, institutions crucially moderate the returns to factor accumulations across countries. While the empirical growth literature has settled on a large number of variables that seem to be robustly related to growth in the global sample, Eicher, Papageorgiou and Roehn (2007) show that popular growth datasets do not contain the crucial regressors necessary to identify the growth determinants in OECD countries. Since global datasets are in a sense based on the lowest common denominator in terms of data collection, it is not surprising that they do not contain key growth determinants for advanced countries, such as R&D intensity, productivity of government investment, tertiary education, etc (for which no developing country data is available). In this paper we therefore seek to develop a dataset that focuses squarely on OECD countries to identify the drivers of economic performance that determine the fortunes of high income countries specifically.

Our task is then to examine whether a set of institutions can be isolated among OECD countries that contributes either directly or indirectly to the observed income differences among advanced countries. The focus on OECD countries is admittedly

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arbitrary. Alternative analyses might be based on the World Banks' group of "high income countries," or the group of countries that rank among the top 30 in terms of per capita income. The two latter approaches, however, do not generate one stable set of countries, as membership in these groups varies over time. Since our goal is panel analysis we therefore adopt the OECD definition.[1]

The empirical literature on the non-institutional determinants of growth in OECD countries has developed substantially over the past two decades, drawing on a growing number of databases. One group of papers is comprised of studies that replicate basic global cross country studies with the sub-sample of OECD countries. Such studies often do not perform well as seen in Mankiw, Romer and Weil (1992) or in Englander and Gurney (1994), who attempt either Solow or Barro style exercises for OECD countries with very limited success.

Subsequent attempts depart from a global analysis focused on OECD specific characteristics (and data) and perform better. Lee (1995) and Alexander (1997) find that private investment, government consumption / debt, and inflation are significant in Barro (1991) style OECD growth regressions. Park (1995) shows the importance of intellectual property rights in OECD countries, and Kneller et al. (1999) find significant effects of tax distortions and productive government expenditures on growth in OECD countries. These results were put into question by Mendoza et al. (1997) who reports that taxes on consumption, labor, capital, and personal income are not statistically significant determinants of growth in OECD countries.

In terms of institutional analysis, Eicher and Leukert (2005) show that, once endogeneity is appropriately taken into account, a small subset of institutional variables is indeed strongly related to economic performance in both the OECD and Non-OECD sample. However, their measure of institutions is rather narrow, and they find that institutional regressors have a 70 percent smaller impact in OECD countries as compared to Non-OECD countries. This raises the question whether the right set of institutions was considered for the OECD sample.

Alternative approaches to institutions, or structural policies and growth in OECD countries include Ahn and Hemmings (2000), Bassanini, Scarpetta and Hemmings (2001) and Nicoletti and Scarpetta (2006). Reviewing the empirical evidence on growth in OECD countries Ahn and Hemmings (2000) find a negative link between hyper-inflation and growth and positive links between financial development, trade, pro-competition policy and economic performance. Bassanini et al. (2001) investigate the effect of policies on economic performance to find that both high inflation, the variance of inflation, direct taxes and government transfers have a direct negative effect. Their results also suggest that the development of financial markets and R&D spending are positively related to growth. Nicoletti and Scarpetta (2003), Scarpetta and Tressel (2002) and Scarpetta et al. (2002) analyze the impact of product and labor market institutions on multi-factor-productivity (MFP) in OECD countries in a cross-section but they do not establish a link to economic growth. Our approach is to examine the impact of institutions on OECD growth that is not limited to labor markets or policy variables. We include a broad spectrum of institutions that might influence economic performance. We will discuss the breath of these institutions below.

We do limit ourselves to assessing the relevance of institutions for OECD economic performance and develop an array of endogenously selected and weighted economic indicators that are combined into one aggregate index of institutional quality in OECD countries (Institutions Climate Index).[2] This Index can be used to quantify and compare the relative institutional quality across OECD countries. Further, we discuss how the index can be used to understand differential economic performances of OECD countries.

The Data

The central purpose of the Institutions Climate Index is to assess the extent to which individual OECD countries possess the institutional quality to achieve economic growth. To this end we seek to identify a set of institutional variables that can be robustly related to economic performance in OECD economies. The aim of the Index is to summarize a

[1] For the narrow set of institutions considered in Eicher and Leukert (2005), results hold for alternative definitions of advanced countries.

[2] Like most other composite indices our index follows a linear aggregation rule. A feature of this type of aggregation rule is that a decrease in one sub-index can be compensated by an increase in one or several other sub-indices. This might be viewed as undesirable since it follows, that the index cannot address questions relating to the sequencing of or the interdependencies among institutional reforms.

country's institutional performance in several distinct growth-relevant dimensions that capture overall institutional quality. A key feature of the index is that all components are selected and weighted based on their predictive power.

