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Corruption and governance around the world

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Chapter 5

Governance and Growth Revisited

“The care of human life and happiness, and not their destruction,
is the first and only legitimate object of good government.”

Henry Steele Commager (1809)

5.1 Introduction

There is a lively debate on the relation between governance and economic growth. One group of studies presents empirical evidence that good governance stimulates economic growth (see, for instance, Knack and Keefer, 1995; Barro, 1997; Keefer and Knack, 1997; Chong and Calderon, 2000; and Kaufmann and Kraay, 2002). Other studies, however, provide evidence for a negative relationship between governance and economic development. For instance, Quibria (2006) reports for 29 Asian countries that economies with better governance fare worse than the ones with poor governance. Country case studies generally support this finding. A good example is China. Even though its governance is below the world average, it has above-average rates of growth (Qian, 2003). Likewise, the Philippines and Vietnam have

This chapter is based on joint work with Emmanuel Pandu Nugroho and Jakob de Haan, published in *Kyklos*, 2007, 60(2): 279-290.

more or less the same quality of governance, but Vietnam is booming out of a poverty trap, while the economy of the Philippines stagnates (Pritchett, 2003).

The literature on the governance-growth nexus is plagued by various shortcomings. First, most governance indicators are only available for recent years. This is certainly true for the governance index of Kaufmann et al. (2006) which seems to have emerged as the industry standard (Quibria, 2006). Consequently, cross-country (panel) growth models can only identify correlation. Second, as pointed out by Quibria (2006: 102), “governance remains a broad, multi-dimensional concept that lacks operational precision. It has often been used as an umbrella concept to federate a whole assortment of different, albeit related, ideas.” Finally, most studies do not check whether results are sensitive to model specification and sample selection.

In this chapter we construct a new index of governance applying Confirmatory Factor Analysis (CFA) to the International Country Risk Guide (ICRG) dataset on indicators of governance, namely, democratic accountability, government stability, bureaucracy quality, corruption, and rule of law. We focus on ICRG data as these are the only governance indicators available for a large group of countries and a long time span. We use CFA to analyze to what extent the different indicators of governance in the ICRG dataset contain the same information. We find that the various dimensions can be combined into one index. Next, we test whether our index is related to growth for varying samples of countries and different sets of conditioning variables. We find that our index is positively related to economic growth. This result is fairly robust across different samples of countries and model specifications.

The remainder of this chapter is organized as follows. In section 5.2, we briefly review the concept of governance and explain how we use CFA to construct our index. In section 5.3, we examine the relationship between this index and economic growth. Section 5.4 concludes.

5.2 Governance: Concept and Construct

Governance is usually defined as the manner in which authority is exercised in the management of a country's socio-economic resources. Kaufmann et al. (1999) have extended this definition by including three core dimensions of governance, namely [1] the process by which those in authority are selected, monitored, and replaced, [2] the government's capacity to effectively manage its resources and implement sound policies, and [3] the respect of citizens and the state for the country's institutions. This definition is in line with what Adserá et al. (2003: 446) call a 'well-functioning government', that is, "governments that abide by the rule of law, whose bureaucrats and policy makers are not affected by graft practices, and whose administrative machinery delivers goods and services in an efficient manner."¹

One crucial question is how to incorporate these various dimensions into a measure of governance. Researchers typically use the average or summation of some ICRG indicators to construct a single index of governance (see, for instance, Knack and Keefer, 1995; Knack, 1996; Hall and Jones, 1999). There are some advantages and disadvantages of this approach. For example, the availability of ICRG data since the beginning of the 1980s makes it possible to observe the governance-economic growth relationship over a substantial time-span. However, simply averaging or aggregating such indicators to construct a governance index can be problematic. Governance is a theoretical concept, which is not precisely measured by the ICRG indicators, which are imperfect measures of governance and likely to contain measurement errors. In such a situation, governance should be treated as a latent variable.²

In this chapter, we consider five variables of the ICRG dataset motivated by the theoretical definitions described above, namely democratic accountability, government stability, bureaucracy quality, corruption, and rule of

¹ Similar labels can also be found in Hall and Jones (1999), Wyatt (2003), and Borrmann et al. (2006).

