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# The Relevance of Judicial Procedure for Economic Growth

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*Abstract:*

*It is argued that a number of judicial procedures increase the predictability of court decisions. This is conjectured to induce more transactions and higher investment levels which should, in turn, lead to higher growth. This paper asks whether the factual implementation of various judicial procedures has any significant and robust effects on economic growth. All in all, 15 procedural devices like the right to counsel, the right to present a defense, the presumption of innocence, and the right to appeal are analyzed. On the basis of 67 countries, it turns out that timeliness, written – as opposed to oral - procedures, and the right to counsel have a robust positive effect on growth, whereas the number of independent procedural actions as well as the presumption of innocence have negative effects on growth. Our results partially contradict the results of former studies based on the Lex Mundi dataset.*

*Key Terms: Judicial procedure, Legal formalism, Judicial Independence, rule of law, investment, growth.*

*JEL classification: H11, K40, 040, P51*

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**The Relevance of Judicial Procedure for Economic Growth**

## 1 Introduction

A number of recent publications show that some structural characteristics of the judiciary have significant impacts on economic growth (Feld and Voigt 2003, 2006). These studies focus primarily on the legal but also the factual independence of courts. However, the effects of other characteristics of the judicial process are less well known. For instance, we know very little about the impact of judicial procedure like the right to counsel, the right to present a defense, the presumption of innocence, the right to appeal and so forth on income and growth. This is a serious shortcoming as they are often considered to constitute an important aspect of the rule of law.

The present paper attempts to fill this gap. We are primarily interested in estimating the growth effects of different aspects of judicial procedure. This is done on the basis of 67 countries over the time period 1985-2003 (Table A3 in the Appendix lists the countries). The outcome of our analysis is to some extent in accordance with our theoretical priors as some of our hypotheses cannot be rejected empirically. Our core findings are that timeliness, written – as opposed to oral - procedures, and the right to counsel have a robust positive effect on growth, whereas the number of independent procedural actions as well as the presumption of innocence have negative effects on growth.

The rest of the paper is structured as follows: section two shortly summarizes the main arguments that make us expect the quality of the judicial process to have a positive impact on growth and further contains a brief overview over the available empirical studies. Section three describes the dataset used. Section four presents the estimation approach and contains a discussion of the results. Section five concludes.

## 2 Theory: Two Competing Views on the Effects of Judicial Procedure

Flourishing economies crucially hinge on secure private property rights and a functioning court system. It could even be argued that property rights can never be secure unless there is a well functioning court system. The independence of courts from both the other branches of government as well as from the conflicting parties has been stressed frequently. Yet, judicial independence can also constitute a danger: it could lead judges to render decisions only with hefty delays, render decisions that neglect much of the available evidence, render decisions that rely on non-applicable norms, or render decisions that are patently false. Independent judges are not only a necessary condition for an efficient economy, they also constitute a

threat to it. This danger was described precisely by Brutus in the Anti-Federalist Paper #11 (1986): "It is, moreover, of great importance, to examine with care the nature and extent of the judicial power, because those who are to be vested with it, are to be placed in a situation altogether unprecedented in a free country. They are to be rendered totally independent, both of the people and the legislature … No errors they may commit can be corrected by any power above them … nor can they be removed from office for making ever so many erroneous adjudications." In more recent terms, one could say that the accountability of judges to the law ought to be secured. One way to increase the chances that judges will stick to the law is to use certain judicial procedures.

Judicial procedure is here defined as those formal steps that judges – and other actors involved in the judicial system – need to follow in order to produce binding decisions. In the U.S., it is usually called due process. The immediate purpose of the tools used to implement judicial procedure is to ensure that court proceedings are fair. If factually enforced, their effect is to make judges accountable to the law as various procedural tools make it more difficult for judges not to give valid legislation its proper role. The right to legal counsel, e.g., ensures that the asymmetry in judicial expertise between the judge and the defendant is systematically reduced by supporting defendants with legal expertise. Lawyers can be expected to insist on the proper application of the relevant norms which increases judges' accountability to the law. The right to appeal has a very similar function: except for the highest level of courts, it creates a positive probability for any judge that her judgment will not be final but will be checked for its proper application of the relevant norms by colleagues with higher status. This creates incentives to apply the relevant norms properly – and hence increases accountability. Similar arguments can be made with regard to all other judicial procedures advanced in the empirical section.