In early work on the influence of institutions on growth, Kormendi and Meguire (1985) applied the Gastil's indexes of civil and political rights to find a statistically significant indirect effect of the index on growth (via investment). One can only speculate that endogeneity problems of institutions overwhelmed the explanatory power of the explanatory variables to wash out any direct effect. The seminal paper on the institutions and growth literature is Mauro (1995), who employs carefully chosen proxies and econometric techniques to identify a significant negative direct effect of corruption on investment and growth, while more efficient bureaucracies and the rule of law are shown to influence growth positively.

The long line of papers that follow Mauro (1995) all use variables derived from institutional quality data that is provided by risk-rating agencies (International Country Risk Guide (ICRG), Business Environment Risk Intelligence (BERI), and Business International), usually with similar results. Most notably, Knack and Keefer (1995) and Knack (1996) use the ICRG security of contract and property rights institutional indices in growth regressions to find effects on growth. Barro (1996) uses the ordinal ICRG and the earlier BERI indices of property rights with an endogenous rule of law index (dated 1982). He finds a consistently positive and significant effect on growth. Barro (1996) also uses Gastil's political rights index and finds that the middle level of democracy most favors growth as he discovered that a curvilinear relationship between growth and the Gastil index exists. Alesina et al. (1996) find a negative effect of government instability on growth and Easterly (1993) indicates negative effects from financial repression. Barro (1996) and Helliwell (1994) also find that the Freedom House indexes were positively related to growth only if variables such as educational attainment and investment rates are omitted as explanatory variables. The authors concluded that any beneficial impacts of democracy on growth may operate through the factor accumulation channels.

A survey of the literature by Aron (2000) yields no less than 41 empirical papers that utilize indices of institutional quality. This *entire* literature bases its results, however, on a global sample of between 80 and 110 countries, mixing countries both developing and developed and attempting to explain the influence of institutions with about 5 to 10 institutional variables.[3] Aron (2000) also documents that none of the papers surveyed focuses on OECD or on strictly European indices as determinants of economic performance. The similar survey by Acemoglu et al. (2005) documents the same fact.

A priori one might expect that the type of institutions that drive growth in developed countries are not identical to the relevant ones in developing countries. Thus, replicating global growth studies for OECD countries and examining this a priori assumption is a natural first step. Eicher and Leukert (2005) show that, if the global sample of the seminal Hall and Jones (1999) paper is split into developing and OECD countries, the significance of the established institutional variables (e.g., corruption, risk of expropriation) vanishes for the OECD sample. This may not be a surprising result, given the nature of the institutional variables included.

The result does raise the stakes, however, to determine whether relevant institutional variables exist which do indeed influence economic performance in OECD countries. Our research seeks to expand the institutional variables under consideration in the existing institutions and growth literature to include broader categories of institutions. Each category is comprised of a set of detailed sub-indices and components that are presumably relevant for OECD countries. For example, Barro's (1991) measure of political instability using observations on revolutions, coups and assassinations is likely to be an insignificant explanatory variable in the OECD subsample, whereas the number of government changes might turn out to be more appropriate.

We took a broad view of institutions and included all factors that reflect institutions and structural policies that have been related in the growth literature to economic outcomes. This comprehensive data collection effort resulted in a database of more than a hundred institutional indicators. However, we did not want to restrain ourselves to an index that relates to a single cross section of countries, instead we decided to base the Index on indices that provide information not only across countries, but also across time. The time series requirement renders a dataset

[3] For a critical view of this literature see Glaeser at al. (2004).

