Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Indicators

Knack, Stephen and Keefer, Philip

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Chapter 3

Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures[1]

Stephen Knack and Philip Keefer

Few would dispute that the security of property and contractual rights and the efficiency with which governments manage the provision of public goods and the creation of government policies, are significant determinants of the speed with which countries grow. North (1990, p. 54) asserts, for example, that "the inability of societies to develop effective, low-cost enforcement of contracts is the most important source of both historical stagnation and contemporary underdevelopment in the Third World. . ." because the absence of secure property and contractual rights discourages investment and specialization.[2] Conditional convergence in per capita incomes across nations, the object of an already large theoretical and empirical literature, is one natural platform for testing the importance of property rights to growth. This literature predicts that the lower the level of steady state income of countries, the slower is their rate of convergence to the steady state from a given initial level of income (see Barro and Sala i Martin (1992)). In countries with unprotected property rights, the steady state level of income to which they can aspire should be lower. Countries that make inefficient public investment and economic policy decisions would also be expected to have lower steady state levels of income.

Nevertheless, principally because of data limitations, empirical research into cross-country sources of growth and convergence has been restricted to a narrow

examination of the role of institutions. This has hindered the development of a robust, cross-country test of North's proposition. Lacking data that directly bears on the security of property rights or on the institutions that protect property rights, researchers have relied upon measures of political stability (Barro (1991)), such as coups and revolutions and political assassinations, or on the Gastil (1983, 1986) measures of political freedoms and civil liberties (Kormendi and Meguire (1985), Grier and Tullock (1989). Scully (1988), McMillan, Rausser and Johnson (1991)). These sets of variables capture only incompletely many of the relevant threats to property and contractual rights.[3]

In addition, recent contributions to the growth literature have incorporated stylized notions of property rights and rent-seeking into formal growth models (see Tornell and Velasco (1993) and Rama (1993)). Rama models the relationship between rent-seeking and economic growth. His tests of the model, using data on rent-seeking legislation from Uruguay, suggest an association between rent-seeking and low growth. Empirical work in this area has not yet employed direct measures of the security of property rights, however.

This paper compares more direct measures of the institutional environment with both the instability proxies used by Barro (1991) and the Gastil indices, by comparing their effects both on growth and private investment. The results provide substantial support for the position that the institutional roots of growth and convergence are significant. The marked improvement that these new variables represent over existing proxies also suggests that there are substantial returns to future research into variables that reflect the security of property rights and the efficiency with which states determine economic policies and allocate public goods.

Ambiguities of Political Violence and the Gastil Indices

Political instability in previous studies is typically captured by two variables measuring political violence: revolutions and coups, and assassinations. Barro (1991)

employed averages of these measures over the 1960-85 period, to match the period for which growth data was then available from Summers and Heston (1991). In the present analysis, two different time periods are employed for revolutions and coups, in the variables *REVC6088* and *REVC7488*. Both measure the average number of coups and revolutions per year, each over a different period. Two other variables measure the average number of assassinations per year per million population over two different periods, *ASSN6088* and *ASSN7488*.

There are two seven-point Gastil indices, one for civil liberties and the other for political freedom. Both are averages for the periods 1973-1986. Since the two indices are highly correlated with each other (the correlation coefficient is .97), they are added together to form the variable *FREE7386*, which ranges from two to fourteen. Higher values of all of these variables indicate fewer freedoms or greater political violence and, therefore, worsening conditions for investment.

The logic behind the use of political instability variables such as revolutions, coups and political assassinations is straightforward. Leaders who fear replacement are more likely to expropriate because they expect to bear fewer of the future costs of their current expropriatory actions [see chapters 5 and 6]. Moreover, during periods of political instability, particularly when instability is triggered by non-constitutional events, institutional and non-institutional mechanisms for protecting property and contractual rights are more fragile, and entrepreneurs are likely to reduce and to reallocate investment to avoid risk.

There are several reasons why such a variable only partially reflects the variation in property rights security among countries. First, leaders are averse to losing power whether or not their replacement is unconstitutional. However, the variables representing political instability contemplate only non-constitutional political events, revolutions, coups and assassinations. The actions of those leaders who face a higher risk of losing power constitutionally are not captured by this variable. Therefore, the success of this

variable as a proxy for the effects of leadership tenure on property rights depends on whether short leadership tenure is correlated with expectations of unconstitutional replacement. There is little evidence on this point.

Second, the proxy itself may be misleading. Countries may experience few coups and revolutions but nevertheless exhibit insecure property rights. In fact, dictators who are most effective in the repression of dissent may be the most successful in avoiding coups, revolutions and assassinations, but offer the worst protection for property rights. Malawi and Zambia, for example, exhibit very low frequencies of coups and revolutions; the leaders of these two countries survived or have survived in office for exceptionally long periods of time. Few would argue, however, that the absence of political violence endows these countries with more secure property rights than France, Italy and even Germany, all of which score at least as poorly on the measures of political violence employed by Barro (1991). On the other hand, the victors in countries with frequent coups often do not make significant policy changes. Property rights that were vulnerable before a particular coup are likely to continue to be vulnerable. In these countries, political upheaval is likely to be symptomatic of an institutional environment that fails to protect property rights, just as it fails to ensure orderly political transitions. The new variables measure the inadequacies of the institutional environment directly, rather than through the proxies of the political violence variables.