Higher degrees of accountability thus decrease the likelihood that legislation is applied arbitrarily. Formulated the other way round, higher degrees of accountability imply that the application of legislation becomes more predictable. It can further be argued that procedural safeguards increase the likelihood that judges will be factually independent from the other government branches as well as from the conflicting parties: if they try to induce judges to draw on non-applicable norms, judges know that they are likely to be overturned by their colleagues (as a consequence of the right to appeal) or heavily criticized in public (as a consequence of the trial taking place publicly). Hence, procedural tools are likely to re-enforce judicial independence. In other words: Judicial independence and judicial accountability are complementary.

What are likely transmission channels that would lead countries with well-defined judicial procedural rules to enjoy high economic growth? One of the most basic problems of states is to turn simple promises into credible commitments: if the state's promise to create and enforce private property is perceived as cheap talk by potential investors, not much trade and investment is expected to take place. If, on the other hand, the promise to enforce private property rights is perceived as a credible commitment, trade and investment are expected to rise, which will lead to economic growth. A bit more specifically, at least three transmission channels can be thought of: (1) with regard to private law, the state's promise to enforce privately entered contracts can be increased via judicial procedures. This will, *ceteris paribus*, increase the number of voluntary contracts, i.e. the number of transactions will be higher. Moreover, it could increase people's willingness to specialize which would result in a higher division of labor which is, of course, expected to contribute to economic growth. (2) If judicial procedures increase the credibility of a state's promises also with regard to public law, some additional positive effects can be expected: if the state can credibly commit not to interfere arbitrarily with private business, both foreign and domestic investment will be higher than if those promises were just cheap talk. (3) It the state wants to issue bonds, the perceived credibility of its promises will be an important determinant for the level of interest that it has to issue the bonds with. Lower interest rates on a given level of debt imply a lower tax burden for the respective society.

There are only few studies concerned with the economic effects of judicial procedures. Feld and Voigt (2003, 2006) introduce two indicators of judicial independence, one for *de jure* independence, the other one for *de facto* independence. Estimating the impact of JI on economic growth, they find that while *de jure* JI does not have an impact on economic growth, *de facto* JI positively influences real GDP per capita growth in a sample of 73 countries. The impact of *de facto* JI on economic growth is robust to outliers, to the inclusion of several additional economic, legal and political control variables and to the construction of the index. The authors thus conclude that *de facto* JI matters for economic growth. Hayo and Voigt (2007) analyze determinants of *de facto* JI and the relationship between *de jure* and *de facto* JI. They show that there is not a one-to-one correspondence between these indicators for JI.

Djankov et al. (2003) develop an entirely different approach towards judicial procedure which they prefer to call procedural or legal formalism. They describe a simple triadic model in which a dispute among neighbors is solved informally by a neutral third party (their neighborhood model). Such dispute-settlement amongst neighbors could work without any formalized procedures and this is used as their benchmark against which real-world systems

are compared. Djankov et al. suspect that more formalized procedures do not serve to protect the conflicting parties but rather to secure government influence on court decisions. Procedural tools would, hence, not contribute to higher levels of accountability and independence. They are, rather, interpreted as aspects of regulatory intervention creating potentially unnecessary but costly burdens on the conflicting parties. They come up with measures that reflect the exact procedures that are used in two paradigmatic cases (the eviction of a tenant for non-payment of rent and the collection of a bounced check). Their index of procedural formalism is to measure "substantive and procedural statutory intervention in judicial cases at lower-level civil trial courts", and is formed by adding up the following variables:

(i) Professionals vs. laymen; their assumption seems to be that controlling the access to the court for both the conflicting parties as well as the decision-makers, government increases its control over the judicial process. A competing argument is that restricting access to qualified experts increases the quality of judicial decision-making.

(ii) Written vs. oral elements; here, a critical argument (not explicitly developed by Djankov et al.) could be that the requirement of all steps to be in writing could increase the incentives for corruption. If evidence is only allowed if it carries the court's seal, parties might be willing to pay for the seal in cases in which evidence was brought in too late etc. The counterargument (explicitly made in Djankov et al.) is that written litigation raises accountability as the entire procedure can be reproduced later on.