² The dataset of Kaufmann et al. has been constructed on the basis of a latent variable technique. Unfortunately, this dataset is available only for years since 1996.

law, as indicators of governance on which we apply CFA yielding a new index of governance.³ This latent variable technique transforms the ICRG dataset into a cardinal index. As in the underlying ICRG variables, a higher score means better governance. The ICRG variables can be described as follows:⁴

- *Democratic Accountability* (6-point scale) measures how responsive government is to its people. The less responsive it is, the more likely the government will fall, peacefully in a democratic society, but possibly violently in a non-democratic one.
- *Government Stability* (12-point scale) is an assessment of the government's ability to carry out its declared program(s), and to stay in office, assigned as the sum of three components: government unity, legislative strength, and popular support.
- *Bureaucracy Quality* (4-point scale) gives a high score to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services, and where it has an established mechanism for recruitment and training.
- *Corruption* (6-point scale) proxies actual or potential corruption in the form of excessive patronage, nepotism, job reservations, 'favor-for-favors', secret party funding, and suspiciously close ties between politics and business.
- *Law and Order* (6-point scale) assesses the strength and impartiality of the legal system (the *law* component) as well as popular observance

³Confirmatory Factor Analysis seeks to determine if the number of factors and the loadings of measured (indicator) variables on them conform to what is expected on the basis of theory. Indicator variables are selected on the basis of prior theory and factor analysis is used to see if they load as predicted on the expected number of factors. Usually the researcher will posit expectations about which variables will load on which factors (Kim and Mueller, 1978: 55) The researcher seeks to determine, for instance, if measures created to represent a latent variable really belong together.

⁴Drawn from <http://www.icrgonline.com/>

of the law (the *order* component).

These indicators are expected to be highly correlated. Table 5.1 indeed shows that the correlation coefficients among these indicators range between 0.71 and 0.84; they are also all highly significant ($p < 0.01$). Nevertheless, the correlations among the governance indicators are lower than 1.00, suggesting that these indicators are imperfect measures of the concept of governance.

Table 5.1: Correlations among the ICRG Indicators of Governance

Governance Indicators	DA	GS	BQ	C	LO
Democratic Accountability (DA)	1.000				
Government Stability (GS)	0.716	1.000			
Bureaucracy Quality (BQ)	0.725	0.786	1.000		
Corruption (C)	0.759	0.736	0.836	1.000	
Law and Order (LO)	0.735	0.762	0.821	0.821	1.00

In the following, we use a latent variables approach to evaluate to which extent the governance indicators capture the same information. We use ICRG data for 1984, the first year for which the data are available. More specifically, we use CFA⁵ that can be expressed as

$$\mathbf{x} = \mathbf{\Lambda}\xi + \delta \quad (5.1)$$

where \mathbf{x} denotes a vector of observed variables drawn from the ICRG data (democratic accountability, government stability, bureaucracy quality, corruption, and rule of law). These are the indicators of the exogenous latent variable governance (ξ); $\mathbf{\Lambda}$ stands for the corresponding matrix of unknown factor loadings that capture both the scale of indicators and the strength of their relation to ξ ; and δ denotes a vector of measurement errors. Moreover, the basic assumptions accompanying equation 5.1 are $E(\delta) = 0$ and $E(\xi\delta^*) = 0$. By convention, variables in \mathbf{x} and ξ are written as deviations from their respective means. Figure 5.1 depicts the relationship between governance, its indicators, and the error terms.

⁵ See Bollen (1989) as well as Wansbeek and Meijer (2000) for further details.