The third limitation of the political violence indicators is that there are many margins on which institutions can affect property rights; instability is a relatively crude indicator of these, detracting from its usefulness for deriving policy prescriptions. Fourth, Londregan and Poole (1990) and others have shown, as Barro (1991) acknowledges, that political violence is in turn very sensitive to economic performance.[4] This sensitivity introduces problems of simultaneity into estimates of the effects of political violence on growth and investment.

For their part, the Gastil indices are aggregate measures that have been compiled without the explicit aim of measuring the security of property rights. Although they embody some consideration of the security of private property, they contain multiple and diverse other dimensions, including freedom of religion and rights of worker association. For many purposes these variables are of great importance. However, many of the dimensions are not closely related to property rights. Moreover, since the indices are not disaggregated and the implicit weights attached to the various dimensions may vary over time and between countries, these measures are likely to embody considerable measurement error in evaluating the particular institutions thought to affect property rights, contracting rights, and the efficiency with which public goods are allocated.[5]

The institutional data

The focus of this paper is on institutional indicators compiled by two private international investment risk services: International Country Risk Guide (ICRG) and Business Environmental Risk Intelligence (BERI). We use the first observations that these services have for any country. For BERI, the vast majority of observations are from 1972 and for ICRG, nearly all observations are from 1982. Unlike the Gastil data, these two sources provide detailed ratings for large samples on disaggregated dimensions of property rights that are closely related to those institutions emphasized by North (1990), Weingast (1993), Olson (1982) and others.[6]

ICRG variables *Expropriation Risk*, measuring the risk of expropriation, and *Rule of Law*, measuring whether there are established peaceful mechanisms for adjudicating disputes, are interpreted here as proxies for the security of property and contract rights.[7] If countries score low on these dimensions, they are likely to suffer a reduction in the quantity and efficiency of investment in physical and human capital. As the probability increases that investors will lose the proceeds from the investment, or the investment itself, investors reduce their investment and channel their resources to activities that are

more secure from the threat of expropriation (trading rather than manufacturing, for example), although they may be less profitable.

Repudiation of Contracts by Government is another indicator of contract enforcement. It is likely that if private actors cannot count on the government to respect the contracts it has with them, they will also not be able to count on the government enforcing contracts between private parties. Without impartial enforcement of contracts by the state, only "self-enforcing" exchanges between private economic actors will occur--those in which the benefits of compliance exceed the gains from cheating or reneging. This restriction on economic activity severely limits the universe of possible Pareto-improving exchanges that would otherwise be undertaken.

Repudiation also measures government credibility. Regimes in which officials have the power unilaterally to modify or to repudiate contractual agreements will likely be unconstrained in other ways. In particular, entrepreneurs are likely to be suspicious about the institutional or other barriers on state officials that keep them from pursuing policies of confiscatory taxation (directly, or through inflation), or outright expropriation.[8]

The remaining two ICRG variables used in this paper are *Corruption in Government* and *Quality of Bureaucracy*. They are taken as proxies for the general efficiency with which government services are provided, and for the extent and damage of rent-seeking behavior. When countries score poorly (low) on these dimensions, it is a strong indication that a bureaucracy lacks procedural clarity or technical competence and is likely to introduce criteria other than efficiency into the determination of government policies or the allocation of public goods. In particular, the bureaucracy is likely to award contracts, business and trade licenses, police protection and so forth on the basis of criteria other than those of allocative and technical efficiency. In addition, bureaucracies where corruption is high or competence is low are less likely to provide a strong bulwark against infringements on property rights. The resulting distortions in investment and

trade may reduce the quantity and efficiency of capital investment and foreign technology introduced into the country.

Theoretically, the use of corrupt allocation schemes in the political marketplace need not produce less efficient results than other forms of political allocation. However, in those countries where ICRG records high levels of corruption, entrepreneurs are also beset by greater uncertainty regarding the credibility of government commitments. That is, the same institutions that allow public officials to demand large and arbitrary bribes, such as failed law enforcement systems, also inhibit those officials from credibly pledging not to renege on their future commitments. This discourages investment and encourages forms of economic activity that are less vulnerable to expropriation.[9]

The measures from BERI that are used for this paper are *Contract Enforceability* and *Infrastructure Quality*, *Nationalization Potential* and *Bureaucratic Delays.* The latter two parallel, respectively, the ICRG variables *Expropriation Risk* and *Quality of Bureaucracy.* The relevance of all the BERI variables is indicated by the foregoing discussion, with the exception of *Infrastructure Quality*. This variable allows some approximation to be made to the efficiency with which governments allocate public goods.[10]

Because of strong correlations among these separate indicators, with the consequent risk of multicollinearity, and in order to avoid omitting any of them from the equation, the five ICRG variables and the four BERI variables have been aggregated to form an ICRG index (*ICRG82*) and a BERI index (*BERI72*) of the security of contractual and property rights. Although the aggregation is accomplished through simple addition, the results reported below do not change significantly when individual components of these indices are used, or when the indices are compiled with different weights.[11] Higher values of the ICRG and BERI indices indicate better conditions for investment.