(iii) Legal justification; demanding legal justification would be yet another instrument of the sovereign to pursue his interests. In favor of this instrument, it could be argued that it increases the relevance of legislation, as the relevant laws need to be explicitly mentioned.

(iv) Statutory regulation of evidence; the regulation of evidence could, again, be used to further the goals of government. Yet, it could also enhance the transparency of the process.

(v) Comprehensive appeal procedures; Djankov et al. suspect that review of first instance court decisions by appellate courts does not serve to protect the conflicting parties from mistakes committed by first-instance judges but rather to keep the sovereign in control of court outcomes. If a superior judge is in control of lower court decisions, this is coded as inconsistent with the neighborhood model.

(vi) Engagement formalities; here, the argument is that only voluntary pre-trial conciliation is in accordance with the neighborhood model as are flexible rules of notification both of process and judgment.

(vii) Independent procedural actions. Additionally, they also produce two numbers that reflect the number of days needed in order to get the tenant evicted and the bounced check cashed in. Their indicator was produced with the association of law firms Lex Mundi and is available for 109 countries.

Their study can be criticized on a number of grounds: the benchmark for their evaluation, i.e. their neighborhood model, might be adequate to resolve simple disputes between neighbors but could be completely inadequate if complex contracts are under dispute. Moreover, they seem to assume that speed in judicial decision-making needs to be maximized. Yet, some decisions might warrant an extensive fact-finding and evaluation process, which requires a minimum amount of time. The 'data' are not based on factual but only on hypothetical cases: they do not measure how courts really perform but how law firms around the world believe that their own courts would perform were they to decide on the two paradigmatic cases constructed by Djankov et al.

The results of their analysis are nevertheless very interesting: They find that procedural formalism is systematically greater in civil than in common law countries. Moreover, formalism is associated with higher expected duration of judicial proceedings, more corruption, less consistency, less honesty, less fairness in judicial decisions, and inferior access to justice. Given these disadvantages, we would expect that, *ceteris paribus*, countries characterized by high levels of procedural formalism should also experience lower growth rates. Since Djankov et al. did not estimate the consequences of procedural formalism on growth, it is done here (in section 4).

This closes the description of the two competing approaches towards judicial procedure. Whereas Djankov et al. suspect the government's desire to interfere into conflict resolution everywhere, the competing approach interprets many judicial procedures as contributing to judicial accountability. Only empirical tests can show which approach is supported by the facts.


**3 Data Description**

In order to estimate the effects of judicial procedure on economic outcomes, we need a number of variables proxying for the various elements of judicial procedure. As previous studies have shown, formal legal texts and their factual enforcement are often worlds apart. It is, hence, desirable to draw on variables that depict judicial procedure as it is factually enforced.

Hathaway (2002) created an index of Fair Trial which contains ten elements, namely (1) independent and impartial judiciary, (2) the right to counsel, (3) the right to present a defense, (4) the presumption of innocence, (5) the right to appeal, (6) the right to an interpreter, (7) the absence of *ex post* facto laws, (8) the right to a public trial, (9) the right that the charges are presented with prior notice and (10) the timeliness of court action.[1]

These are all procedural aspects. All of them can be expected to make the behavior of judges and other representatives of the judiciary more predictable. It might be useful to highlight some conjectures in a little more detail. In the European Convention on Human Rights, only three of these procedural aspects are not explicitly mentioned in conjunction with criminal charges, namely (1) the right to an independent and impartial judiciary, (8) the right to a public trial and (10) the right to timeliness. Some of these elements indeed only make sense with regard to criminal cases like: (3) the right to present a defense, (4) the presumption of innocence, and (9) the right that the charges are presented with prior notice presuppose that we are dealing with cases in criminal law. *Ex ante*, it is unclear how procedures in criminal cases affect the number of transactions, investment in physical capital and the degree of specialization with regard to human capital. To the extent that these procedural rights are explicitly mentioned with regard to criminal cases but are readily applicable to public and private law cases as well, it seems safe to assume that compliance in criminal law should be highly correlated with compliance in both public and private law. To the extent that these procedural rights are not directly applicable to non-criminal cases, ambivalent arguments appear possible. On the one hand, it can be argued that higher degrees of fairness in criminal cases would increase the confidence that people have in the court system in general– and all state organizations as well. On the other, it could be argued that the number of transactions and investment behavior have little relation to how criminal cases are run.