Table 1

Candidate Variables and Sources

Categories	Sub-Indices	Components
1. Constitutional system	1.1 Democratic System	Institutionalized democracy (Polity) Institutionalized autocracy (Polity) Competitiveness of executive recruitment (Polity) Openness of executive recruitment (Polity) Competitiveness of political participation (Polity) Regulation of participation (Polity) Regulation of chief executive recruitment (Polity) Executive recruitment (Polity) Political competition (Polity) Democratic accountability (ICRG)
	1.2 Political Stability	Government stability (ICRG) Regime durability (Polity) Multiple terms in office (DPI)
	1.3 Civil Liberties	Political rights (Freedom House) Civil liberties (Freedom House)
	1.4 Checks and Constraints	Legislative index of electoral competitiveness (DPI) Checks/number of veto players (DPI) Political constraints indices (Witold Henisz) Ethnic tensions (ICRG)
2. Social conflict potential	2.1 Conflict	External conflict (ICRG) Internal conflict (ICRG) Religious tensions (ICRG) Military in politics (ICRG)
	2.2 Military in Politics	Chief executive a military officer (DPI)
3. Administrative and judicial quality	3.1 Basic Institutional Quality	Property rights &legal structure (EFW) Law&order (ICRG) Corruption (ICRG) Bureaucratic quality (ICRG) Legal/administrative restrictions (WES) Political stability (WES) Confidence in government economic policy (WES)
4. Economic institutions	4.1 Optimal Taxation	Top marg. tax rate (and income threshold at which it applies) (EFW) Tax wedge (including employer's soc. sec. contributions) (OECD) Income tax rate (average rate in %) (OECD)
	4.2 Fiscal Burden	Total tax revenue (% GDP) (OECD)
	4.3 Trade Openness	Black market premium (EFW) Tariffs (EFW) Trade size (actual size of trade sector compared to expected) (EFW)
	4.4 Capital Markets	Credit market regulations (EFW) International capital market controls (EFW) Private sector domestic credit (% of GDP) (World Bank)
	4.5 Labor Markets	Labor market regulations (EFW) Early retirement index, male (OECD) Female labor force participation rate (World Bank) Long term unemployment rate (OECD)
	4.6 Structure of Government Expenditures	Government consumption spending (% of total consumption) (EFW) Government enterprises and investment (% of total investment) (EFW)
5. Educational system	5.1 Human Capital Efficiency	Primary gross enrolment rate (World Bank) Secondary gross enrolment rate, (World Bank) Tertiary gross enrolment rate (World Bank) Average years of schooling (World Bank) Public educational expenditure (World Bank)
6. Social system	6.1 Social Expenditure	Old age expenditure (OECD) Family expenditure (OECD) Active labor market program expenditure (OECD)
	6.2 Health System	Public health expenditure (OECD) Infant mortality (OECD) Life expectancy at age 0 (OECD)
7. Innovation potential	7.1 Patents and Citations	ICT patents at EPO (OECD) Biotechnology patents at EPO (OECD) Scientific/technical journal articles per 1000 pop (World Bank)

Notes: DPI: Beck et al. (2001), EFW: Fraser Institute (2006), ICRG (2006), Polity: Polity IV Project (2004), Witold Henisz (2000, 2002), WES: Ifo World Economic Survey (2007).

to 61 possible variables that are available in 5-year moving averages over the time period 1988–2004 for 24 OECD countries.[4] We sort the indices into 7 broad categories that pertain to i) constitutional system, ii) social conflict potential, iii) administrative and judicial quality, iv) economic institutions, v) educational system vi) social system, and vii) innovation potential. Each of the seven categories is in turn comprised of several sub-indices. Table 1 lists the variables that were considered as candidates for the analysis.

The variables represent both expert assessments regarding the quality of the institutional environment as well as objective coding of institutional quality. All indicators originate from reliable sources such as the World Bank, the OECD, the International Risk Country Guide (ICRG) and the Fraser Institute. Novel is our inclusion of previously unused institutional data from the World Economic Survey (WES) of the Ifo Institute for Economic Research, Munich. WES data has been available since 1992 and surveys different dimensions of the economic environment, such as "Lack of Confidence in Government's Economic Policy", "Political Instability" and "Legal and Administrative Restrictions for Foreign Firms to Invest in this Country and/or to Repatriate Profits".

Methodology

In this section we outline which variables are included in the index, why and with which specific weight. A key problem in the institutions literature is that the large number of possible candidate regressors quickly leads the number of regressors to exceed the number of observations. In addition, multicollinearity is often rampant within a specific category. Finally, several indicators might proxy for the same institution. In contrast to capital and labor, institutions are not directly measurable. Thus, research into the institutional determinants of economic performance has to make use of indicators that proxy for specific variables of interest. This may cause identification problems due to the fact that distinct variables may proxy for similar institutions.

