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Institutional quality database

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Working Paper No. 457

Institutional Quality Database

by

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Institutional Quality Database

Aljaz Kuncic *

2012

Abstract

In this paper we emphasize the role of institutions in economic analysis. We describe and compare different institutional classifications systems, which is rarely done in the literature, and show how to operationalize institutional classification based on the subject category, as the most appropriate one. More than thirty established institutional indicators can be clustered into three homogenous groups of formal institutions: legal, political and economic, which capture to a large extent the complete formal institutional environment of a country. We compute the latent quality of legal, political and economic institutions with factor analysis for every country in the world and for every year, relative to the values of others. We propose a World Institutional Quality Ranking, through which we can follow whether a country is improving or worsening its relative institutional environment. The calculated latent institutional qualities can be especially useful in further panel data applications, and add to the usual practice of using simply one or another index of institutional quality to capture the institutional environment, so we make the Institutional Quality Database freely available online.

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You praise the firm restraint with which they write
I'm with you there, of course:
They use the snaffle and the curb all right,
But where's the bloody horse?

Roy Campbell (1901-1957)
On Some South African Novelists¹

1 Introduction

Mainstream economics in the form of neoclassical economics is not generic. It can not uniformly be applied to any given situation or environment produce viable results. Social interactions or any other interactions in an economic system do not happen in vacuum, even though they may be mostly studied in such a way, neatly exogenizing other factors, which nevertheless, govern or have an effect on interactions of economic agents (be it individuals, organizations or firms or even countries). The study of this factors is the core idea of New Institutional Economics (NIE), which amongst others, is built on the contributions of Coase (1937, 1960), North (1981, 1990, 2005b), Ostrom (1990, 2005) and Williamson (1975, 2000).

If the importance of institutions today is well acknowledged and extensively used in growth and cross country income levels studies (Hall and Jones, 1999; Acemoglu et al., 2001; Easterly and Levine, 2003; Rodrik et al., 2004), as well as assiduously within the general research program of New Institutional Economics, there still lacks a common sense of what institutions are and how can they can be classified. This is not so much a consequence of different definitions, but a consequence of different frameworks used to study institutions, which have not yet been, to our knowledge, evaluated and discussed in relation to one another.

This paper aims at firstly bridging this gap in the literature, discussing and contrasting the existing frameworks for research on institutions. With the aim of finding good empirical counter parts to theoretical concepts, we choose an institutional classification system based on subject category, defining formal institutions as legal, political and economic, and operationalize them with existing institutional proxies. We depart from the literature, which tends to use one or another institutional proxy, and show how to capture the true latent institutional quality within each group. We extract the underlying relative quality of legal, political and economic institutions for every country in the world in every year in the period 1990 to 2010 (subject to data availability) and rank the countries each year on World Institutional Quality Ranking. This allows us to examine the countries in the world from a comparative institutional perspective. Both the relative institutional dynamics of a country with its relative institutional quality scores, most useful in panel data cross country applications, as well as indicative absolute institutional quality variables and other statistical measures from this paper are freely available in a database on the author's webpage <http://sites.google.com/site/aljazzkuncic/>. The data can freely be used for further research, especially from an institutional perspective or as an inclusion in terms of explanatory variables in other economic applications.

¹Coase (1998) paraphrases Campbell's poem in an excellent essay on New Institutional Economics, implying that the majority of mainstream economists *study the circulation of blood without a body*.

In terms of the spirit of this paper, the final product - the database, is most related to a dataset offered by CESifo Group in Germany (Eicher and Rhn, 2007). They compose an Institutional climate index for OECD countries from 1994 onwards. The index, composed out of eight parts, is primarily intended “to assess the extent to which individual OECD countries possess the institutional quality to achieve economic growth”, which also means that its “components are selected and weighted based on their predictive power”. This, apart from the focus on only OECD countries, is also one of the main differences between the database constructed in this paper and their work, as we start from the theoretical foundations of institutions and thus do not weight institutional proxies by their GDP predictive power, and do not believe in the possibility of forming a single variable that could adequately describe the entire institutional environment of a country. Also, comparing our three institutional measures with parts of Institutional climate index, the difference is that most parts of the Institutional climate index would actually not be called institutions in our work (using North’s *rules of the game* definition (North, 1990)), as they also represent policy choices, market outcomes, preferences and their interactions. Our work thus contributes to the literature both in terms of country coverage and in terms of linking the theoretical institutional concepts with the empirical counterparts, without biasing the composition of the institutional measures with a particular end-game in mind.

The paper is structured as follows. Section 2 defines institutions and presents the institutional classifications. Section 3 describes the empirical proxies, summary statistics and offers some basic results. Section 4 includes the calculations on institutional quality and shows how the database can be used for comparative institutional analysis. Finally, section 5 summarizes the paper and concludes.

2 Definitions of institutions and classification systems

The most common and widely used definition of institutions can be attributed to Douglas North, who defines institutions as formal and informal rules of the game, and their enforcement characteristics (North, 1990, 1993, 2005a). North (1993) also demarcates institutions from organizations, which are the players of the game, be it individuals, firms, organizations or any other definable social construct. The game, in this respect, is any social interaction.

Often the definition of institutions will include the provision that institutions are all rules or forms of conduct, which are devised with the intention of reducing uncertainty (as a consequence of imperfect information and limited rationality), controlling the environment/game and lowering transaction costs (Menard and Shirley, 2005).

Yet another, less succinct but equally important definition of institutions offers Ostrom (1990):

”Institutions” can be defined as the sets of working rules that are used to determine who is eligible to make decisions in some arena, what actions are allowed or constrained, what aggregation rules will be used, what procedures must be followed, what information must or must not be provided, and what payoffs will be assigned to individuals dependent on their actions

In Ostrom's definition, the concept of *arena* or *action arena* (Ostrom, 2005) is analogous to North's concept of a game.

We discuss 3 commonly known classifications of institutions: subject category, degree of formality and degree of embeddedness, and propose a new classification based on the institutional matrix (North, 1993, 2005a) and action arena (Ostrom, 2005). Regardless of the type of classification chosen, the groups of institutions are almost always intersecting, both within as well as between system of classification, which must be kept in mind, as it implies that there exists more ways than one to classify institutions, even within a chosen type of classification. This holds especially for the marginal institutions from the point of view of classifications, which have characteristics of more than one group, and can so be classified as belonging to one group, the other group or both.

In respect to subject category, we can classify institutions as being legal, political, social or economic institutions (Joskow, 2008), while it would be perfectly sensible to place the organizational institutions within firms (also called modes of governance) into a separate group. Legal institutions are the most omnipresent type of institutions, for some or other form of legislature can be found in practically any kind of, but most primitive or intimate, social interactions. They vary from public or state devised legal institutions, to private legal institutions, which are realized in contracts. Legal institutions are a large part of what is called formal institutions in the degree of formality classification. The range of issues where legal institutions are important is vast, some of more grave issues involve property right, the origins of legal systems and their effects, and enforcement of legal institutions. We can talk about political institutions at any time, when we discuss polity in a broad meaning, the voters, electoral rules, political parties and rules of and limits of a government or state. Social institutions are concepts such as norms, beliefs, trust, civic cooperation, coincide largely with informal institutions in the degree of formality classification. The literature on social institutions also examines and researches social capital and social networks. Market institutions are being intersected to a large extent by legal institutions and are institutions needed to secure the properly working market, such as legal system, enforcement of property rights, regulation, etc. Lastly, institutions within a firm or modes of governance are the micro, organizational type institutions, which rest directly on transaction costs concepts. The issues researched within this last group of institutions are what kind of types of organization (ranging from a free market to a perfectly integrated firm) are most appropriate.

Classification on the degree of formality is the simplest, as there are only two, largely distinct groups: formal and informal institutions. This classification follows directly from North's definition of institutions and is often used in general applications. Formal institutions are largely laws (statute or common law or a combination of both), regulations and any other rules to which people explicitly subscribe, while informal institutions are norms, conventions, codes of conduct, trust, etc. and are the rules which are not explicitly written down and are below the social surface. There is also an earlier similar distinction of institutions as being either constitutional rules (such as the constitution and basic legislation), operating rules (legislation) and behaviour rules (aimed at legitimizing the first two groups) (North, 1981). The first two groups can thus be considered as formal institutions, and the third as informal institutions.