To generate her indicator, Hathaway (2002) relied on the Human Rights Reports issued by the U.S. State Department. These reports are verbal and thus needed to be quantified. Two research assistants coded the data and intercoder reliability was 82%. The indicator is available for six years (1985, 88, 91, 94, 97 and 2000) and for up to 160 countries. Countries are coded "0" if the respective right is always enforced, "0.5" if it sometimes enforced and "1" if it is never or not enforced. Thus, the indicator is clearly constructed to reflect the

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[1]     Hathaway selected these issues because they figure prominently in the various human rights conventions (the International Covenant on Civil and Political Rights, the American Convention on Human Rights, the European Convention on Human Rights [more precisely the Convention for the Protection of Human Rights and Fundamental Freedoms], and the African Charter on Human and People's Rights).

factual enforcement of judicial procedures. The focus is restricted to civilian trials, i.e. the practices of military courts are not taken into account. Besides this restriction, the Hathaway indicator refers to all kinds of trials and includes civil as well as penal or administrative cases. The indicator needs to be treated with caution as the correlation within countries but across years is surprisingly low. In order to reduce the likelihood that singular events unduly influence the results, we use the average over all the years for which data are available. An additional problem with the data is its source: the country reports of the State Department are political documents, which might also serve the purpose to justify U.S. development aid to certain states etc. Yet, it has been noted (Poe et al. 1999) that the annual reports of Amnesty International and the State Department have been steadily converging and do not display many differences concerning the evaluation of most states anymore. Potentially, the coarse coding constitutes yet another problem. The "always" and "never enforced categories" are not problematic. However, the "sometimes" category would potentially allow extreme variation: a procedural right could not have been enforced just one single time, but also systematically in hundreds or even thousands of cases. Although the State Department Reports are based on reported facts, the subjective evaluation of the staff of U.S. embassies still plays a role. Both measures are influenced by what the observers expected to see in a country. Ideally, we would prefer more objective measures.

Despite these possible shortcomings, the Hathaway data have a number of advantages over the Lex Mundi data: They reflect the experiences with thousands of court cases that really took place. They therefore reflect the problems encountered in real interactions and not only with problems supposed to be important as in Lex Mundi.[2] What is more, the Hathaway data reflect factual experience over a decade and a half whereas the Lex Mundi data is a snapshot of what a number of advocates believed to be likely at one point of time. If a country had just implemented some judicial reforms, the expected improvements might already be reflected in their answers. Since we use the average of the Hathaway data, this is highly unlikely here.

We now present some descriptive statistics of the ten elements here explicitly taken into consideration. It is noteworthy that the variation in two of the ten elements is particularly low, namely "no *ex post* facto laws" and "right to an interpreter". *Prima facie*, we would not expect to see dramatic effects caused by these two elements.

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[2]    In fact, cashing in bounced checks does not seem to be a very typical problem either in highly or less highly developed countries.

Table 1: Descriptive Statistics of the 10 judicial procedure indicators from Hathaway and the seven criteria from Djankov et al.

|  | Min. | Max. | Mean | Std. Deviation |
| --- | --- | --- | --- | --- |
| Judiciary independent and impartial | 0 | 1,00 | 0,582 | 0,391 |
| Right to Counsel | 0 | 0,750 | 0,324 | 0,187 |
| Right to Present Defense | 0 | 0,667 | 0,172 | 0,176 |
| Presumption of Innocence | 0 | 0,833 | 0,157 | 0,172 |
| Right to Appeal | 0 | 0,750 | 0,065 | 0,116 |
| Timeliness | 0 | 1,00 | 0,437 | 0,298 |
| No *ex post* facto laws | 0 | 0,167 | 0,003 | 0,020 |
| Public | 0 | 0,417 | 0,062 | 0,101 |
| Charges Presented Prior | 0 | 1,00 | 0,232 | 0,198 |
| Right to Interpreter | 0 | 0,250 | 0,010 | 0,050 |
| Professionals vs. Laymen |  |  |  |  |
| Written vs. Oral Elements |  |  |  |  |
| Legal Justification |  |  |  |  |
| Regulation of Evidence |  |  |  |  |
| Control of superior review |  |  |  |  |
| Engagement formalities |  |  |  |  |
| Independent procedural actions |  |  |  |  |