One can begin to address these issues by aggregating variables with similar interpretations into separate categories. The standard procedure in the literature (see survey by Aron, 2000) is to average or sum indices – implicitly subjectively assigning equal weight to all variables chosen to be included in the analysis. In contrast to studies that weigh variables ex ante by assigning identical or arbitrary weights, we employ Factor Analysis (FA) to generate weights.[5]

We therefore present a simple, but important extension of Hall and Jones (1999) to construct institutional indices. Their work gave rise to an extensive literature on growth and development accounting based on institutional data. Our addition is that the regressors are weighted by their relevance, taking into account similarities between regressors. Factor Analysis addresses the variable identification issue by reducing the dimensionality of the dataset. Factor Analysis returns the smallest number of linear combinations of regressors that spans a similar dataspace as all candidate regressors. The linear combinations are commonly called factors. We employ Factor Analysis in a two-step procedure. In the first step, several candidate regressors (components) that are all suspected to proxy for a similar institutional proxy (such as political stability) are combined under one sub-index heading (see Table 1). All variables in one sub-index are then subjected to Factor Analysis, which establishes the linear dependencies among candidate regressors. In the second step, we perform Factor Analysis on all sub-indices that belong to one category heading (see Table 1). As is common practice we restrict ourselves in both steps to those factors with an eigenvalue greater than unity to span the matrix of independent variables as efficiently as possible. The informational content of each component in a sub-index and each sub-index in a category is reflected by the weight that is assigned in the linear combination. Hence, the weights are specified by the data and not by the researcher.

After reducing the dimensionality of the independent variables, we analyze how many factors are economically relevant in determining economic performance in OECD countries, hence the factors are regressed on GDP per capita growth rates. Instead of focusing on an index that relates to a single cross section of countries, we decided to base the Index on information not only across countries, but also across time. Thus, we regress the factors on the average

[4] Due to lack of sufficient data we exclude the Czech Republic, Hungary, Iceland, Luxembourg, Poland and the Slovak Republic from the set of OECD countries.

[5] More specifically, we employ the Principal Factor method.

GDP per capita growth rate on three cross sections 1994, 1998, 2002. To smooth cyclical movements we employ 4-year average GDP p.c. growth rates as our dependent variable. Hence the first cross section relates to the average growth rate of 1990 to 1994, the second to 1994 to 1998 and the third to 1998 to 2002. To account for the fact that institutions are seen to lead growth, we use two-year lags of each institutional factor as independent variables.

To establish economic relevant sub-indices, only those factors were retained that proved to exhibit significant explanatory as well as predictive power. Specifically, we retained only those factors whose coefficient estimate's t-value exceeds unity and therefore improves the regression. This procedure resulted in a set of factors that are able to explain 44 percent of the variation in per capita GDP growth rates. The factor coefficient estimates together with the weights of each sub-index in a factor were then used to establish the impact of each sub-index on the aggregate institution index. Finally, the weights of each component in a sub-index could be employed to calculate the influence of each institutional variable on the overall Institutions Climate Index.

Composition of the Institutions Climate Index

The result of the factor and regression analysis is one aggregate institution index that is composed of 8 distinct institutional sub-indices. Figure 1 displays the sub-indices and their contribution to the overall Institutions Climate Index. Each sub-index is again comprised of several components (Figures A1-8). We will describe each of the selected indicators in greater detail below.

All components are aggregated into one Index score for each country. We normalize the index such that it ranges from zero to unity. To do so, each of the components is normalized to range from 0 to unity according to:

$$Norm(C_{i,t}) = \frac{C_{i,t} - Min(C_{i,t})}{Max(C_{i,t}) - Min(C_{i,t})}$$

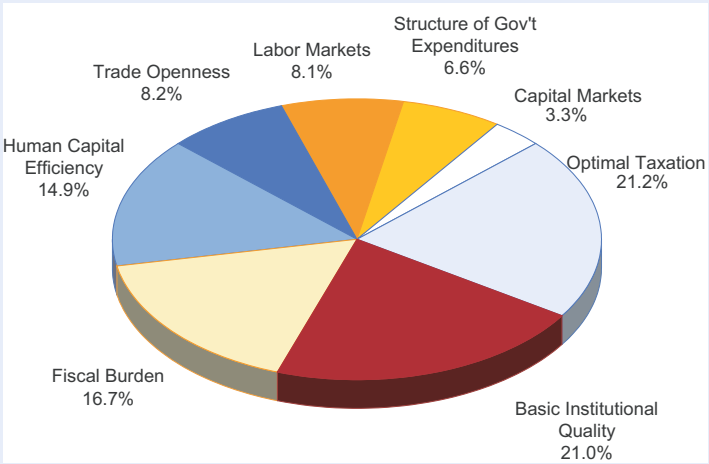
where $C_{i,t}$ is the value of the component of country i at time t. $Min(C_{i,t})$ and $Max(C_{i,t})$ are the minimum and maximum sample values of each variable $C_{i,t}$.[6] The overall Index is then the weighted sum of all normalized components. The weights of each sub-index in the final index are shown in Figure 1, while Figures A1-8 display the weights for the components in each sub-index. A score of 0 (1) indicates that a country received the minimum (maximum) score observed within the entire sample in all components. This normalization procedure assures comparability of the Index over time.