The degree of embeddedness or Williamson's (Williamson, 2000) classification of institutions is one of the most interesting, as it is able to describe the interlinking nature between formal and informal

institution with the concept of embeddedness of institutions. In his classification, institutions are ordered in four levels, each level being more embedded. Because lower levels of institutions are more embedded, they change more slowly than higher levels of institutions. Level 1 institutions are mostly informal institutions such as customs, traditions, norms and religion. Less embedded are Level 2 institutions or institutional environment, defined as the formal institutions or formal rules of the game, especially property rights, polity, judiciary and bureaucracy. Level 3 are the institutions of governance, where governance structures are aligned with transactions, especially contracts with their transaction costs. Finally, Level 4 institutions present the rules that govern resource allocation and employment, that is using the neoclassical marginal principles to maximize certain objectives. Each higher level evolves more slowly than a lower level. The proposed frequency of change for the first level is from 100 to 1000 years, 10 to 100 years for the second and 1 to 10 years for the third. Changes at the fourth level can happen on a continuous basis. Additionally, since levels are embedded in each other, each institutional level is constrained by the immediately preceding higher (more embedded) level. There can be feedback from lower to higher levels as well, although the first constraining relationship is much stronger.

Apart from the suitability of theoretical classification for a chosen area of investigation, for any empirical application one must take into account the possibilities for conceptualization of chosen theoretical constructs. With that in mind we proceed with the subject category classification (Joskow, 2008) and concentrate on three relatively homogenous groups of institutions: legal, political and economic. The reason for excluding social and organisational institutions is that the institutions which could be grouped into the first or the second groups are still too heterogenous for the groups to be thought of as representing a set of homogenous underlying institutions. Additionally, for the first three formal subject groups the availability of indicators both across countries as well as time is much better than for the social and organisational institutions, for which there are few empirical proxies, and even fewer that are internationally comparable.

3 Institutional proxies and basic statistics

The important issue in empirical research is how to conceptualize the theoretical constructs. Institutions are latent factors within the economic system, and it is hard to find one proxy which would suitably represent the quality of the institutional environment, even when we disaggregate it on several fields. A composite indicator which combines the information of many empirical proxies is a better solution. It can be based on a simple average of more proxies or better yet, calculated as the latent factor with factor analysis, so that it truly represents the underlying intitutional dimension, which is shared between the institutional proxies.

After a review of the available empirical institutional indices, we compose a table of the ones that have the longest time coverage² and include most of the countries in the world. As an additional criteria, we give preference to the indicators with a proven track record in the literature. The list however is not exhaustive and is subjective, although the number of indicators used and the technique of extracting the latent institutional factor goes a long way to capturing the true underlying institutional quality, which is not dependent on only a couple of included or excluded institutional

²In the 2000s the availability of institutional proxies has increased dramatically. We do not however include the more recent indicators, as that would limit the sample to the same period.

proxies. We group the empirical proxies into three relatively homogenous groups of formal institutions: legal, political and economic, as showed in Table 1, which also includes the coverage and source of the indicator, while the name of the indicator itself represents what the indicator is capturing. Our database of institutional proxies is composed out of Table 1, and includes most countries in the world, 234 to be exact, but with various coverage. Most indicators are available on a yearly basis in the period from 1995 to 2008.

Table 1: Institutional proxies

Institutional group	Source	Code
Legal institutions		
Index of Economic Freedom: Property rights	The Heritage Foundation and The Wall Street Journal	L1
Freedom of the Press: Legal Environment*	Freedom House	L2
Freedom in the World: Civil Liberties: Rule of Law	Freedom House	L3
Freedom in the World: Civil Liberties*	Freedom House	L3sum
EFW Index: Legal Structure and Security of Property Rights: Judicial independence	Fraser Institute	L4
EFW Index: Legal Structure and Security of Property Rights: Impartial courts	Fraser Institute	L5
EFW Index: Legal Structure and Security of Property Rights: Protection of property rights	Fraser Institute	L6
EFW Index: Legal Structure and Security of Property Rights: Military interference in rule of law and the political process	Fraser Institute	L7
EFW Index: Legal Structure and Security of Property Rights: Integrity of the legal system	Fraser Institute	L8
EFW Index: Legal Structure and Security of Property Rights: Legal enforcement of contracts	Fraser Institute	L9
Law and order	ICRG	L10
Rule of Law	WB World Governance Indicators	L11
Political institutions		
Freedom of the Press: Political Environment*	Freedom House	P1
Freedom in the World: Political Rights: Electoral Process	Freedom House	P2
Freedom in the World: Political Rights: Political Pluralism and Participation	Freedom House	P3
Freedom in the World: Political Rights: Functioning of Government	Freedom House	P4
Freedom in the World: Political Rights*	Freedom House	P2P3P4
Institutionalized Democracy - Institutionalized Autocracy	Polity IV	P5
Checks and balances	World Bank DPI	P6
Democratic accountability	ICRG	P7
Corruption	ICRG	P8
Bureaucratic quality	ICRG	P9
Control of Corruption	WB World Governance Indicators	P10
Corruption perceptions index	Transparency international	P11
Political terror scale*	Political terror scale	P12
Economic institutions		
Index of Economic Freedom: Financial Freedom	The Heritage Foundation and The Wall Street Journal	E1
Index of Economic Freedom: Freedom from Corruption	The Heritage Foundation and The Wall Street Journal	E2
Regulatory Quality	WB World Governance Indicators	E3
Freedom of the Press: Economic Environment*	Freedom House	E4
EFW Index: Regulation of Credit, Labor, and Business: Credit market regulations	Fraser Institute	E5
EFW Index: Regulation of Credit, Labor, and Business: Labor market regulations	Fraser Institute	E6
EFW Index: Regulation of Credit, Labor, and Business: Business Regulations	Fraser Institute	E7
Business freedom	The Heritage Foundation and The Wall Street Journal	E8

* Scale is inverse, a higher number implies lower quality.

Some exceptions in availability of institutional indicators as well as summary statistics for each of the three institutional groups are reported in Appendix A in Tables 1, 2 and 3. The tables show the number of observations for the entire period, average value, the variability, maximum and minimum and percentiles values of 10th, 50th and 90th percentile. Additionally, for the average values, the 10th and 90th percentile, an example of the country closest to that value is shown. These examples of countries imply that the countries with better institutions in all institutional group tend to be more developed economically, politically and socially. The fact that exceptions to this general tendency can be found is a warning that using just one of the indicators as a proxy for the wider institutional environment can be misleading.

Looking at the the world as a whole, we can depict how the institutional quality has been changing, mainly in two ways: the first is the absolute quality of indicators, averaged out to a single measure of institutional quality , and the second is the evolution of the dispersion of institutional quality (an institutional inequality measure). If we take a random person in the world each year, is this person living in a better or a worse institutional environment, and one that is more, or less dispersed?

We take all available indicators and express each country value as a share of the maximum³, then compute a country average for every institutional group⁴ and finally average that out on the world level, using population sizes as weights, and finally multiplying the result by the number of countries to get to the same scale. This yields three average weighted institutional values for the world each year, expressed as a share of the maximal value, which can be plotted and used to calculate dispersion. We concentrate on the period from 1995 to 2008, where most indicators are available. Graphing these values in Figure 1 reveals some worrying trends. All the world institutional values linger between 50% and 60% of the maximal value, with no discernable trend for the quality of political institutions, but with an evident negative trend in the quality of legal and economic institutions. A person chosen at random from the world in 1995, in comparison to his or her counterpart in 2008, clearly enjoyed a better institutional environment, with more legal rights and economic freedom. This is not consequence of population weighted aggregation (it does increase the changes though).