## 4 Estimation Approach and Interpretation of Results

The empirical analysis of our hypotheses of interest takes place within the context of a basic growth model. We try to explain the average growth rate of per capita GDP for 67 countries over the period 1985-2003 using the conventional framework of the Solow growth model.[3]

$$Y = B\alpha + J\beta + C\gamma + D\delta + L\lambda + \varepsilon, \tag{1}$$

where:
$Y$ = Vector of growth rates in %,

$B$ = Matrix of basic explanatory variables,

$\alpha$ = Vector of coefficients basic explanatory variables,

$C$ = Matrix of control variables,

$\gamma$ = Vector of coefficients on additional control variables,

$J$ = Matrix of procedural justice indicators,

$\beta$ = Vector of coefficients on procedural justice variables,

$D$ = Matrix of the degree of judicial formalism variables,

$\delta$ = Vector of coefficients on the degree of judicial formalism variables,

$L$ = Matrix of the legal origin variables,

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[3]  Although Hathaway provides data for 160 countries, we are only able to estimate our model for 67 countries because we only include countries that are also covered by Lex Mundi and have information for the full set of control variables.

$\lambda$     =     Vector of coefficients on the legal origin variables,

$\varepsilon$     =     Vector of errors.

Given the relatively short sample period of about 15 years over which the judicial indicators are available (1985 to 2000), we decided to concentrate on the average growth rate, as even cutting the period in half to generate a panel may lead to severe problems of unaccounted business cycle variations distorting the growth path. Moreover, the Djankov et al. variables on judicial formalism are only available for one point in time. To make use of the maximum number of years since 1985 currently available, we compute the economic variables as an average over the time period 1985-2003.

The basic explanatory variables collected in matrix B are the ratio of investments to GDP, the real GDP in US dollar in 1985, the rate of population growth in % and the share of persons over 25 years with a secondary education in % (Barro and Lee 2000). In the Solow growth model, we would expect the following variables to have an effect on the per capita growth rate *outside* the steady state: First, as growth rates of capital should be higher when the capital stock is low, growth rates of income should also be higher when the initial income is low. Second, GDP per capita growth rates should be higher when there are more investments. Third, population growth affects income per capita negatively. We could interpret the degree of schooling in the population either as an indicator of human capital, and then it will have the same impact as investments outside the steady state or we could interpret it as an indicator of labor-augmenting technological progress, which would affect income positively at the steady state. Using a modified version of the extreme bounds analysis suggested by Leamer (1978), De Haan and Sturm (2000) find investment, initial income, and the degree of schooling to be robustly linked to economic growth. In our sample, and applying a general-to-specific modelling strategy, it is rather population growth that turns out to be robustly related to growth, while schooling is much less so.

Matrix C contains the control variables of our model. Control variables can be allocated to different categories: *Regional dummies* for Africa, Asia, Middle East, South America, Pacific Islands, and transition countries. *Economic control variables* include openness defined as the sum of imports and exports divided by GDP (average over the period 1985-2003), inflation (growth rate of the GDP deflator over the period 1985-2003), and government expenditure in relation to GDP (average over the period 1985-2003), as e.g. suggested by Barro (1997) as an important variable. Additionally, a dummy for OECD members is used to control for the influence of being wealthy on growth. *Political and institutional control variables* are the

degree of democratization (POLITY IV), the degree of economic freedom (Fraser Institute, average over 1985-2003), the degree of press freedom (Freedom House 2002), Political rights and civil liberties (also from Freedom House), and the occurrence of military control (Banks 2004). All variables without a specific reference are taken from the Penn World Tables Version 6.2 (Heston et al. 2006).