Optimal Taxation

With 21.2 percent, Optimal Taxation carries the largest weight, due to its large statistical and economic contribution to the overall index. This sub-index assigns low values to countries with either insufficiently low or excessively high tax rates. The intuition is that taxes have a nonlinear effect on growth. A certain quantity of tax revenues is necessary for growth to provide, for example, productivity enhancing infrastructure investments. However, excessive tax rates deter private investment. This idea was first formalized in an endogenous growth framework by Barro (1990). Figure A1 shows the components of the Optimal Taxation sub-index and their individual respective contributions. *Tax wedge* measures employees' and employers' social security contributions and personal income tax less transfer

Figure 1

INSTITUTIONS CLIMATE INDEX: COMPOSITION



Source: Institutions Climate Index for OECD Countries.

[6] The choice of sample dependent minimum and maximum values in contrast to absolute minima and maxima was due to the fact that for some variables no absolute maxima (e.g. average years of schooling) or meaningful absolute minima exist (e.g. gross enrolment rates).

payments as percentage of gross labor costs. The *top marginal tax* rate assigns higher ratings to countries with lower marginal tax rates that take effect at higher income thresholds (Fraser Institute 2006). The *squared tax* component captures the non-linear relationship between the tax rates and growth as outlined by Barro (1991). Since the linear and non-linear components cannot be meaningfully separated, we only provide discussion of this sub-index as a whole.

Basic Institutional Quality

A close second in terms of importance is the Basic Institutional Quality sub-index with 21 percent. Basic Institutional Quality closely resembles the original index of government anti-diversion policies employed in Hall and Jones (1999). It measures the extent to which the government protects individuals from diverting resources into unproductive uses through e.g. protection of property rights, law and order enforcement, impartial courts or bureaucratic quality or how the government themselves acts as a diverter for example through corruption.

The Basic Institutional Quality sub-index is comprised of 7 components (Figure A2). The first component measures how *political stability* influences the climate for foreign investors. *Bureaucratic quality* captures the institutional strength that minimizes revisions of policy when governments change. Therefore, high points are given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services (ICRG 2006). *Law&order* assesses the strength and impartiality of the legal system and the observance of the law. Countries that enjoy a high *law&order* rating exhibit sound judicial systems and legal enforcement with effective sanctions (ICRG 2006). The component *property rights&legal structure* contains valuations of judicial independence, impartial courts, protection of intellectual property, military interference in rule of law and the political process and the integrity of the legal system (Fraser Institute 2006). A further component is the assessment of a country's level of *corruption*. Finally the last two subcomponents are survey questions of Ifo's World Economic Survey (WES) about a country's *confidence in economic policy* as well as about the extent of which the climate of foreign investors is influenced by a country's *legal/administrative restrictions* for foreign firms to invest and/or to repatriate profits.

Fiscal Burden

Fiscal Burden contributes to the overall Institutions Climate Index with 16.7 percent. This sub-index measures the extent to which the government diverts resources away from private and possibly more productive use. We proxy a country's fiscal burden by the *total tax revenue* as percentage of a country's GDP. The component is a good measure of how extensive a tax system of a country is. Direct taxes might be low, but the government might alternatively generate revenues from indirect taxes as well as from a host of alternative fees and hidden taxes. The revenue section is thus perhaps the best measure of the negative impact of the size of the government that has been highlighted by Barro (1990).

Human Capital Efficiency

The importance of human capital as a driver of economic growth was acknowledged in economics at least since the seminal papers of Lucas (1988) and Romer (1990). Human capital can either act as a factor of production in the technology sector (Romer, 1990) or it can facilitate the adoption of technology diffusion (Nelson and Phelps, 1966; Benhabib and Spiegel, 1994). Our measure of Human Capital Efficiency receives a weight of 14.9 percent in the overall index. Figure A4 displays the composition of the Human Capital Efficiency sub-index. The *tertiary gross enrolment* ratio is the number of pupils enrolled in tertiary, regardless of age, expressed as a percentage of the population of the five-year age group following on from the secondary school leaving age. The average years of *schooling* of adults is the years of formal schooling received, on average, by adults over age 15. The *secondary gross enrolment* ratio is the number of pupils enrolled in secondary, regardless of age, expressed as a percentage of the population in the theoretical age group for secondary education. Finally, total *public educational expenditure* is measured as the current and capital expenditures on education by local, regional and national governments, including municipalities, expressed as a percentage of the gross domestic product (GDP).