Dispersion in world institutional quality concentrates on countries and uses the same indicators as before, but not weighing the world average by population. It also shows clear trends. For each institutional group, we calculate the evolution of standard deviation, GINI inequality coefficient and the 80/20 institutional ratio. All three measures of dispersion agree on the trends. The institutional GINI inequality coefficient is plotted in Figure 2 for the period of best data availability for all three institutional groups, where a higher value implies more institutional inequality (less dispersion), and a lower less institutional inequality (more dispersion). The graph reveals interesting facts. Namely, the steepest slope can be found in the dispersion of legal institutional quality, which seems to be decreasing in the world, dropping from around 0.25 to 0.2. This could be good news for developing countries, if this would be a consequence of their quicker progression. In light of the absolute quality of legal institutions in the world falling, however, this seems unlikely. Political institutional quality dispersion remains reasonably constant throughout the period, with a slight negative linear trend. In terms of the dispersion of economic institutional quality, surprisingly, we can see an increasing slope. The economic quality trend implies that the quality of economic institutions is diverging in the world, and since the absolute quality of economic institutions is falling in that period, this implies that the well governed countries are most likely not improving their economic institutions, while the ones that started with worse economic institutions, have even managed to worsen them.

We proceed with another application of all the institutional indicators, which is also the cross-sectional start of comparative institutional analysis in Section 4. The important thing is to use all

³For indicators with an inverse scale, the scale is firstly adjusted.

⁴Which reduces possible biases in individual indicators on a country level. Additionally, since we are computing a simple weighted average, it is increasingly important to rely on as many possible indicators as possible, not to get a biased result.

Figure 1: Institutional quality of the world

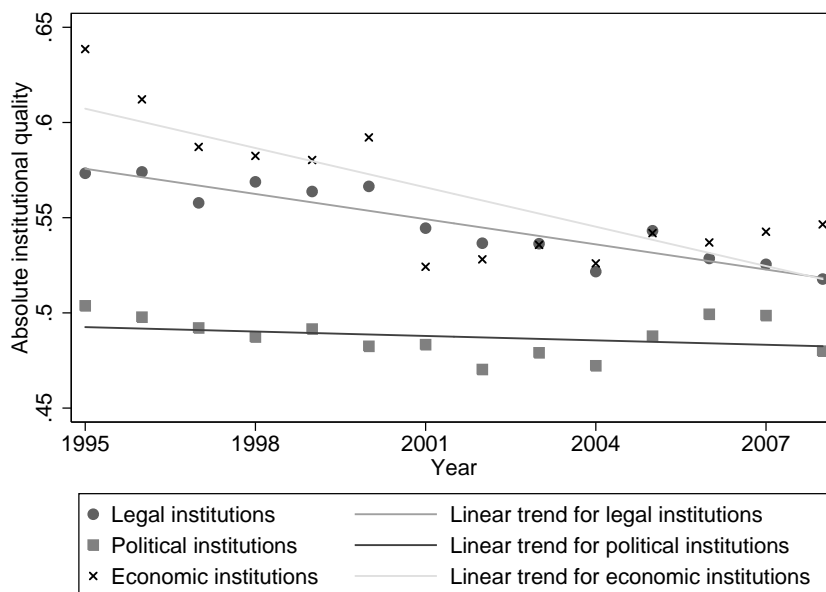
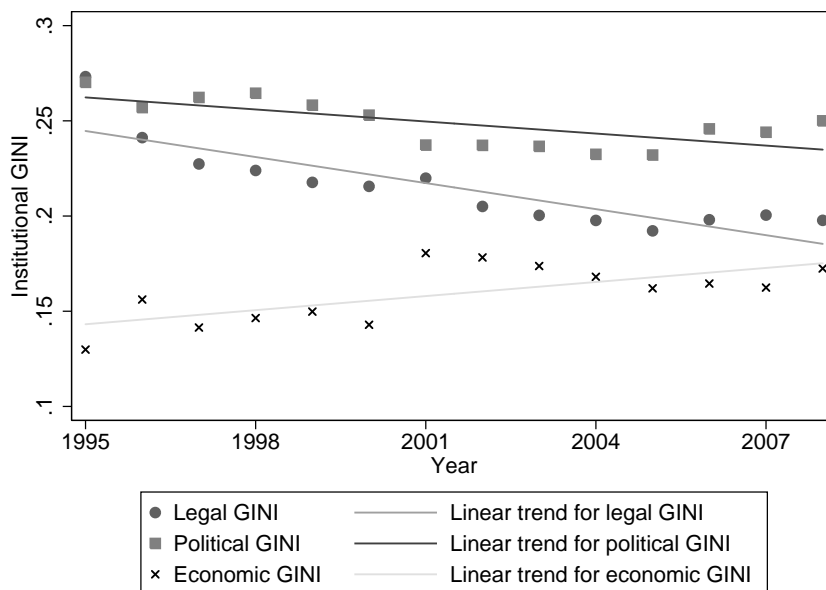


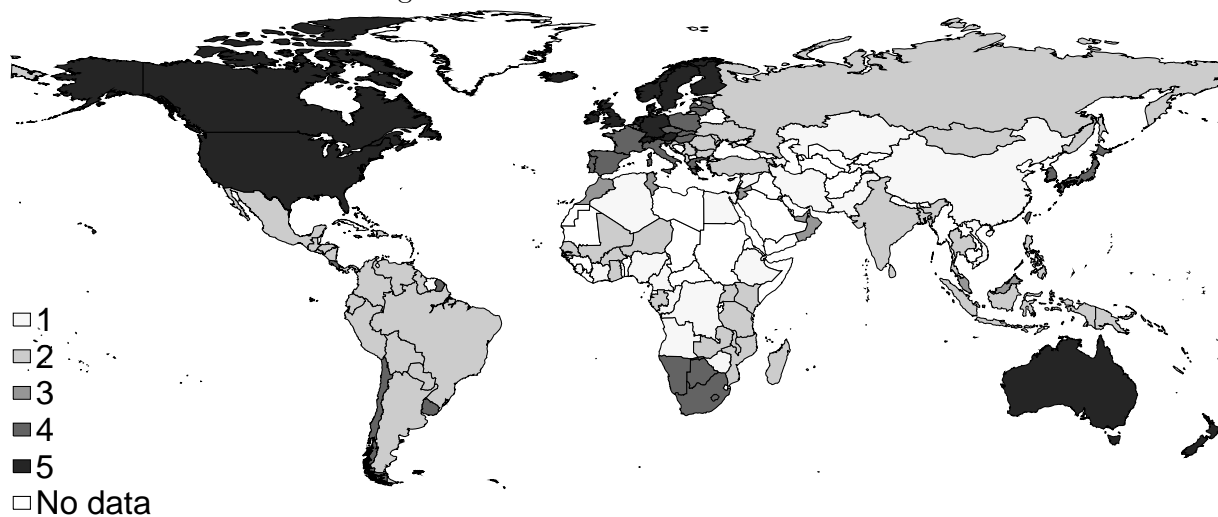
Figure 2: Institutional dispersion in the world



the available information in the institutional proxies. In cluster analysis we condense this information to one time period, to get an overview of how similar countries are. Cluster analysis allows us to cluster similar countries in terms of institutions together and forms homogenous groups. We use hierarchical clustering with Euclidean metric and Ward's error sum of squares method. We take the average of institutional proxies in the entire period, which yields 108 countries with values for

all institutional proxies.⁵ Additionally, we use a variant of the nearest neighbour matching⁶ on all institutional proxies within each group to determine which countries are closest to each country, and then substitute the missing values of countries which are missing less than one third of their institutional proxies within each group with the average of the value of the two closest neighbors. This leaves us with 122 countries on which we continue the cluster analysis. The dendrogram in Figure 8 in Appendix B, where the length of vertical lines shows dissimilarity between groups, implies a clustering solution into two large groups of countries, or more interestingly, into five smaller groups, which are also shown on a world map in Figure 3.