From Equation 5.1, the population covariance matrix, Σ , follows as

$$\begin{aligned}\Sigma(\theta) &= E(\mathbf{xx}') \\ &= \mathbf{\Lambda}\Phi\mathbf{\Lambda}' + \Theta.\end{aligned}\tag{5.2}$$

The last line of equation 5.2 shows that the covariance matrix of \mathbf{x} is decomposed into the parameters of $\mathbf{\Lambda}$; the covariance matrix of ξ , (Φ); and the covariance matrix of δ , (Θ). This equation is estimated using the maximum likelihood (ML) function,

$$F_{ML} = \log |\Sigma(\theta)| + tr [\mathbf{S}\Sigma^{-1}(\theta)] - \log |\mathbf{S}| - q.\tag{5.3}$$

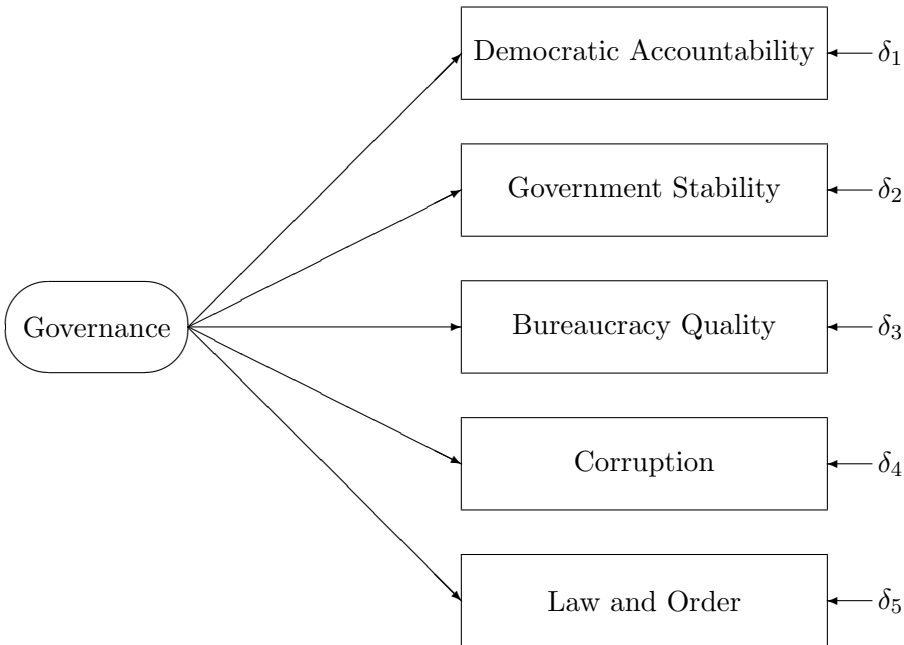


Figure 5.1: Governance in Factor Analysis Model

Minimizing this fitting function means choosing the values for the unknown parameters that lead to the implied covariance matrix $\Sigma(\theta)$ as close

as possible to the sample covariance matrix (\mathbf{S}); with q denotes the number of indicators. On the basis of these parameters, the governance index can be generated.

Table 5.2 reports the estimates of the parameters and corresponding statistics that explain the resulting index of governance. This table shows that all parameters are estimated with reasonable precision. The parameters are statistically significantly different from zero as indicated by the high values of the t -statistics. The value of χ^2 , comparing the proposed model to an unrestricted alternative (saturated) model, has a value of 4.70 with 5 degrees of freedom, which is not significant. The Normed Fit Index (NFI) has a value of 0.99, while the Comparative Fit Index (CFI) has a value of 1.00. Likewise, the root mean squared error is zero. According to these measures, the model fits very well.⁶ In addition, the last column of the table shows the estimate of the reliability of each indicators; i.e., the squared correlation with the latent variable governance. According to this measure, democratic accountability performs the worst and bureaucracy quality the best, respectively, with reliabilities of 0.67 and 0.84.