Comparing Institutional Variables, Violence and the Gastil Indices

The importance of institutional data that more precisely represents the security of property and contractual rights on growth is evaluated in a number of ways. First, we run correlations between the institutional variables and the political violence and Gastil indices. Second, we assess the relative explanatory power of the various measures in empirical growth equations. Third, we compare the coefficient on initial income with and without the institutional variables. If countries converge to their steady state incomes, and if institutions are significant determinants of the steady state incomes to which countries converge, then the coefficient on initial income should be higher when institutions are adequately controlled for. That is, if the convergence hypothesis is correct we should find that countries grow faster, the lower their initial income, if we control sufficiently for the quality of their institutions. Fourth, we compare the power of the variables in explaining private investment rates across countries.

Low correlations between the data are an indication that the institutional variables from the investor services contain information not in the other variables. High correlations suggest, on the other hand, that the new variables may add little additional information. The correlations below are negative, because higher values of the political violence and Gastil variables indicate worsening conditions for investment, while higher values of the ICRG and BERI indices indicate better conditions for investment.

In fact, the correlations are relatively low, as Table One indicates. The ICRG index for 1982 has a Pearson correlation coefficient of only -0.23 with *ASSN7488* and -0.42 with *REVC7488*. The Pearson correlation with *FREE7386* is higher, at -0.66. Correlations with the political instability variables rise somewhat for the longer period, 1960-88, to -0.27 for *ASSN6088* and -.51 for *REVC6088*.

-TABLE 1 ABOUT HERE-

It may be argued that the ordinal information in the institutional variables is more meaningful than the intervals between observations. To account for this possibility, Spearman rank-correlation coefficients were also calculated. These were in most cases approximately the same as the Pearson coefficients. The ICRG index for 1982 has a Spearman correlation coefficient of only -0.25 with *ASSN7488* and -0.53 with *REVC7488*. The differences between the Spearman and Pearson calculations are greater for the longer periods. Spearman correlations with the political instability variables for the period 1960-88 are -0.43 for *ASSN6088* and -.65 for *REVC6088*.

It is likely to be true that the longer a country's history of political violence, the lower its property rights indicators. The longer period identifies those countries better than the shorter period, and increases somewhat the correlation between the property rights indicators and the political violence variables.[12] Regardless of the period or the variables, however, the correlations support the contention that the ICRG index conveys considerable additional information about the institutional environment that is not captured in the political violence or Gastil variables. The BERI index for 1972 exhibits a similar pattern of correlation, as Table 1 shows, although it has a substantially higher correlation with *FREE7386*, at -.76.[13]

The extent of the complementarity can be seen by looking once again at Zambia, Malawi, France and Italy. Zambia scores 20 on the ICRG index and Malawi scores 25.6. Malawi averaged zero revolutions and coups per year over the period 1974 - 88, and .012 assassinations per million population per year. Zambia averaged .07 revolutions and coups over the period and zero assassinations. France and Italy have approximately the same scores for political violence as Zambia and Malawi, (zero revolutions and coups and .006 assassinations in the case of France, and .07 revolutions and coups and .043 assassinations in the case of Italy). However, France and Italy score 46.5 and 38.2, respectively, on the ICRG index, demonstrating more precisely the possibility of

breakdowns in the relationship between instability and the inadequate protection of property rights.

The growth equation

The principal motivation for searching for other institutional variables is not the low correlation among older and newer variables, but rather the additional insights that can be obtained regarding the sources of economic growth. Barro and Sala-i-Martin (1992), Mankiw, Romer and Weil (MRW) (1992) and others examine the evolution of economic growth in countries, assuming that they are out of their steady state growth paths. That is, they explicitly model growth, taking into account rate of convergence of countries to their steady state. Equation (14) of MRW (1992) and equation (8) of Barro (1992) describe the evolution of an economy as

$$\ln(y(t)) = (1 - e^{-\lambda t}) \ln (y^*) + e^{-\lambda t} \ln (y(0)) \quad (1)$$

where $y(t)$ is the level of income at time t, $y(0)$ is the initial level of income, and y^* is the steady state level of income. The rate of convergence is given by λ. Barro and Sala-i-Martin (1992a and b) manipulate this to construct the equation,

$$\ln\left(\frac{y_{iT}}{y_i(0)}\right) = a_i - (1 - e^{-\lambda})(\ln(y_i(0)) - g_i T) + \varepsilon_i \quad (2)$$

where $a_i = g_i + (1 - e^{-\lambda})\ln(y_i^*)$. The rate of technological progress, g_i, is assumed constant across countries.[14] This equation is similar to that employed by Barro (1991), the specification that is relied upon below to compare the effects of political violence and the Gastil and institutional indicators on growth:

$$GR6085 = \alpha + \beta_1 GDP60 + \beta_2 SEC60 + \beta_3 PRIM60 + \beta_4 GOVCONS + \beta_5 REVCOUP + \beta_6 ASSASS + \beta_7 PPI60DEV + \varepsilon_i \quad (3)$$

Here, growth is a function of initial income,[15] secondary and primary school enrollment in 1960, the percent of government consumption in GDP, frequencies of revolutions and assassinations, and the magnitude of the deviation of the Summers and Heston investment deflator (U.S. = 100) from the sample mean.[16] In the Barro model, then, the determinants

of the steady state of income that vary across countries are (*SEC60*, *PRIM60*, *GOVCONS*, *REVCOUP*, *ASSASS*, *PPI60DEV*).