Figure 3: New institutional world order



To be able to see the quality of institutional proxies within each group, Table 4, 5 and 6 in Appendix B show the average values for each proxy and each cluster for legal, political and economic institutions, respectively. Along with cluster numbers, we also name the clusters. Cluster 1 is really bad, as it scores consistently around one standard deviation below the average in all three institutional groups. In contrast, cluster 5 is doing extremely well, as it scores consistently one or more standard deviations above the average. Cluster 4 is also good, with having most of the institutional proxies well above the average. The two more interesting clusters are clusters 2 and 3. In terms of the legal environment, cluster 2 scores poorly, while cluster 3 scores quite well, with a considerably lower than average score on two indicators, which denote civil and press oppression. In terms of the political environment, cluster 2 does not have excessively bad scores, but is very corrupt, while cluster 3 scores implies relatively worse political institutions but without corruption. Finally, in terms of economic freedom, cluster 2 is bad, with scores significantly below the average, while cluster 3 is good, with the same exception as before, that is the oppression of the press.

⁵L3, P2, P3, and P4 are not used since they are only available since 2006, instead L3sum and P2P3P4 are used. Also, only countries with the average proxy values available for most of the proxies are included in the analysis.

⁶For every unit, we calculate the distance from all the other units within each institutional group and using standardized variables, which allows us to aggregate distances on every dimension - variable and determine the distances of each unit to all the other units and thus also the closest neighbours.

Table 2 lists the countries belonging to each of the clusters and Table 3 shows average GDP per capita, literacy rate and life expectancy for each cluster. The tables reveal that the 20 countries in cluster 1 are really not very desirable places to live, as they have an average GDP pc of only 800 USD, a life expectancy of less than 60 years and a literacy rate of less than 70%. All in all, they are undeveloped, poor, and sometimes even politically unstable, and coincide well with Paul Collier’s bottom billion countries (Collier, 2007). The 16 countries in cluster 5 are the complete opposite and are the so called developed world, with a high incomes, life expectancy and almost perfect literacy rate. Those are in fact the places to live well and prosper. The largest group of countries is clustered into cluster 2, where we can find 48 countries. Their average income is still very low, but twice the one of cluster 1, and they have a significantly higher life expectancy. Institutionally however, they are not doing that well, especially corruption wise. Their counterpart would be cluster 4, which prevalently consists of reasonably developed countries with also some very developed countries, but the average GDP per capita is thus appropriately lower. The most mixed group is cluster 3, where there are only nine countries. What makes them similar outside of the variables in question is the fact that they are the countries with a majority muslim religion. In terms of their average GDP per capita and life expectancy, they are at par with cluster 4. However, lower literacy rate and the quality of their institutions imply these countries tend to oppress certain groups in their populations. It seems that countries in cluster 3 seem to be reasonably good places to live, if one does not crave for certain civil liberties (which might depend also on gender and religion) and does not have a tendency to run a free media.

Returning to the world map in Figure 3, the quality of institutional environment data of the last 20 years seems to be telling us that if we are looking for a place to move, it looks like a good idea to look at North America, Australia, Europe or Japan, but also some countries in the very south of Africa or west of South America. The other extreme and high on our *not to move there* list, are countries in Central America, Asia and most of South America and Africa.

4 Building up the database and applications

We proceed with a description of database construction and some applications in terms of comparative institutional analysis of all the countries in the world, which is based on results of confirmatory factor analysis. Factor analysis allows us to calculate the latent underlying factor in each institutional group, which represents what the institutional proxies have in common within each group. It enables us to arrive at three country level institutional quality variables: legal, political and economic, which form the heart of our institutional database and can then be used also in other economic applications. In this section, we also show the usefulness of our calculated institutional quality measures by showing institutional rankings of countries and display changes in country institutional rankings throughout the period.

There are two options for cluster analysis, we could either calculate the latent factors within each institutional group for every country separately throughout the observed period (intra country), or for every year separately for all the countries (inter country). Due to having more data for each factor analysis when taking the second route, we proceed with the inter country factor analysis, one for every viable year in the sample. Intra country factor analysis is not optimal due to a poor intersection of institutional indicators, so we rather use the simple averages of adjusted institu-

Table 2: Cluster memberships (number of countries)

1 - Really bad (20)	2 - Corrupt (48)		3 - Bad but not corrupt (9)		4 - Good (28)		5 - Great (16)
Egypt	Mongolia	Brazil	Guatemala	Malaysia	The Bahamas	Chile	United Kingdom
Zimbabwe	The Philippines	Madagascar	Bangladesh	Oman	Hungary	Greece	Iceland
Syria	Peru	Nicaragua	Thailand	Tunisia	Slovakia	Belgium	Switzerland
Haiti	Argentina	Guyana	Bolivia	United Arab Emirates	Cyprus (Greek)	Portugal	Canada
Viet Nam	Panama	Uganda	Zambia	Kuwait	Costa Rica	Czech Republic	Luxembourg
Nigeria	Armenia	Tanzania	El Salvador	Jordan	South Africa	Malta	The Netherlands
Algeria	Moldova	Honduras	Senegal	Morocco	South Korea	Israel	New Zealand
Ethiopia	Malawi	India	Croatia	Bahrain	Namibia	Spain	Finland
Sierra Leone	Mexico	Papua New Guinea		Singapore	Estonia	France	Ireland
Congo, Dem. Rep.	Mozambique	Indonesia			Taiwan		Denmark
Cameroon	Ecuador	Paraguay			Botswana		United States
Iran, Islamic Republic of	Romania	Turkey			Trinidad and Tobago		Australia
Pakistan	Russia	Mali			Latvia		Austria
Azerbaijan	Serbia	Burkina Faso			Italy		Norway
China (PRC)	Ghana	GuineaBissau			Uruguay		Germany
Cote d'Ivoire	Colombia	Venezuela			Poland		Sweden
Angola	Bulgaria	Gabon			Jamaica		
Togo	Ukraine	Albania			Slovenia		
Kazakhstan	Sri Lanka	Dominican Republic			Lithuania		
Republic of The Congo (Brazzaville)	Kenya	Niger			Japan		

Table 3: Some basic statistics for clustered countries

	1 - Really bad (20)	2 - Corrupt (48)	3 - Bad but not corrupt (9)	4 - Good (28)	5 - Great (16)
GDP pc	811.63	1652.19	10918.01	10121.23	27060.28
Adult Total Literacy	68.06	77.61	83.38	94.19	99.00*
Total Life expectancy	58.50	63.89	73.07	73.21	78.18

Notes: All values from WB WDI, values are averages for the sample 1990 - 2010.

* denotes value from UNDP report 2009. GDP per capita in constant 2000 USD.

tional indicators within every group for within country institutional dynamics at the end of this part. Since with inter country factor analysis missing only one value of any indicator within an institutional group would exclude a country in a given year from the analysis, we modify the raw data with some additional values, as with cluster analysis. Firstly we standardize the variables across countries for each year and then use a variant of the nearest neighbour matching within each institutional group and for each year to determine the countries closest to each country, and then substitute the missing values of countries which are missing less than one third of their institutional proxies within each group and year with the average of the value of the two closest neighbors.

Due to unavailability of disaggregated values, we use L3sum instead of L3 and P2P3P4 instead of P2, P3, P4 until 2006. We only start the factor analysis when three or more empirical proxies are available, which means 1993 with legal, 1990 with political and 1995 with economic institutions. The factor equation, which breaks the total variance of each institutional indicator on the variance of the common latent factor - communality, and indicator specific variance, is estimated in two steps. Firstly, we estimate the communalities with the principal factor method, which is most appropriate for smaller samples. Next, since we are searching for only one latent factor within each institutional group and thus are not constrained with within factor correlations, we use the orthogonal rotation with Varimax method, which is the most appropriate when we want to explain every indicator with one or a minimal number of factors. Factor analysis is very suitable for our purposes, as allows us to test the hypothesis that each of the institutional groups is homogenous and can be explained by only one latent factor. This implies the eigenvalue of first factor in each group should greatly exceed the eigenvalues of other factors (also, the Kaiser criterion suggests keeping only factors with eigenvalues of greater than one). Putting it differently, the variance of each indicator within each group, should be explained well with only one latent factor, if all the indicators in fact point to the same underlying latent institutional quality. Additionally, the rule of thumb tells us that every good indicator for the latent factor should have a communality of 0.2 or more (a lower communality implies the indicator is capturing something else than the others), which allows us to test the strength and usefulness of indicators within each group.