Matrix J contains the observations on the judicial process indicators described above. We compute the average over the judicial indicators provided by Hathaway (2002) over the time period 1985-2000. A low value indicates that the respective procedural aspect is fulfilled, while a high value indicates a violation. Due to the very low variance of the "right to interpreter" and "no *ex post* laws" variables in our sample they have been excluded from the analysis. Note that we ran a number of robustness checks to ensure that the exclusion of these variables does not affect the results and that they are never statistically significant.

Matrix D contains the seven indicators proposed by Djankov et al (2003): Professional vs. laymen, Written vs. oral elements, Legal justification, Statutory regulation of evidence, Control of superior review, Engagement formalities, and Independent procedural actions. These indicators are available for both stylized cases, namely eviction of a tenant and collection of a check. In addition, Djankov et al. combine these indicators into simple indices for each of the two cases. These indices are never significant in our specifications, and for reasons of brevity, we do not report their results.

Matrix L contains the legal origin variables proposed by La Porta et al. (1999), namely English, French, German, Scandinavian and Socialist legal origin. They argue that these are "deep" institutional variables that can help to explain the cross-country economic performance.

It is interesting to look at the correlations of the four groups of judicial variables (procedural variables, formalism eviction of a tenant, formalism collecting a check, and legal origin). Tables A1 and A2 in the appendix provide the respective Pearson correlation coefficient and the outcome of statistical significance tests. None of the correlations are above 0.45 and many are not significant. Three noteworthy patterns are the following: Firstly, the procedural aspect timeliness is positively related to most formalism indicators, which implies that increasing formalism is associated with less timely decisions. Secondly, the formalism indicator independent procedural actions is positively correlated with most procedural indicators. This could be interpreted as more independent procedural actions leading to a less strict adherence to legal procedures. Of course, causality may run the other way around but it is less clear why a weaker adherence to judicial procedures should increase the number of independent

procedural actions. Thirdly, countries with a Scandinavian legal origin display a particularly strict adherence to procedural norms.

Since bivariate correlations are often misleading, we will concentrate on multivariate procedures for the explanation of the cross-country variation of average GDP growth rates. Regarding the econometric methodology, we apply a general-to-specific modeling approach (Hendry 1993). This has several advantages compared to the typical group-by-group analysis of indicators. It ensures that potential estimation biases are low, it allows for consistent testing procedures, and fully considers the interaction of the explanatory variables. In line of this approach, it would in principle be desirable to estimate equation 1 using all the available data. However, given our limited number of degrees of freedom, we have opted for a general-to-specific modeling approach within models that have *a priori* restrictions on equation (1).

In particular, we present the outcome of consistent testing-down approaches for the following four models:

$$Y = B\alpha + C\gamma + L\lambda + \varepsilon \,, \tag{2}$$

$$Y = B\alpha + C\gamma + J\beta + \varepsilon \,, \tag{3}$$

$$Y = B\alpha + C\gamma + J\beta + D_a\delta_a + \varepsilon \,, \tag{4}$$

where:  $D_a$ = Matrix of the degree of judicial formalism variables for eviction of tenant,

$\delta_a$ = Vector of coefficients on the degree of judicial formalism variables for eviction of tenant,

$$Y = B\alpha + C\gamma + J\beta + D_b\delta_b + \varepsilon \,, \tag{5}$$

where:  $D_b$ = Matrix of the degree of judicial formalism variables for eviction of tenant,

$\delta_b$ = Vector of coefficients on the degree of judicial formalism variables for eviction of tenant,

Since we still have quite a number of potentially influential variables in specifications (2)-(5), there is the danger that our final parsimonious models are not encompassing models, as inference may be path-dependent. Based on the re-examination of the vices and virtues of data mining by Hoover and Perez (1999), Hendry and Krolzig (1999) develop a model reduction algorithm, which is, according to a wide range of Monte-Carlo studies, surprisingly powerful in recovering the underlying data generating process (DGP). Statistical tests indicate that the unrestricted models based on equations (2)-(5) are acceptable representations of the DGP, as they pass all relevant diagnostic tests (results available upon request). This makes estimation with OLS possible. In the following tables, we present the resulting parsimonious models that emerge from the general-to-specific modeling process at a nominal significance level of 5%.

Table 2 shows the results of estimating equation (2). Column one contains the variables that remain after the reduction process and the elimination of which would violate a statistical test. The coefficient estimates and standard errors (SE) are given in columns two and three, respectively. Column four contains partial $R^2$s and column five estimates of the elasticities of the variables measured at their respective means.