Unlike MRW (1992) and others, Barro (1991) omits rates of factor accumulation, implicitly assuming that they should be the same across countries except to the extent that education and other idiosyncratic factors drive them apart. It is these idiosyncratic factors that he attempts to capture with government consumption, revolutions, price deviations, etc. Although the regressions that follow employ the Barro specification, the results derived are robust to adding rates of factor accumulation, following MRW (1992).

Following Barro (1991), Barro and Sala-i-Martin (1992a and 1992b) MRW (1992) and others, we assume that the problem of omitted variables is not serious enough to require that ordinary least squares (OLS) be abandoned for another estimation procedure, such as fixed effects.[17] This is clearly a strong assumption. Growth depends on a multitude of factors, only some of which are captured by the included variables in any empirical investigation. If any of these omitted variables are correlated with included explanatory variables, the coefficients on those included variables will be biased. However, there are at least three reasons for retaining the OLS procedure.

First, the principal objective of this paper is to estimate the influence of institutions within the same framework that other effects, including those measured by the Gastil and political violence indicators, have been evaluated in the literature. Second, the new variables employed in this paper are significant, even in the presence of previously used institutional proxies, suggesting that they are capturing some of the effects omitted in previous work and, therefore, are reducing the influence of omitted variable bias. The third reason is eminently pragmatic: the institutional variables are relatively stable over time, and would therefore drop out of a fixed effects estimation.

Unlike Barro (1991), this paper focuses on growth over the period 1974-89 to mitigate the effects of possible measurement error in the ICRG and BERI indices that might have been introduced by evaluator bias. The evaluators of the investor services

might be influenced by the level of income of the countries that they evaluate. Current levels of GDP are a product of past growth, naturally. To the extent that evaluators are influenced by the current level of GDP, estimates of the effect of property rights on growth might be biased upwards. This is a problem that afflicts all such measures, including the Gastil measures. Our choice of period reduces problems of simultaneity that might cloud inferences about the effect of property rights.

Empirical Results--Growth

The following discussion indicates that the more specific ICRG and BERI indicators of the security of property and contractual rights offer additional insights into the sources of growth, beyond those provided by the instability and Barro variables. This section examines the performance of these indicators in growth equations, in which the ICRG index performs the best. The performance of these variables as explanations of private investment is also investigated in a subsequent section. The BERI index has the greatest explanatory power in those regressions. These findings are robust to changes in the sample period, sample size and specification.

The regressions in Tables 2, 3 and 4 compare the performance of political violence and Gastil variables with *ICRG82* and *BERI72*. Comparisons are made on the basis of several regressions. First, regressions are run with only political violence or Gastil variables (along with the other control variables in (3)) using the ICRG or BERI samples of countries.[18] Results from these tests are compared to regressions run using only ICRG or BERI as institutional indicators. Regressions are also run with the ICRG or BERI variables entering jointly with the political violence or Gastil variables.

The evaluation of the ICRG and BERI indices relative to the political violence and Gastil indices is made in three ways. Comparisons are made, first, of the statistical significance of the variables, when they enter alone and when they enter together; second, of their economic significance; and third, of the magnitude of the coefficient on *GDP70*,

initial income. This coefficient reveals the extent of convergence after controlling for country-specific institutional, educational and other factors that affect steady state income. When variables are used that capture more of these factors, the rate of conditional convergence, and therefore the coefficient on *GDP70*, should rise, provided that the underlying hypothesis of conditional convergence is correct.

Equations (1) of Tables 2 and 3 are benchmark regressions for the ICRG and BERI samples, respectively, and include no institutional variables. Equations (2) add the political violence indicators, but not the ICRG and BERI indices. Three conclusions are noteworthy comparing equations (1) and (2). First, the explanatory power of the regressions is substantially higher when the political violence indicators are included.[19] Second, the political violence indicators are only marginally significant using the BERI sample; the same is true for *ASSAS7489* for the ICRG sample. Third, both the statistical significance and the magnitude of the coefficient on *GDP70*, from which the rate of convergence is derived, increases notably.[20] Evidence for conditional convergence is significantly stronger when institutional determinants of steady state income are appropriately accounted for.