The Online Statistical Appendix to this paper shows the yearly factor analysis statistics for legal, political and economic indicators, as well as an example of factor loadings for the year 2000. The statistics imply that we are right in our assumption that each of the three groups are in fact homogenous, as the eigenvalue of the first latent factor is always much higher than the eigenvalue of the second factor. Additionally, the majority of the variance of indicators is explained with the first latent factor, leading us to believe that the first factor is performing well in capturing the latent quality of legal, political and economic environment, respectively. With the exception of three instances in the group of economic indicators, there are no weak indicators, implying in general that the indicators chosen do in fact capture the same underlying factors. The factor loadings, that is Pearson correlations of each indicator with the latent factor, imply that the first factor is always highly correlated with the indicators within each institutional group, and moreover, that the indicators with the inverse scale load the factor negatively, which implies that the latent factors do in fact represent the quality of underlying institutional environment monotonically, a higher value of the latent factor thus always implies a better quality of the institutional environment.

The most useful result of the factor analysis are the standardized factor scores, which are generated within each institutional group and year for all the available countries. These values are directly

comparable across countries and thus can be used in any international economics application. The yearly coverage with these new measures of institutional quality span for 17 years for legal, 21 years for political and 16 years for economic institutions. Wanting to control for all formal institutional quality dimensions in a panel, for instance, leaves us with a 15 year time period and a coverage from 73 to 151 countries, which is a reasonable amount of data. Although the institutional factor scores are correlated with each other, as follows from Table 4, the remaining factor specific variance implies that they nevertheless capture different dimensions of the institutional environment. They also correlate highly with GDP per capital (in 2000 USD), with the strength of correlation in the order of legal, political and economic factor. The calculated latent institutional quality variables can easily be used in panel data international economics application.

Table 4: Correlations

	Legal FS	Political FS	Economic FS	GDPpc
Legal FS	1			
Political FS	0.854	1		
Economic FS	0.893	0.815	1	
GDPpc	0.790	0.688	0.751	1

The relative institutional quality variables - standardized factor scores, not surprisingly also correlate strongly with existing institutional quality measures. In Appendix C, Table 7 shows the pairwise correlations between our relative institutional quality measures, the Institutional climate index and the World governance indicators. In the entire sample, all correlations are strongly significant and positive, implying a common ground to all institutional quality variables, but at the same time clearly reveal that some variation is specific to our calculated relative institutional quality variables.

The quality of institutional environment by country and institutional group can best be presented as a ranking of factor scores for all countries and years, which we call *World institutional quality ranking - WIQR*. This rankings for legal, political and economic institutions can simply be constructed for every year of the sample. Additionally, for every country, the ranking in each year for each institutional group can be presented on a graph, which shows how the country is progressing, in terms of institutional quality, relative to all the other countries in the world. Place on the WIQR for USA, Germany and Turkey can be seen in Figure 4 for legal institutions, in Figure 5 for political institutions and in Figure 6 for economic institutions. A negative trend indicates that a country is improving the quality of a given set of institutions through time, relative to the others (climbing the institutional quality ladder), while a positive trend implies a country is loosing its institutional competitiveness. The graphs imply that in terms of relative quality of legal environment, Germany has been increasing it, overtaking USA in 2002, which has been loosing on the legal front slightly. Turkey, although at a different level, shows fastest improvements. In terms of relative quality of political environment, Germany has been keeping its place throughout the sample, USA shows slight regression, while Turkey, starting from an already bad position, managed to go even further down the line, loosing on the quality of political environment considerably. Finally, in terms of the relative quality of economic environment, Germany has again been sustaining its position, again overtaking USA in 2000, which is regressing slightly. Turkey is showing signs of improvements in its relative quality of economic institutions, although starting from a much worse position than the other two.