Table 5.2: CFA Estimates

Governance Indicators	Estimates (Standardized)	Error Covariance	Reliability
Democratic Accountability	0.820 (10.092)	0.328 (6.401)	0.672
Government Stability	0.841 (10.503)	0.293 (6.252)	0.707
Bureaucracy Quality	0.915 (12.088)	0.162 (5.118)	0.838
Corruption	0.909 (11.931)	0.175 (5.298)	0.825
Law and Order	0.898 (11.704)	0.193 (5.523)	0.807
RMSE	0.000		
χ^2	4.702		

Continued on next page

⁶ For a further discussion on the fit measures, see Wansbeek and Meijer (2000).

Governance Indicators	Estimates (Standardized)	Error Covariance	Reliability
Normed Fit	0.989		
Comparative Fit	1.000		

t-statistics in brackets

5.3 Governance and Growth

5.3.1 Parsimonious Model

We now examine the relationship between economic growth and governance. In examining this relationship, we first run a set of parsimonious growth models as follow:

$$G = \mathbf{F}\boldsymbol{\alpha} + \beta\xi \quad (5.4)$$

where G is a vector of average GDP per capita growth rates over 1984–2004 and ξ is the 1984 governance index we have constructed. Meanwhile, \mathbf{F} is a matrix consisting of three or four explanatory variables. At least two possible sets of variables have been suggested in the empirical growth literature. In Levine and Renelt (1992) and Mankiw et al. (1992), the matrix \mathbf{F} consists of the initial income, the school enrolment rate, and the investment rate. Keefer and Knack (1997) and Beugelsdijk et al. (2004) include initial level of GDP per capita, the school enrolment rate, and the price level of investment in the matrix. We take the values of these variables at the beginning of the growth period to minimize reverse-causation.

Table 5.3 displays the results of the parsimonious regressions. Our findings for income convergence and human capital confirm those of many other growth studies. The inclusion of the price level of investment in model 4 yields a slightly higher R^2 compared to the inclusion of the investment ratio in model 3, but the coefficients of both variables differ significantly from zero. However, once the governance index is included in the regressions, the model with the price level of investment has more explanatory power than the one with the investment ratio and the difference between the two R^2 -s

becomes larger. Moreover, the investment ratio loses its significance as its t -values drops from 2.31 to 1.35. Most importantly, the coefficients of our governance index are very similar in both specifications and always positive and significant.

Table 5.3: Parsimonious Growth-Governance Regressions

Explanatory Variables	Model 1		Model 2		Model 3		Model 4	
	β	t -val.	β	t -val.	β	t -val.	β	t -val.
Constant	5.50	2.61	5.52	2.59	11.32	4.29	12.31	4.67
Income	-0.92	-2.69	-0.68	-2.12	-1.56	-4.14	-1.50	-4.14
Schooling	4.06	3.40	4.56	3.84	3.72	3.05	4.22	3.58
Inv. per GDP	6.73	2.31			4.24	1.35		
Inv. Price			-0.01	-2.46			-0.01	-2.53
Governance					0.94	3.25	0.94	3.36
N	106		103		82		81	
F	9.30		9.29		8.53		10.19	
R^2	0.21		0.22		0.31		0.35	

Different N is due to list-wise deletion; Independent Variables: in 1984 values
 Dependent Variable: Average growth rate of GDP per capita, 1984-2004

In the remainder of this section we will examine the robustness of our finding. We test whether the coefficient of our governance indicator is sensitive to changes in [1] the number of observations and [2] model specification.

5.3.2 Effect of Observations

To examine the impact of the use of various observations on the stability of our index, we apply recursive regressions. The idea behind this approach is to use a different number of observations, starting from 50 per cent of the sample to end up with the full set of 81 countries. For this purpose, we use model 4 of Table 5.3 since it outperforms model 3.

First, we put observations in ascending order according to their governance scores, i.e., from the lowest to the highest scores. Starting with 50 per cent of the sample, we add one observation every time we run the regression, and end up with the full sample. Thus, the first 50 per cent of

the ascending-ordered sample are countries with poor governance. Second, we follow the same procedure in the other way around, i.e., in a descending order for the governance indicator. In other words, the first 50 per cent of the descending-ordered sample are countries with good governance.