-TABLE 2 ABOUT HERE-

In equations (3) of Tables 2 and 3 the ICRG and BERI indices, respectively, replace the political violence indicators. Both are more significant than the political violence indicators. Moreover, the magnitude and significance of the coefficient on *GDP70* rise dramatically. The coefficient on *GDP70* rises from -.482 with the Barro variables to -.692 with *ICRG82*. When *BERI72* replaces the political violence indicators, the coefficient rises from -.594 to -.694. These results once again support the conditional convergence hypothesis, and suggest that *ICRG82* and *BERI72* better reflect the institutional determinants of steady state income. Both the magnitude and statistical

significance of the convergence coefficient increase when these institutional variables are included in the estimated equation.

In the final equations of these two tables, the political violence indicators enter with either *ICRG82* or *BERI72*. In the regression with the ICRG index, the magnitude and statistical significance of the violence indicators drop substantially and *ICRG82* remains significant. *BERI72* performs less well, but still exhibits at least as much economic and statistical significance as the political violence indicators.[21]

-TABLE 3 ABOUT HERE-

Comparing these variables in terms of their economic impact also reveals the greater explanatory power of the ICRG/BERI indices relative to the political violence indicators. Since the units of the variables are not comparable, standardized estimates of their regression coefficients were calculated. These denote the change in the dependent variable, in standard deviation units, for a one unit change in the standard deviation of the dependent variable. For the ICRG case in Table 2, the sum of the standardized estimates of *REVC7499* and *ASSAS7488* in Equation (2) is -0.36. The standardized estimate of *ICRG82* when it replaces these two variables in Equation (3) of Table 2, however, is 0.504: an increase of one standard deviation in *ICRG82* leads to an increase in growth equal to 0.504 of its standard deviation. The standard deviation of the growth variable *GR7489* is 2.465, indicating that an increase of one standard deviation in *ICRG82* (equal to approximately 12 points on the 40 point scale, or the difference between the *ICRG82* scores of Honduras (15) and Costa Rica (27), or of Argentina (25) and Italy (30)) increases growth by more than 1.2 percentage points. The importance of the effect of *ICRG82* can be seen by comparing its standardized coefficient to the standardized coefficient on secondary education enrollment (*SEC70*), which is not much higher at .57. When *ICRG82* and the political violence variables are all included in the same regression,

the standardized estimate of *ICRG82* is 0.393 and the sum of the standardized estimates of the violence indicators is -0.235. In all cases, the economic impact of *ICRG82* is significant and greater than that of the political violence indicators.

A similar story can be told with regard to *BERI72*. Alone, the two political violence indicators have a combined standardized estimate of -0.47. When it replaces these variables, however, the BERI index has a standardized estimate of 0.54. When the three variables enter into the same regression, the combined political violence standardized estimate is -0.37 and the standardized estimate of *BERI72* is 0.38.

These results were robust to a number of alternative specifications. The institutional variables were statistically and economically significant in growth regressions that included rates of factor accumulation (investment and labor force growth); that deleted OPEC members from the 1974-89 period regressions; that substituted *REVC6088* and *ASSAS6088* for their 1974-89 counterparts in growth regressions; and that employed the log of initial income.[22]

The coefficients on the institutional variables were somewhat lower when investment was included. This is to be expected; one way that insecure property rights hinder growth is by deterring investment, an effect that is captured by investment itself when it enters the regression. However, it is noteworthy that the institutional variables were still significant, even in the presence of an investment term. This suggests that institutions measured by the BERI and ICRG indices matter not only because secure property rights encourage fixed investments, but also because they encourage the efficient allocation of factor inputs. In response to expropriatory threats of one kind or another, entrepreneurs not only reduce investment, they also invest in less specialized capital (human and physical), which can be moved more easily from one activity to another. This has static efficiency effects, but also discourages dynamic gains from innovation, since innovation is most likely to thrive when specialization is encouraged.

Table 4 summarizes parallel regression results for the index of the Gastil variables, *FREE7386*, for the period 1974 - 89. In no case is this variable significant.[23] The ICRG and BERI indices are in every case significant, however. Moreover, the coefficient on *GDP70* shows the expected dramatic increase in magnitude when *ICRG82* and *BERI72* replace *FREE7386*. This again demonstrates the power of institutions, and the extent of additional institutional information provided by these two variables.

-TABLE 4 ABOUT HERE-

Empirical Results--Investment

Another basis for comparing the different institutional variables is in their ability to explain investment. Barro excludes investment from his growth estimations at least implicitly because many of the variables in the growth equation, including institutional variables, operate, at least in part, through factor accumulation. The importance of institutions, then, can also be examined through empirical estimates of the determinants of investment. Barro (1991) estimates variants of the following equation for private investment, for which cross country data is available beginning in the 1970's:

$$(4) \quad PINV7085 = \alpha + \beta_1 GDP60 + \beta_2 SEC60 + \beta_3 PRIM60 + \beta_4 GOVCONS + \beta_5 REV + \beta_6 ASSASS + \beta_7 PPI60DEV + \beta_8 PPI60 + \varepsilon_i$$

where *PINV7085* is the average ratio of real private investment to real GDP over the period, equal to the ratio of real total investment over real GDP less the same ratio for real public investment. The 1960 purchasing power parity investment deflator (from Summers and Heston) is also employed.[24] Initial income, *GDP60*, enters as a proxy for initial capital stock. The higher the initial capital stock, the greater the effect of diminishing returns on investment, and the less investment that would be expected.