Figure 4: Place on legal WIQR

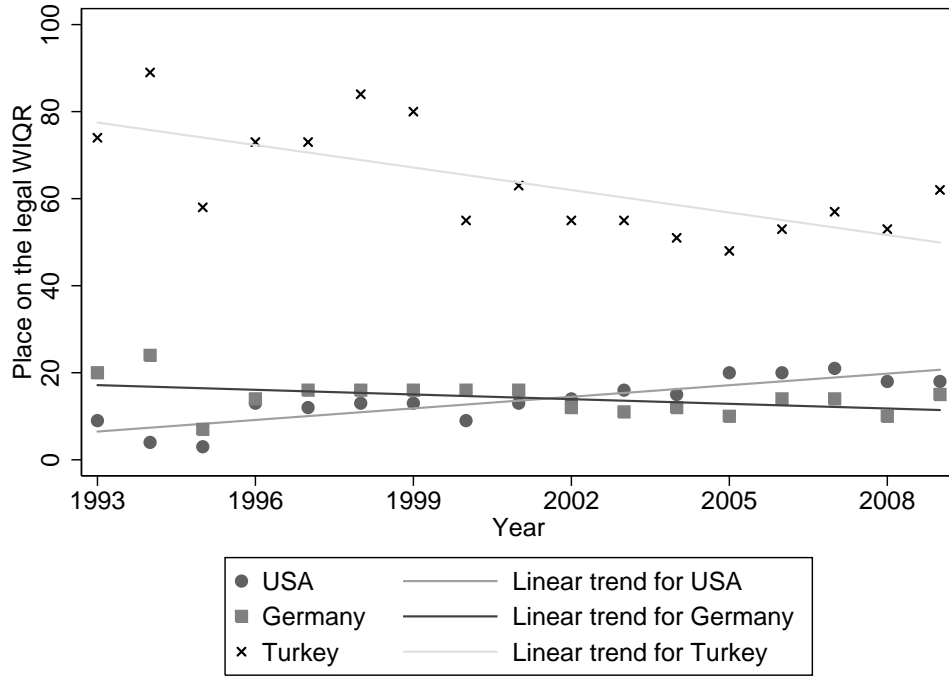


Figure 5: Place on political WIQR

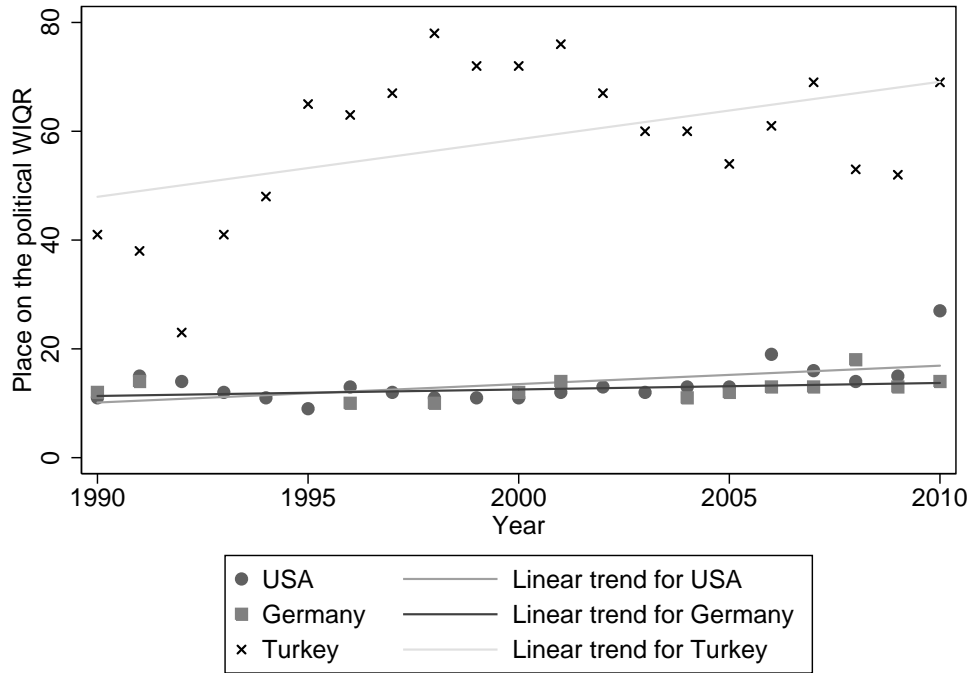
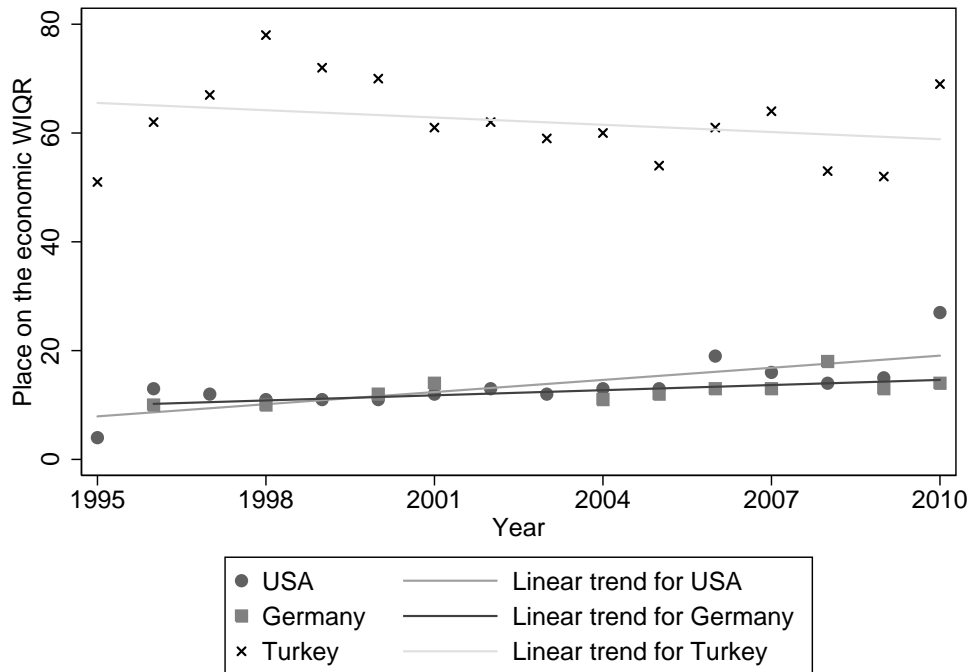
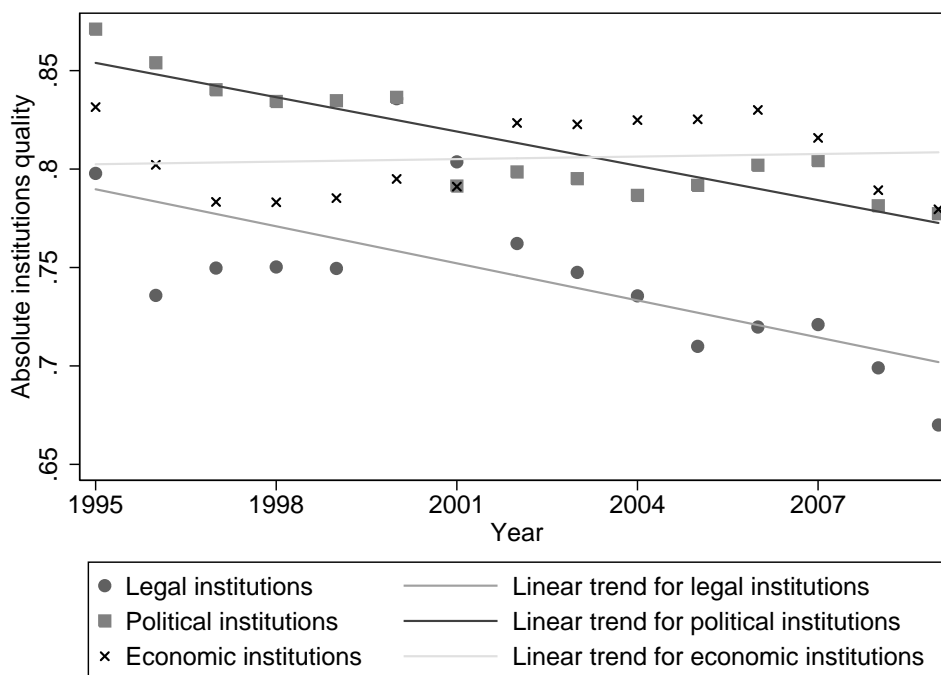


Figure 6: Place on economic WIQR



When interested only in the within country dynamics, the data regrettably does not facilitate factor analysis. Thus the simple averages of institutional indicators within each group, expressed as a share of the maximal value as in Section 3 of this paper, can be used. Looking at the relative institutional dynamics of any country in the world, say USA depicted in the graphs, the question remains whether USA is digressing on its institutional fronts only relative to other countries in the world, that is to say other countries are improving their institutional quality faster than USA, or also in absolute terms. Digressing in absolute terms would imply that the absolute quality of institutions is digressing within the country. A graph of within USA institutional dynamics for the period when all three institutional absolute quality values are available is shown in Figure 7. The graph firstly implies, as have the relative rankings, that the USA is very high up the quality ladder with institutions. Secondly, it also reveals that the absolute quality of economic institutions does not show a clear trend, while both legal and political institutional quality seems to be deteriorating.

Figure 7: Absolute quality of institutions



Moreover, we can see who the winners and losers are in terms of institutional dynamics, by comparing country specific institutional linear trends in all three WIQR. Bottom five countries with worst dynamics and top five countries with best dynamics are shown in Table 5 for each institutional group.⁷ The countries that made the highest strides in terms of the improvements in their relative institutional qualities are the countries that started quite low with the absolute quality of their institutions in the beginning of 1990s. The progression is quite remarkable, looking for instance at Croatia reveals that the country took over 22, 44 and 44 countries in the quality of legal, political and economic institutions, respectively. On the other extremes are countries which worsened their institutional systems relative to others. Venezuela, for instance, was in the period beaten by 72, 96 and 78 countries in the quality of legal, political and economic institutions, respectively.

Table 5: Trend changes in WIQR

Best dynamics		Worst dynamics			
N	Trend	N	Trend		
Legal institutions					
Singapore	17	-3.154	Venezuela	17	5.495
Tunisia	16	-3.096	Bolivia	17	5.267
Bahrain	14	-3	Ecuador	17	5.071
Oman	13	-2.873	Argentina	17	5.061
Vietnam	13	-2.299	Paraguay	17	4.978
Political institutions					
Croatia	13	-2.368	Russia	18	5.027
Ghana	20	-2.256	Venezuela	18	4.897
Serbia	11	-2.255	Zimbabwe	21	4.89
Indonesia	21	-2.131	Cote d'Ivoire	20	4.26
Liberia	19	-1.588	Armenia	13	4.214
Economic institutions					
Croatia	13	-2.39	Thailand	16	5.871
Ghana	14	-2.385	Venezuela	13	5.407
Indonesia	16	-2.037	Russia	16	4.941
Peru	15	-1.864	Zimbabwe	16	4.896
Niger	11	-1.268	Cote d'Ivoire	11	4.692

The availability of the calculated relative institutional quality values as well as the simple within country absolute institutional quality averages, is shown in Table 6. This data is freely available on the author's webpage, as the relative institutional quality values are especially useful in panel data cross country applications. The data set includes the world bank iso3 country codes, country names and years, the three relative institutional quality measures (which go approx. from -2 to 2 with a mean 0), the adjunct World Institutional Quality Rankings for all three sets of institutions, the three absolute quality of institutions measures (which are transformed to the interval from 0 to 1) and countries' cluster memberships (where the countries with missing data do not get a cluster membership, as they were not included in the cluster analysis), as presented in this paper.

Also, since the database has been constructed out of many sources, using several statistical aggregation procedures, the choice when deciding for a criteria for an inclusion of some calculated statistic was always between the inclusion of more values and risk of higher volatility and outliers on one side, or less data and a more stable data series, but also much poorer in terms of time and country coverage, on the other. The decision was predominantly in favor of the first one, which also implies outliers are bound to occur in the database.⁸ These statistical artifacts should thus be discounted, when discovered.

⁷Examining only the countries with 10 or more observations.

⁸This holds especially for the start and end of the data series of measures of absolute quality of institutions, and the year 1995 for measures of relative quality of institutions.