Trade Openness

The positive impact of a countries openness towards other countries on growth was empirically shown e.g. by Sachs and Warner (1995).[7] Trade promoting poli-

[7] For a recent survey of the empirical evidence between openness and growth see e.g. Baldwin (2003).

cies do not only yield benefits from specialization and facilitate the adoption of technology from other countries but as Hall and Jones (1999, p. 98) point out: "tariffs, quotas, and other trade barriers [also] create lucrative opportunities for private diversion". Thus, Hall and Jones include a measure of openness in their index of institutional quality. Our measure of the degree of Trade Openness contains the following components (see Figure A5): *tariffs* contains information about the revenues from taxes on international trade as a percentage of exports plus imports, the mean tariff rate as well as the standard deviation of tariff rates (Fraser Institute 2006). The variable *trade size* measures the actual size of the trade sector compared to expected size. It then allocates higher ratings to countries with large trade sectors compared to what would be expected, given their population, geographic size, and location. On the other hand, countries with small trade sectors relative to the expected size receive lower ratings (Fraser Institute 2006). The component *black market premium* assesses the difference between official exchange rate and black market rate. This component allocates the highest rating to countries without a black-market exchange rate; *i.e.,* those with a domestic currency that is fully convertible without restrictions. When exchange rate controls are present and a black market exists, the ratings will decline toward zero as the black market premium increases toward 50 percent. The lowest rating is given when the black market premium is equal to, or greater than, 50 percent (Fraser Institute 2006).

Labor Markets

Rigid labor markets or tight regulations might prevent an economy to react to technological changes and allocate labor to the most productive use and hence distort growth. Further, other institutional arrangements that affect the labor market such as the pension system, retirement age or family policy or child care can lead to the exclusion of whole groups of the population from the labor market and thereby from production. Figure A6 displays the components and respective weights of our sub-index Labor Markets. The *early retirement index* is constructed as 1 minus the male labor force participation rate of age 55-64. A country receives a higher value the lower the *early retirement index*. The index of *labor market regulations* combines information about the impact of minimum wage, hiring and firing practices, the share of labor force whose wages are set by centralized collective bargaining, unemployment benefits and the use of conscripts to obtain military personnel (Fraser Institute 2006). Finally, *the female labor participation* rate is also included. This component proxies for the obstacles existing within a country that prevent women from actively participating in the labor market.

Structure of Government Expenditures

We assume that output diverted to government expenditures captures the cost of government in a society. When a government expends money, it acquires resources, diverting them away from potentially more productive private choices of resource allocations (Fraser Institute 2006). Our sub-index Government Expenditures is measured as general *government consumption* spending as percentage of total consumption as well as *government enterprises and investment* as percentage of total investment, see Figure A7.

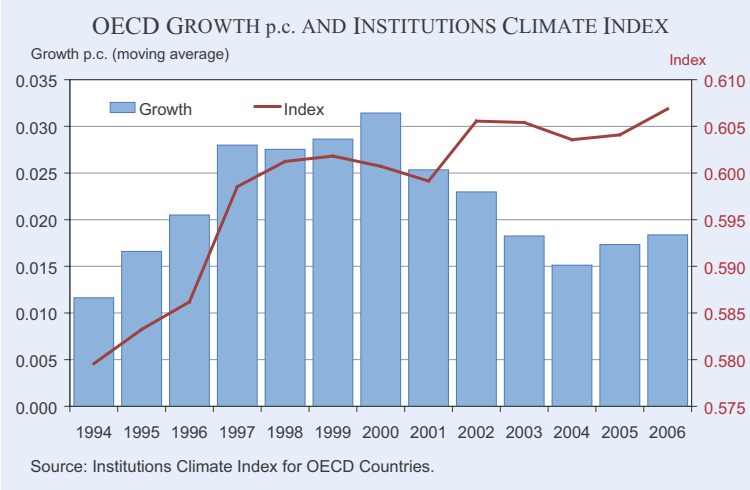
Capital Markets

The beneficial effect of capital markets or financial intermediation on economic performance was found e.g. in the influential contribution of Levine, Loayza and Beck (2000).[8] Financial intermediation is seen to help (i) production of ex ante information about possible investments, (ii) monitoring of investments and implementation of corporate governance, (iii) trading, diversification, and management of risk, (iv) mobilization and pooling of savings, and (v) exchange of goods and services. Aghion, Howitt and Mayer-Foulkes (2005) additionally stress the importance of financial intermediation for the rate of technology diffusion. The preferred proxy for financial intermediation is usually the ratio of private credit to GDP (see Levine, Loayza and Beck, 2000; Aghion, Howitt and Mayer-Foulkes, 2005; Levine 2005). Our measure of Capital Markets or financial intermediation is comprised of *private sector domestic credit* as percentage of GDP and *capital market controls* (see Figure A8). *Private sector domestic credit* refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment (WDI 2006). *Capital market controls* assesses the access of citizens to foreign capital markets and foreign access to domestic capital markets as well as restrictions on

[8] For a comprehensive summary of the recent evidence see Levine (2005).

the freedom of citizens to engage in capital market exchange with foreigners (based on the 13 IMF capital controls categories) (Fraser Institute 2006).