The results of the recursive regressions are displayed in Figure 5.2. Several conclusions can be drawn from this figure. The coefficients of the governance indicator computed on the basis of ascending and descending-ordered samples fluctuate around 0.94. The largest deviations occur when the number of countries is between 42 and 48. The lowest coefficients range between 0.25 and 0.37, while the highest are in the 1.14-1.40 range. This implies that the impact of our index is relatively stable, in the sense that it is not much affected by a change in the number of observations. In sum, the effect of governance on economic growth is always positive, no matter what sample we take into consideration. However, the effect is bigger in poorly-governed countries.

The graphs for the t -values tell a similar story. In general, the t -values are high and they become higher when the number of observations increases to converge at 3.36. In the governance-ascending-ordered countries, the t -values are always significant, while significant t -values in the governance-descending-ordered countries are reached after the inclusion of 60 countries.

5.3.3 Sensitivity Analysis

Finally, we examine whether our results are sensitive to a change in model specification. For this purpose, we extend the ‘base’ regression, equation 5.5, as follow:

$$G = \mathbf{F}\boldsymbol{\alpha} + \beta\xi + \mathbf{Z}\boldsymbol{\gamma} \quad (5.5)$$

where G , \mathbf{F} , and ξ are defined as before; while \mathbf{Z} is a matrix of up-to-three variables drawn from a pool of M available variables. This is the setup we use to identify the robustness of ξ adopted from Levine and Renelt (1992) and Sala-i-Martin (1997). Levine and Renelt examine the robustness by

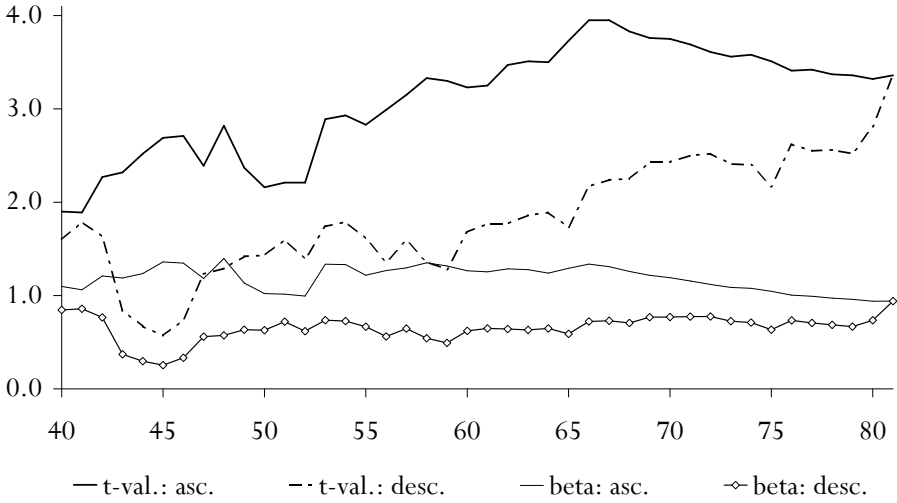


Figure 5.2: Regressions with Various Samples

running a series of regressions from all possible combinations in the matrix \mathbf{Z} (Appendix 3 for the detail list of variables). This results in a vector of $\hat{\beta}$ and its standard deviation, $\sigma_{\hat{\beta}}$. According to Levine and Renelt, the robustness of ξ is determined on the basis of two extreme bounds defined as $\frac{\max}{\min} \hat{\beta} \pm 2\sigma_{\hat{\beta}}$. They consider a variable robust if the lower and upper extremes produce the same signs and remain significant; otherwise it is fragile, even if there is only one regression for which the sign of the coefficient changes or becomes insignificant.

Since this test is too strong for any variable to pass it, Sala-i-Martin (1997) proposes to examine the entire distribution of $\hat{\beta}$ and to run a test for the cumulative distribution function (CDF). The CDF(0) test is based on the fraction of the CDF lying on each side of zero; that is, the larger areas under the density function regardless whether it is CDF(0) or 1-CDF(0). So, CDF(0) will always be a number between 0.5 and 1.0.