Table 6: Coverage of the database

	Relative institutional quality values		Absolute institutional quality values	
	From	To	From	To
Legal institutions	1993	2009	1995	2008
Political institutions	1990	2010	1990	2009
Economic institutions	1995	2010	1995	2008

Notes: Year noted included in the sample.

5 Conclusion

The aim of this paper is to firstly define and discuss different classification systems of institutions, and then to bring an appropriate institutional classification system to the data and compose a database of underlying institutional quality for every country in the world and for a longer time period. We collect more than thirty institutional indicators widely used in the literature that have a reasonable time span and coverage, and use the institutional classification based on subject category to group them into three sets of formal institutions: legal, political and economic. We then proceed with some basic data applications, such as looking at the institutional quality of the world as a whole and with clustering based on institutional quality. Finally, we determine the true underlying institutional qualities for legal, political and economic institutions with factor analysis and show how the results can be used for inter country comparisons.

When we examine the world as a whole, we can say that a person chosen at random from the world in 1995, in comparison to his counterpart in 2008, clearly enjoyed a better institutional environment, with more legal rights and economic freedom. In terms of the variance of institutional quality in the countries of the world, we can see that there is convergence in terms of legal institutions, but divergence in terms of political institutions. Looking at how countries cluster together in terms of institutional quality reveals that countries can be clustered into five clusters, which roughly correspond with levels of development. The most developed countries in terms of income, longevity and literacy are also ahead in the quality of all three sets of institutions. The second most developed group follows both in terms of development and quality of institutions. The following two clusters are more mixed. One is composed of exclusively muslim countries, which have reasonably good economic and legal institutions and bad political institutions, with signs of oppression of the press and some other groups in the society, but, interestingly enough, does not suffer from corruption. The other is reasonably bad on all three institutional fronts, with a mixed result in the political institutions group, as political institutions are not generally bad as with the former muslim cluster, but are excessively corrupt. The last cluster of countries are the least developed countries of the world, facing the failed or failing state problem at one point or another. They coincide reasonably well with the Paul Collier's bottom billion countries.

Turning from a snapshot picture of the world to how the quality of institutional environment changes in time on a country level, we employ factor analysis, where we search for a common latent dimension within each institutional group and each year. Firstly, the factor analysis confirms that our three groups of institutional indicators are very homogenous within, as the first latent factor within each group of institutions captures the large majority of the total variance. Secondly, the empirical indicators chosen perform well and share a reasonable amount of variance in each year within each institutional group. Within each institutional group, we calculate the latent factor scores for every country in the world and each year, which capture the relative institutional quality.

Although the legal, political and economic latent institutional qualities are correlated, they vary enough to capture three different dimensions of formal institutional environment. All the countries are ranked on all of the three institutional quality measures in every year, yielding a set of rankings we call *World institutional quality rankings - WIQR*. WIQR for legal, economic and political institutions shows the relative competitiveness of every country in the world and every year, in terms of the quality of the underlying institutional environment. As a demonstration, we track the evolution of ranking on all three WIQR scales for United States, Germany and Turkey, and display the use of calculated latent institutional variables. Lastly, using a simple average of institutional indicators within each group, we also calculate the within country, absolute values for the quality of legal, political and economic institutions. This allows us to track the dynamics of a country firstly relative to other countries in the world, and then also in absolute terms. A country digressing in terms of institutional quality relative to other countries might simply be progressing slower than others in absolute terms, or, it might also be digressing in absolute terms, which can be checked with the comparison of relative and absolute institutional qualities.

In terms of panel applications of calculated relative quality of institutions variables, values for all three institutional groups at the same time are available in a 15 year time period and a cover from 73 to 151 countries, which is a reasonable amount of data. The calculated latent institutional quality variables can easily be used in panel data international economics application when formal institutions should be controlled for, thus the data is publicly available at the author's website <http://sites.google.com/site/aljazzkuncic/>. The dataset also includes the yearly place on the WIQR for each country, absolute quality of institutions indicators, more appropriate for tracing institutional quality changes within a country, and also countries' cluster memberships.

There are several interesting ways forward from here in terms of research. The institutional variables can be used in various comparative institutional analysis settings, as well as other studies where institutions matter. Given the design of the database, the results are most appropriate for international economics application.

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A Data

Economic freedom of the World indicators have been produced on a yearly basis from 2000 onwards, while before, they were computed on a 5 year basis. Instead of imputing the values for the period from 1996-1999, we opt for having an unbalanced panel. With the Freedom of the Press indicators from the Freedom House, the problem is that we have a significant break in the series due to a changed methodology from 1995 to 1996 and from 2000 to 2001. This does not represent a problem in cross country comparison, since the same break is present for all the countries, but caution is needed when dealing with possible within country estimations using this data. With the Rule of Law from WB DPI, the missing years (1997, 1999 and 2001) are imputed as the average values of the year before and after. We only have access to ICRG indicators up to and including 2007. Civil Liberties index from the Freedom House is only available in disaggregate form from 2006 onwards, so before we include the summary index L3sum (Rule of Law, Freedom of Expression and Belief, Associational and Organizational Rights, Personal Autonomy and Individual Rights). Similarly holds with Political Rights indicator, also from Freedom House. The disaggregated data is only available from 2006 onwards, so we also include the summary index P2P3P4 (Electoral Process, Political Pluralism and Participation, Functioning of Government). In all cases of Serbia and its adjoined states from 1990 - 2010, the country code assigned to the entity (which varied geographically) is Serbia, since it was the dominant country in the entity throughout the period. The yearly available observations of all institutional proxies are available in the Online statistical appendix of the paper Kuncic (2012). Summary statistics for all legal, political and economic institutional proxies are shown in Tables 1, 2 and 3, respectively.

Table 1: Summary statistics for legal institutions proxies

	N	mean	sd	min	max	p10	p50	p90	mean, example	p10, example	p90, example
L1	2473	49.49	23.94	5.00	95.00	25.00	50.00	90.00	Slovakia	Guinea	Switzerland
L2*	2849	10.17	7.79	0.00	30.00	2.00	8.00	23.00	Egypt	Latvia	Syria
L3	974	8.61	4.75	0.00	16.00	2.00	8.00	15.00	Panama	Laos	Germany
L3sum*	3830	3.48	1.86	1.00	7.00	1.00	3.00	6.00	Ecuador	Canada	Laos
L4	1002	5.18	2.35	0.17	9.82	2.10	5.02	8.48	Poland	Bolivia	Iceland
L5	1310	4.94	1.94	0.00	9.69	2.67	4.64	7.90	Sri Lanka	Ecuador	France
L6	1019	5.47	2.03	0.91	9.61	2.83	5.28	8.41	Hungary	Dominican Republic	UK
L7	1303	6.61	2.81	0.00	10.03	2.80	6.67	10.00	Brazil	Nigeria	Finland
L8	1209	6.34	2.35	0.00	10.00	3.33	6.67	10.00	India	Cameroon	Austria
L9	942	4.56	1.85	0.00	10.00	2.21	4.59	7.13	Guyana	Panama	Iceland
L10	2427	3.82	1.45	0.00	6.00	2.00	4.00	6.00	Turkey	Liberia	Italy
L11	2779	-0.04	1.00	-2.69	1.96	-1.26	-0.19	1.43	Ghana	Myanmar	Spain

Notes: Examples of countries from the year 2000 (2006 for L3, L9). * implies an inverse scale.