**Table 2: Specific model for the per capita GDP growth rate in % (equation (2))**
**Included judicial variables: Legal origins**

| Remaining variables | Coeff. | SE | Partial-$R^2$ | Elasticities |
|---|---|---|---|---|
| Initial GDP in 1985 in US $ | -0.0016** | 0.0003 | 0.33 | -1.07 |
| Investment to GDP ratio in % | 0.930** | 0.221 | 0.23 | 1.29 |
| Population growth in % | -1.072** | 0.211 | 0.26 | -1.18 |
| Average inflation rate | -0.239* | 0.095 | 0.10 | -0.05 |
| Economic freedom index | 5.470* | 2.057 | 0.11 | 2.87 |
| South America | -8.559** | 2.794 | 0.14 | |
| Constant | -6.226 | 10.98 | 0.01 | |

| | |
|---|---|
| (1) No of observations | 67 |
| (2) SE equation | 9.14 |
| (3) $R^2$ | 0.57 |
| (4) Model selection criterion: Adj. $R^2$ | 0.526 |
| (5) Model selection criterion: Hannan-Quinn | 7.452 |
| (6) Joint test remaining variables | $F(6,60)$ = 13.2** |
| (7) Testing-down from general model | $F(16,44)$ = 0.82 |
| (8) Heteroscedasticity test | $F(11,48)$ = 0.96 |
| (9) Normality test | $Chi^2(2)$ = 2.42 |
| (10) RESET test | $F(1,59)$ = 2.36 |

*Notes*: Estimation method: OLS. The elasticity estimates are computed at the means of the respective variables. Low values of the judicial variables indicate that the respective right is usually enforced. *(**) indicates significance at a 5% (1%) level.

We find that only few of the initially 22 variables survive the testing-down process. In the lower panel of the table, relevant diagnostic information is given. First, in line 7 the testing-down tests indicates no statistical problems with regard to removing 16 variables. The remaining variables are highly significant as a group. Secondly, the model explains about 57% of the variation in the cross-country growth rates, which is good. To foster the comparison of final models across the four specifications in equations (2)-(5), we compute the Hannan-Quinn criterion (here computed including the log-likelihood constant) and the adjusted $R^2$. The Hannan-Quinn criterion is consistent and lies between the criteria proposed by Akaike and Schwarz with regard to penalizing a higher number of variables in the model. The adjusted $R^2$ is not as well-founded statistical theory but widely used in empirical applications.

For a valid estimation process it is important to ensure the adequacy of the underlying statistical assumptions. Therefore, we run a battery of diagnostic tests, none of which indicates any misspecification. The model passes tests for heteroscedasticity (White (1980), using squares), normality (Jarque and Bera (1987), with a small-sample correction), and misspecification (RESET test based on Ramsey (1969) using squares of the fitted values).

Looking at the outcome of estimating equation (2), we find that the impact of the variables that survive the testing-down process is in line with our theoretical priors. Regarding the economic variables, there is a negative effect of initial income, a positive effect of investments on growth, a negative effect of the population growth rate on growth. In addition, we obtain a negative impact of the inflation rate on growth.

Interpreting these findings, we can conclude first that there is evidence of income convergence, as the countries that were relatively poorer in 1985 exhibit a faster growth rate. However, this is *conditional* convergence, i.e. after controlling for other effects. Note that we do *not* find evidence for unconditional convergence in our sample (results available upon request). Every $1000 additional per capita income reduce the average growth rate over the full period by about 1.6 percentage points. This is not a trivial impact, as per capita income varies from about $700 to almost $25000 per year and the mean of the average per capita growth rates is about 12 percent.

Second, investment has a positive effect on growth, as expected. A one percentage point higher share of investments in GDP raises the average growth by about 0.9 percentage points. Third, population growth exerts a negative influence on the per capita growth rates. An increase of the population growth rate by one percentage point lowers the GDP growth rate by about 1.1 percentage points.