Figure 2



The Institutional Climate and Economic Growth

Our index is composed with the expressed intent to highlight the key underlying variables that determine economic per capita growth. After composing the Institutions Climate Index we are therefore interested how well the index predicts economic growth across OECD countries. We focus on the 4-year moving average to filter out the business cycle variations. The OECD GDP per capita growth rate is simply the un-weighted average of the growth rate of the 24 countries included in our analysis. The Institutions Climate Index for OECD countries is the un-weighted average of the individual country Index values. Figure 2 shows the 4-year moving average of OECD per capita GDP (left hand scale) and the Institutions Climate Index (right hand scale).

Figure 2 shows how remarkably well the Index tracks the average OECD GDP per capita growth rate. This is especially stunning, since the calibration of the Index weights is based on three cross sections only (1994, 1998, 2002). The Index values for post 2002 are out of sample predictions. Moreover, as pointed out above we use two period lagged institutions to predict growth. Thus, the Index value of for example the year 2000 is based on institutional indicators of the year 1998.

One exception to the overall well tracking of growth rates of the Index is the year 2002. From the year 2001 to 2002 we observe a sharp increase in the Index, while average OECD GDP growth declined. After this one instance of diverging trends the index and OECD growth again co-move for the rest of the periods. A deeper analysis of the sources reveals that this increase was driven by a surge in the Openness sub-index – and in particular in the *tariffs* and *trade size* indicators in many of the European countries. Since the index values in 2002 relate to institutions in 2000, we conclude that the upswing in the trade variables is related to the introduction of the Euro in the EU countries which, however, did not generate the expected (in terms of index projection) upswing of the growth rate.

Conclusion

A consensus has formed in the recent empirical growth literature that strong explanatory power can be attributed to institutional variables in the *global* sample of countries. To date, however, the impact of institutions on economic growth in *OECD countries* has not been systematically explored. We identify an array of endogenously selected and weighted economic indicators that are combined into one index of institutional quality for OECD countries. We show that this Institutions Climate Index is able to track average OECD growth over the period 1994-2006 remarkably well. The Index can be used to analyze and understand the differential economic performance of OECD countries.

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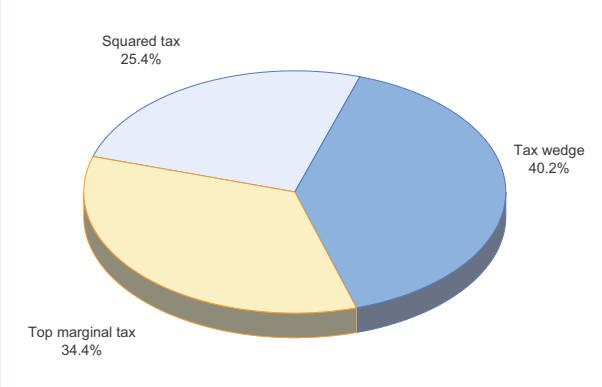
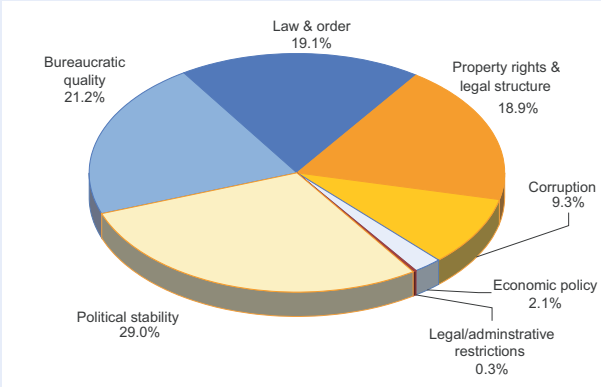
Appendix
Composition of Sub-Indices, Figure A1–8