Our judgment on the robustness of our governance index will be based

on the test of Sala-i-Martin. Following Sturm and de Haan (2005), we apply the criteria that $\text{CDF}(0) > 0.95$ and that the coefficient of the governance index should be significantly different from zero in at least 90 per cent of the regressions we run. Computation on the basis of 81 observations and 65 variables in the matrix \mathbf{Z} —thus we run 43,680 regressions—indicates that the $\text{CDF}(0)$ test statistics equals 1.00. Moreover, we find that in 93 per cent of the regressions, the coefficient of our index is significantly different from zero at the 5 per cent level.

Finally, we redo the sensitivity analysis but with varying numbers of observations. Like before, we order the sample in ascending and descending ways. Starting with 50 per cent of the sample, in every step of the analysis we add one observation to end up with the full sample. At this stage, however, we focus on the $\text{CDF}(0)$ test and run 3,581,760 regressions. The results are displayed in Figure 5.3.

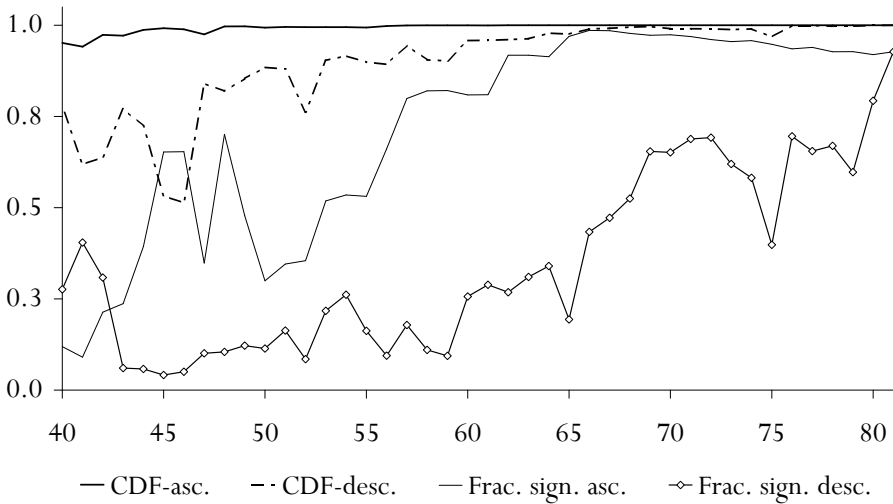


Figure 5.3: Sensitivity Analysis

In general, the results support our previous findings. The ascending-ordered group starts with a $CDF(0)$ of 0.95 and ends up with 1.00. The descending-ordered group also passes the threshold of 0.95, but only after the use of 53 observations. Starting with a $CDF(0)$ of 0.71, the descending-ordered group of countries catches up the other group to converge at a $CDF(0)$ of 1.00. In terms of the fraction of regression with 95 per cent level of significance, however, the two groups perform less, although there is a tendency to converge. In the ascending-ordered group, the 90 per cent-threshold is reached after the use of 62 observations, but it is never achieved by the descending-ordered group. Therefore, it is safe to conclude that our index is fairly robust considering its performance in the $CDF(0)$ test.

5.4 Conclusion

The literature on the governance-growth relationship does not provide clear cut conclusions about the relevance of governance for growth. We contribute to this debate by introducing our governance index generated using confirmatory factor analysis on ICRG governance indicators. We focus on ICRG data as these are the only governance indicators available for a long time-span that include a large group of countries. Confirmatory factor analysis is an ideal instrument to analyze to what extent the different dimensions of governance as identified in the ICRG dataset contain the same information. We find that the five dimensions of governance can be combined into one single index.

Our parsimonious models indicate that this constructed index positively and significantly explains economic growth. We also tests for the robustness of our results by applying recursive regressions and the sensitivity test of Sala-i-Martin (1997). Furthermore, we apply the same test to varying samples. On the basis of our results, it is safe to conclude that the impact of our index on economic growth is fairly robust.