As before, the ICRG and BERI indices perform substantially better than the political violence or Gastil variables: their statistical and economic significance is greater

and the explanatory power of models that contain only the ICRG and BERI indices is greater than those that contain the political violence or Gastil measures.

Table 5 summarizes the investment results comparing the political violence, ICRG and BERI indicators. Contrary to the Barro (1991) results for the time period 1960-85, Table Five indicates that for the time period 1974-89 revolutions and assassinations are statistically insignificant, alone or in combination with *ICRG82* and *BERI72*, while the institutional indicators are statistically significant wherever they appear.[25] Economically, as well, the institutional indicators offer a more powerful explanation of growth. The sum of the standardized coefficients for *REVC7489* and *ASSAS7489* in regression (4) of Table 5 is -0.31. When the BERI variable enters alone, in regression (5), its standardized coefficient is .815. When the three variables enter together, the difference remains equally dramatic, -.08 versus .77. The ICRG results are qualitatively the same, although the magnitude of the differences in absolute value is smaller: -.20 versus .37 when they enter in separate equations, and -.12 versus .33 when they enter in the same equation.[26]

-TABLE 5 ABOUT HERE-

Although variable *GDP70* does not attain high levels of significance, both the magnitude of its coefficient and its significance increase noticeably in the presence of the institutional variables. The low capital stock of countries with poor institutions does not attract investment, despite the possibility of high returns, while the high capital stock countries, benefitting from good institutions, continue to attract investment despite diminishing returns. This effect is identified when relatively precise institutional variables are used to explain investment.

Similar results, summarized in Table 6, were obtained when the Gastil index was substituted for the political violence indicators. *FREE7386*, entered alone or in

combination with *ICRG82* or *BERI72*, is consistently insignificant. The institutional indices are statistically significant in every case, and have an economic impact (as measured by standardized parameters) that substantially outweighs the effect of *FREE7386*. In combination with *FREE7386*, *ICRG82* has a standardized coefficient equal to .386. Alone, *ICRG82* has a standardized coefficient of .375. These not only exceed *FREE7386* (.152 and .123, respectively), but are comparable in magnitude to the other most powerful explanatory variable, enrollment in primary education, which has standardized coefficient estimates uniformly in the range of .35.

-TABLE 6 ABOUT HERE-

The BERI variable is even more impressive, with standardized coefficient estimates ranging as high as .88 compared to the estimate for the Gastil variable of .34, in the regression where they both appear. The BERI variable is the most statistically and economically significant explanatory variable in those investment equations in which it appears, for the sample of 38 countries for which BERI and private investment data is available. Finally, once again, the coefficient on initial income, *GDP70*, becomes larger and more significant in the presence of the institutional variables, demonstrating once again the importance of controlling for institutions in identifying diminishing returns to capital.

Conclusion

These results offer strong support for three propositions. First, political violence and the Gastil political and civil liberties indicators are insufficient proxies for the quality of the institutions that protect property rights. More direct indicators are needed to properly account for the influence of institutions. Second, institutions that protect property rights are crucial to economic growth and to investment. Some of the

regressions above point to effects that rival even those of education. Moreover, the effect of institutions on growth persists even after controlling for investment. This suggests that the security of property rights affects not only the magnitude of investment, but also the efficiency with which inputs are allocated. Third, when institutions are controlled for, stronger evidence emerges for conditional convergence. The coefficients on initial income, from which conditional convergence or diminishing returns to capital are evaluated, rise in both statistical and economic significance in the presence of the ICRG and BERI indices of institutional quality.

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Table 1. Correlations between Institutional Variables

	ICRG82	BER172
FREE7386	-0.661	-0.761
ASSN7488	-0.232	-0.240
ASSN6088	-0.270	-0.319
REVC7488	-0.424	-0.297
REVC6088	-0.514	-0.463

Table 2. Growth, Institutions and Political Violence: ICRG

	(1)	(2)	(3)	(4)
Intercept	1.980	3.028	0.254	1.345
	1.980	2.851	0.237	1.091
ICRG82			0.092	0.072
			3.420	2.499
REVC7489		-1.630		-1.115
		-1.904		-1.302
ASSN7489		-3.486		-2.278
		-1.695		-1.108
GDP70	-0.401	-0.482	-0.692	-0.683
	-2.564	-3.141	-4.055	-4.030
SEC70	6.083	6.284	5.051	5.411
	3.819	4.083	3.286	3.524
PRIM70	-0.690	-0.959	-0.532	-0.752
	-0.758	-1.072	-0.617	-0.862
GCON7489	-5.222	-6.388	-4.289	-5.286
	-1.213	-1.527	-1.051	-1.293
PP174DEV	-0.920	-0.985	-0.892	-0.941
	-2.243	-2.482	-2.3	-2.439
R-Square	0.198	0.270	0.291	0.318
N	97	97	97	97