Table 2: Summary statistics for political institutions proxies

	N	mean	sd	min	max	p10	p50	p90	mean, example	p10, example	p90, example
P1*	2853	12.48	9.15	0.00	40.00	3.00	10.00	27.00	Gambia	Lithuania	Kenya
P2	974	7.68	4.32	0.00	12.00	1.00	9.00	12.00	Benin	Pakistan	Cyprus
P3	974	10.07	5.16	0.00	16.00	2.00	11.00	16.00	Malawi	Algeria	Israel
P4	974	6.55	3.68	0.00	12.00	1.00	7.00	12.00	Sri Lanka	Iraq	Slovenia
P2P3P4*	3814	3.50	2.20	1.00	7.00	1.00	3.00	7.00	Georgia	Bulgaria	Bahrain
P5	3141	2.74	6.76	-10.00	10.00	-7.00	6.00	10.00	Iran	Eritrea	Taiwan
P6	3487	2.82	1.73	1.00	18.00	1.00	3.00	5.00	Botswana	Honduras	Australia
P7	2427	3.76	1.69	0.00	6.00	1.04	4.00	6.00	Papua New Guinea	Hong Kong	Mexico
P8	2427	3.01	1.33	0.00	6.00	1.50	3.00	5.00	Jordan	Indonesia	Hungary
P9	2427	2.18	1.17	0.00	4.00	1.00	2.00	4.00	Turkey	Bolivia	Sweden
P10	2737	-0.02	1.00	-2.49	2.47	-1.12	-0.25	1.41	Samoa	Comoros	Spain
P11	1930	4.35	2.28	0.40	10.00	2.10	3.50	8.42	Czech Republic	Mozambique	Germany
P12*	3654	2.49	1.14	1.00	5.00	1.00	2.50	4.00	Cambodia	Poland	Rwanda

Notes: Examples of countries from the year 2000 (2006 for P2, P3, P4). * implies an inverse scale.

Table 3: Summary statistics for economic institutions proxies

	N	mean	sd	min	max	p10	p50	p90	mean, example	p10, example	p90, example
E1	2470	50.74	20.25	10.00	90.00	30.00	50.00	70.00	Peru	Yemen	Ireland
E2	2474	40.30	23.86	4.00	100.00	10.00	32.00	79.00	Malawi	Haiti	Germany
E3	2747	-0.02	1.00	-2.84	3.35	-1.28	-0.10	1.35	Belize	Tajikistan	Chile
E4*	2853	9.61	6.75	0.00	30.00	2.50	7.50	21.00	Sudan	Denmark	Libya
E5	1313	7.71	1.62	0.48	10.01	5.50	8.00	9.50	Mauritius	Niger	Denmark
E6	1127	6.00	1.50	2.34	9.46	3.99	5.98	7.95	India	Egypt	Hong Kong
E7	1072	5.75	1.16	2.64	9.44	4.34	5.70	7.34	Latvia	Honduras	France
E8	2469	64.14	15.27	10.00	100.00	42.20	65.60	85.00	Fiji	Chad	Japan

Notes: Examples of countries from the year 2000. * implies an inverse scale.

B Dendrogram and standardized cluster values

Figure 8: Cluster analysis

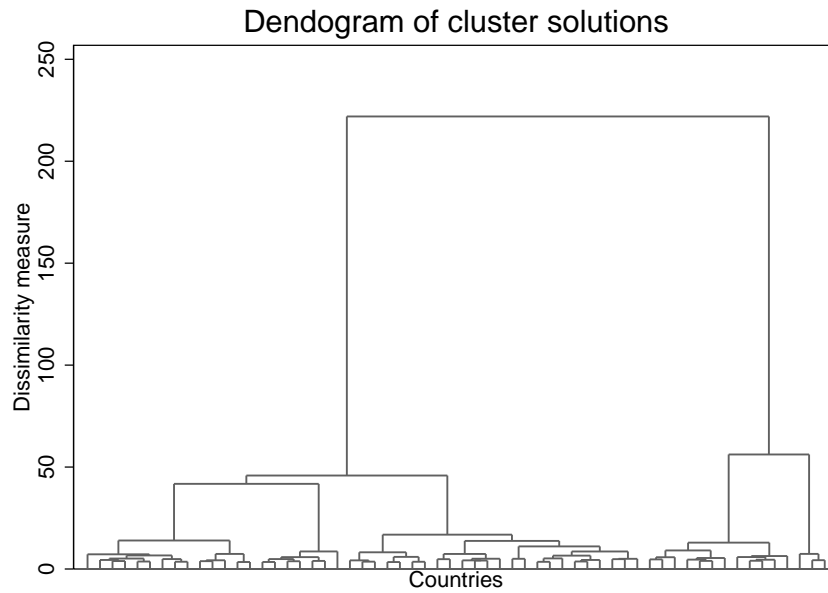


Table 4: Average proxy values for legal institutions

	Really bad	Bad	Good with oppression	Good	Great	Total
	1	2	3	4	5	
L1	-1.18	-0.53	0.39	0.66	1.64	0.00
L2*	1.31	0.14	1.40	-0.90	-1.21	0.00
L3sum*	1.41	0.21	1.07	-0.90	-1.38	0.00
L4	-0.86	-0.73	0.55	0.47	1.60	0.00
L5	-0.66	-0.70	0.86	0.37	1.78	0.00
L6	-0.73	-0.76	0.74	0.33	1.64	0.00
L7	-1.16	-0.42	0.35	0.75	1.16	0.00
L8	-0.55	-0.64	0.62	0.39	1.54	0.00
L9	-0.38	-0.38	0.27	0.27	0.98	0.00
L10	-0.66	-0.62	0.53	0.45	1.59	0.00
L11	-1.09	-0.62	0.47	0.71	1.67	0.00

Notes: Z standardized values from the average values of the sample. * implies an inverse scale

Table 5: Average proxy values for political institutions

	Really bad	Corrupt	Bad but not corrupt	Good	Great	Total
	1	2	3	4	5	
P1*	1.29	0.27	0.97	-0.86	-1.40	0.00
P2P3P4*	1.50	0.11	1.17	-0.95	-1.13	0.00
P5	-1.29	0.08	-1.64	0.85	1.00	0.03
P6	-0.89	0.13	-1.23	0.30	0.88	0.00
P7	-1.35	-0.15	-1.00	0.70	1.42	0.00
P8	-0.82	-0.52	-0.08	0.40	1.92	0.00
P9	-0.89	-0.57	0.13	0.63	1.63	0.00
P10	-1.00	-0.64	0.46	0.60	1.83	0.00
P11	-0.88	-0.65	0.50	0.48	1.95	0.01
P12*	1.01	0.46	-0.27	-0.71	-1.30	-0.01

Notes: Z standardized values from the average values of the sample. * implies an inverse scale

Table 6: Average proxy values for economic institutions

	Really bad	Bad	Good with oppression	Good	Great	Total
	1	2	3	4	5	
E1	-1.26	-0.21	0.01	0.48	1.33	0.00
E2	-0.94	-0.63	0.74	0.44	1.86	0.00
E3	-1.32	-0.48	0.37	0.76	1.52	0.00
E4*	1.33	0.21	1.06	-0.88	-1.31	0.00
E5	-1.14	-0.16	0.28	0.39	1.05	0.00
E6	-0.17	-0.20	0.83	0.00	0.33	0.00
E7	-0.91	-0.47	0.69	0.31	1.61	0.00
E8	-1.05	-0.55	0.85	0.68	1.26	0.00

Notes: Z standardized values from the average values of the sample. * implies an inverse scale

C Correlations

Table 7: Correlations with other institutional measures

	legal_rel	political_rel	economic_rel	Institutional climate index	WGI: control	WGI: voice	WGI: po- litical	WGI: govern- ment	WGI: regula- tory	WGI: ruleoflaw
legal_rel	1,00									
political_rel	0.86*	1,00								
economic_rel	0.89*	0.81*	1,00							
Institutional cli- mate index	0.76*	0.75*	0.78*	1,00						
WGI: control	0.93*	0.83*	0.88*	0.73*	1,00					
WGI: voice	0.83*	0.98*	0.81*	0.69*	0.77*	1,00				
WGI: political	0.80*	0.69*	0.73*	0.63*	0.75*	0.72*	1,00			
WGI: government	0.92*	0.84*	0.90*	0.70*	0.94*	0.78*	0.74*	1,00		
WGI: regulatory	0.89*	0.84*	0.96*	0.76*	0.86*	0.79*	0.67*	0.92*	1,00	
WGI: ruleoflaw	0.96*	0.83*	0.90*	0.77*	0.93*	0.81*	0.82*	0.94*	0.88*	1,00

Notes: * denotes significance at 0.1%.

The number of observations in the pairwise correlations ranges from 408 with Institutional climate index to over 2000 for others.