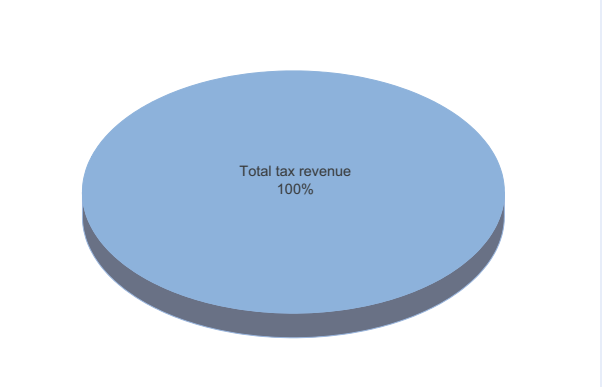
A1: Optimal Taxation



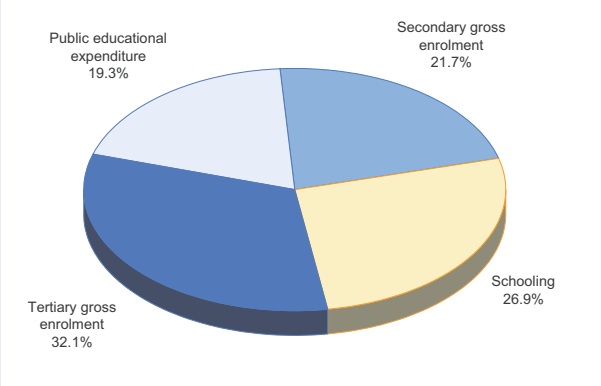
A2: Basic Institutional Quality



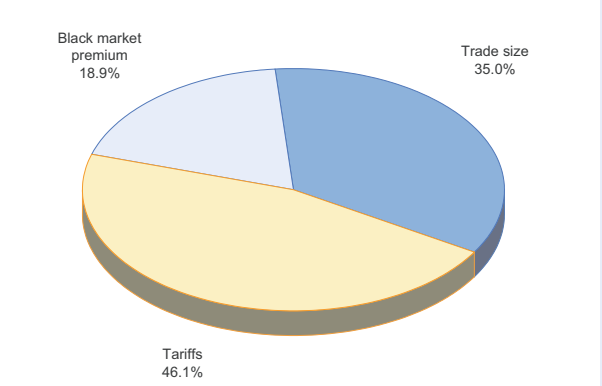
A3: Fiscal Burden



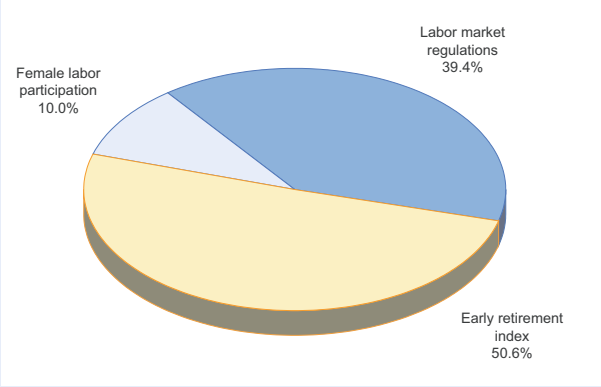
A4: Human Capital Efficiency



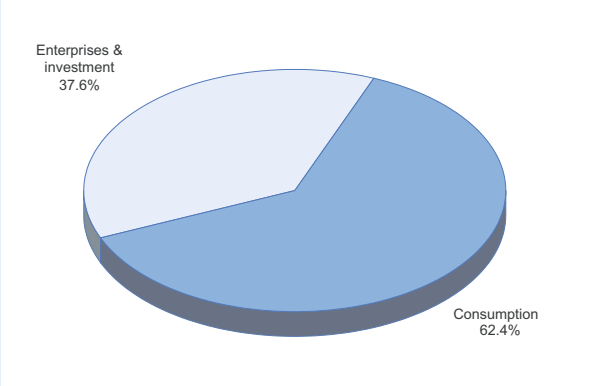
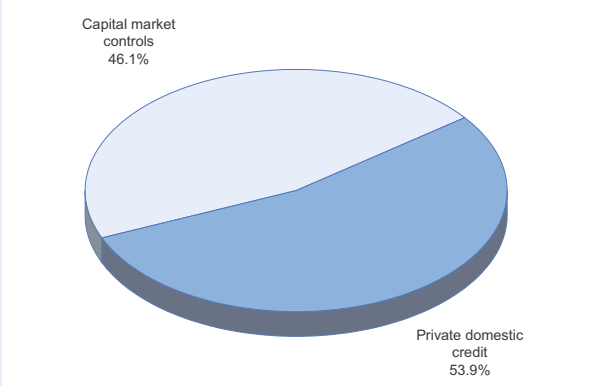
A5: Trade Openness



A6: Labor Markets



A7: Structure of Government Expenditures



A8: Capital Markets