Table 3. Growth, Institutions and Political Violence: BERI

	(1)	(2)	(3)	(4)
Intercept	1.022	0.356	-0.977	-0.627
	0.644	0.205	-0.545	-0.336
BER172			0.376	0.263
			2.111	1.357
REVC7489		-1.653		-1.630
		-1.304		-1.300
ASSN7489		-23.015		-14.695
		-1.710		-1.003
GDP0	-0.501	-0.594	-0.694	-0.721
	-2.751	-3.277	-3.520	-3.566
SEC70	5.376	4.624	4.047	4.026
	2.805	2.411	2.083	2.067
PRIM70	0.653	2.793	0.580	2.018
	0.377	1.389	0.349	0.976
GCON7489	-1.145	-1.508	-2.968	-3.052
	-0.183	-0.249	-0.489	-0.500
PP174DEV	-0.929	-0.894	-0.711	-0.748
	-1.921	-1.938	-1.495	-1.595
R-Square	-0.276	0.375	0.350	0.405
N	46	46	46	46

Table 4. Growth, Institutions and the Gastil Indices

	BERI			
	(1)	(2)	(3)	(4)
BERI72			0.376 *2.111*	0.381 *2.067*
FREE7386		-0.042 *-0.287*		0.018 *0.128*
GDP70	-0.501 *-2.751*	-0.527 *-2.565*	-0.694 *-3.520*	-0.686 *-3.239*
R-square	0.276	0.277	0.350	0.350
N	46	46	46	46
	ICRG			
	(1)	(2)	(3)	(4)
ICRG82			0.092 *3.420*	0.089 *3.234*
FREE7386		-0.111 *-1.152*		-0.052 *0.563*
GDP70	-0.401 *-2.564*	-0.482 *-2.815*	-0.692 *-4.055*	-0.720 *-4.032*
R-square	0.198	0.210	0.291	0.293
N	97	97	97	97

Dependent variable: Average per capita GDP growth, 1974-89.
For other control variables, see Tables 1 and 2. Numbers in italics are t-statistics.

Table 5. Investment, Institutions and Political Violence

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.160	0.112	0.125	0.159	0.124	0.123
	5.188	3.443	3.404	2.678	2.487	2.174
Institut'l var.		0.002	0.001	0.263	0.014	0.014
		2.151	1.741	1.357	3.087	2.554
REVC7489	-0.017		-0.014	-0.011		-0.008
	-0.578		-0.480	-0.216		-0.174
ASSN7489	-0.083		-0.042	-0.560		-0.118
	-1.201		0.072	-1.346		-0.281
GDP70	-0.0002	-0.004	-0.004	-0.002	-0.009	-0.009
	-0.050	-1.000	-0.942	-0.461	-1.754	-1.643
SEC70	0.019	-0.002	0.528	0.033	0.007	0.005
	0.447	-0.044	-0.002	0.528	0.131	0.085
PRIM70	0.065	0.071	0.067	0.090	0.026	0.037
	2.529	3.011	2.662	1.323	0.519	0.564
GCON7489	0.005	0.043	0.048	-0.103	-0.215	-0.204
	0.043	0.345	0.381	-0.527	-1.221	-1.105
PP174	-0.022	-0.019	-0.014	-0.014	-0.011	-0.011
	-2.549	-2.325	-2.375	-1.329	-1.136	0.359
R-Square	0.312	0.338	0.345	0.215	0.356	0.359
N	69	69	69	38	38	38

Table 6. Private Investment, Institutions and the Gastil Indices

	BERI		
	(1)	(2)	(3)
BERI72		0.014 *3.087*	0.015 *3.299*
FREE7386	0.002 *0.534*		0.005 *1.247*
GDP70	-0.0001 *-0.019*	-0.009 *-1.754*	-0.007 *-1.233*
PPI74	-0.016 *-1.444*	-0.011 *-1.136*	-0.014 *-1.451*
R-square	0.166	0.350	0.388
N	38	38	38
	ICRG		
	(1)	(2)	(3)
ICRG82			0.002 *2.205*
FREE7386	0.002 *0.677*	-0.111 *-1.152*	0.002 *0.861*
GDP70	0.002 *0.396*	-0.482 *-2.815*	-0.003 *-0.685*
PPI74	-0.022 *-2.505*		-0.021 *-2.453*
R-square	0.293	0.338	0.345
N	69	69	69

Dependent variable: Average private investment/GDP, 1974-89.
For other control variables, see Table 5. Numbers in italics are t-statistics.

ENDNOTES

[1] This chapter was originally published under the same title in *Economics and Politics*, 7(3), November 1995, 207-27. It is reprinted with permission from Blackwell Publishing.
[2] See also Olson (1982) and Weingast (1993).
[3] Kormendi and Meguire (1985) and others assert that the Gastil indices are probably correlated with economic rights. They obtain very significant results using the Gastil civil liberties index as an explanation of rates of investment. We do not find the Gastil indices to be significant determinants of investment; the different results are likely due to their smaller sample, and to the fact that their Gastil index is from 1979, close to the end of their growth period, raising issues of simultaneity.
[4] Alesina, Ozler, Roubini and Swagel (1996) find no impact of growth on a broad measure of government turnover, but do find a significant impact of contemporaneous growth on coups.
[5] Researchers using the Gastil data have found evidence that causality works from growth to better scores on the Gastil indices, rather than the reverse. See Bilson (1982) and Helliwell (1994).
[6] Mody and Wheeler (1991) and Mauro (1993) use indicators from a third political risk service, Business International (BI), and find them to be significant determinants of foreign direct investment and investment, respectively. They use BI data from the 80's, a sample which includes many fewer countries than the ICRG data, and a much shorter time period than the BERI data. BI also has data from the 70's but the variables are different and are scored differently.
[7] See Appendix for details on the data.
[8] See Weingast (1993) and Keefer (1993) for a discussion of the effects of government credibility on investment and growth.
[9] The predominance of trading as the object of most new entrepreneurial effort in Russia during the transition is likely due not only to the high returns to trading, but also to the low returns to other forms of economic activity that are driven down by riskiness of investments and the difficulties of making credible deals with corrupt government officials.
[10] Poorer countries are likely to score lower on this measure. The correlation coefficient for 1972 values of the infrastructure variable and income per capita in 1970 is .87.
[11] For example, weighting by factor scores generated from factor analysis yields scales correlated at .99 with the simple additive indices for ICRG and BERI.
[12] Barro and Lee (1993) similarly argue that political violence indicators averaged over a longer period may contain more information relevant to current investment decisions than do indicators averaged over more recent but shorter periods.
[13] The Spearman rank correlation coefficients for the BERI data are substantially higher than the Pearson coefficients for the revolutions and coups variables. *BERI72* has a Spearman correlation of -.60 with *REVC7488* and -.72 with *REVC6088*.
[14] Like Barro and others, we assume that institutions do not affect g, the rate of improvement in institutions and technology.
[15] Other research has employed the log of initial GDP. The regressions reported below, employing initial GDP, were also run with the log of this variable. In nearly all cases the qualitative findings, that the institutional variables add significant additional information that explains growth, remain unchanged (the exception is noted in footnote 20).
[16] Barro (1991) uses economic growth and investment data from Summers-Heston. For this paper, data on these variables comes from the World Bank and are taken from Levine and Renelt (1992).
[17] See McMillan, Rausser and Johnson (1991), Islam (1993) and Knight, Loayza and Villanueva (1993) for different econometric approaches to this problem in the context of cross-country growth equations.
[18] To fully adjust to the use of the later period, the following other control variables are used: *PPIDEV74*, *GCON7489*, *PRIM70*, *SEC70* and *GDP70*. *GCON7489* is from the World Bank [Levine and Renelt (1992)] and includes education and defense expenditures. Government consumption in Barro (1991) does not include these expenditures.
[19] The adjusted R^2 ratios are low by the standards of the literature on cross country regressions because the sample only extends for 16 years (1974 - 1989). Similar results, with more typical R^2 ratios (in the .5 to .6 range), are obtained when the longer period, 1960 - 89, is used. However, by focusing on the shorter

period, we mitigate the causality issues that have arisen in earlier uses of the Gastil data, by Kormendi and Meguire (1985), Scully (1988) and others, in which growth periods beginning in 1950 or 1960 are examined despite the fact that the Gastil indices cover the period 1973-85.

[20] The work of MRW (1992) and others has already indicated that human capital is a significant determinant of conditional convergence.

[21] Using log of initial income and the BERI sample of countries, and including the two political violence indicators along with *BERI72*, all three variables are statistically insignificant, although *BERI72* is more significant than *ASSAS7488*, and the standardized estimate of *BERI72* is equal to the sum of the standardized estimates of the two political violence indicators.

[22] These regressions were also run using the original Barro (1991) period of 1960-85. The results were similar in all respects. The institutional variables performed better, in terms of both statistical significance and economic impact, than the political violence variables. Moreover, the coefficients on initial income (*GDP60*) exhibited the expected increase in statistical significance and magnitude when the institutional variables were added, suggesting once again that the institutions that protect property rights are key determinants of the steady state of income that conditions rates of convergence.

[23] Helliwell (1994) finds that the Gastil variable fails to predict growth for the 1960-85 period.

[24] Barro runs this model with and without dummy variables for Africa and Latin America. These dummies remain significant even in the presence of the ICRG and BERI indices, suggesting either that our indices incompletely describe the institutional characteristics that distinguish countries on these continents, or that there are non-institutional idiosyncracies that must also be taken into account. They might also become insignificant if were better able to control possible endogeneity between the institutional indices and growth. Using a simultaneous equations methodology to examine the relationship of growth and political stability, Alesina, et al. (1996) find that these dummies are insignificant in two of their three specifications.

[25] The ICRG/BERI variables are much weaker at predicting total investment. This is consistent with the theory, however. We would not expect public investment to be sensitive to risks of expropriation.

[26] Regressions comparing the institutional and the political violence indicators were also run using the original Barro (1991) specification [regression (20) in his paper], covering investment over the period 1970-85, but independent variables from 1960. The results were unchanged; the ICRG and BERI variables were at least as significant as the political violence indicators, either in combination with them, or entered separately.