In addition to the core economic variables, the economic freedom index is significant, indicating that greater freedom leads to an increase in the average growth rate. Since the dimension of this index and of the judicial indices employed below is arbitrary, it may be useful to look at the estimated elasticities at the sample mean in the last column of Table 2. Here we find a high estimate of the elasticity, a one percent increase in economic freedom causes a 2.9 percent increase in the GDP growth rate.

Finally, the countries in South America appear to grow by about 9 percentage points below the rate that we would expect given the values of the other variables in the model. Given the focus of our paper, it is important to point to a group of variables that has not come out as significant: legal origin. Thus, legal origins do not have a significant influence on the average growth rate in our sample.[4]

It is of interest to compare the relative importance of variables in the model. Partial $R^2$s give the explanatory power of variables after the impact of the other variables has been accounted for. Here we find that the three variables that are directly derived from the Solow model have the highest relative explanatory power. Finally, from the estimated elasticities at the mean of the respective variables we get further insights into the effects of relative changes in the explanatory variables. The economic freedom index clearly shows the highest elasticity. However, the effects of the three economic variables derived from the Solow growth model are also rather elastic.

In a next step, we estimate equation (3) using the Hathaway-coded indicators of procedural aspects of the national legal systems. Table 3 contains the outcome of the testing-down process from the general model with 27 variables

**Table 3: Specific model for the per capita GDP growth rate in % (equation (3))**
**Included judicial variables: Procedural indicators**

| Remaining variables | Coeff. | SE | Partial-$R^2$ | Elasticities |
|---|---|---|---|---|
| Initial GDP in 1985 in US $ | -0.0014** | 0.0003 | 0.35 | -0.97 |
| Investment to GDP ratio in % | 0.603** | 0.190 | 0.15 | 0.83 |

---

[4] Due to perfect collinearity, the regional dummy for transition countries makes it impossible to include the indicator for socialist legal origin.

| | | | | |
|---|---|---|---|---|
| Population growth in % | -1.143** | 0.197 | 0.37 | -1.25 |
| Presumption of innocence | 34.10** | 6.813 | 0.30 | 0.42 |
| Timeliness | -18.63** | 4.244 | 0.25 | -0.54 |
| Military control | -6.876* | 3.072 | 0.08 | |
| South America | -5.392* | 2.663 | 0.07 | |
| Transition countries | -14.27* | 6.201 | 0.08 | |
| Constant | 36.71** | 5.502 | 0.43 | |

| | |
|---|---|
| (1) No of observations | 67 |
| (2) SE equation | 7.67 |
| (3) $R^2$ | 0.71 |
| (4) Model selection criterion: Adj. $R^2$ | 0.666 |
| (5) Model selection criterion: Hannan-Quinn | 7.154 |
| (6) Joint test remaining variables | $F(8,58)$ = 17.5** |
| (7) Testing-down from general model | $F(19,39)$ = 0.41 |
| (8) Heteroscedasticity test | $F(14,43)$ = 1.23 |
| (9) Normality test | $Chi^2(2)$ = 0.06 |
| (10) RESET test | $F(1,57)$ = 0.30 |

*Notes*: Estimation method: OLS. The elasticity estimates are computed at the means of the respective variables. *(**) indicates significance at a 5% (1%) level.

Again, the removal of 19 variables from the general model is accepted at every sensible level of significance as is evident from the F-test reported in line 7 of the lower panel of the table. We observe a substantial improvement in explanatory power as the coefficient of determination rises from 0.57 in the previous model to 0.71. This improvement in the model is also apparent from the two model selection criteria displayed in the table. The diagnostic tests are far away from becoming significant.

Interpreting the remaining variables, it is noteworthy that the variables directly derived from the Solow model are again highly significant. The absolute impact of these variables has decreased, except for population growth, which has now a somewhat stronger negative impact on growth. These changes are also reflected in the relative impact of these variables in terms of partial $R^2$s and elasticities. In contrast, neither economic freedom nor inflation remain in

the final specification. There are now significant additional control variables, as transition countries as well as those under military rule experience lower economic growth than the average of countries in our sample.

Two judicial variables, namely timeliness and presumption of innocence, appear to have a significant effect on income growth. Those economies characterized by relatively longer judicial processes exhibit a lower growth rate. At the same time, the presumption of innocence has a significantly positive sign, indicating that upholding that notion may have costs in terms of lower economic growth. One explanation for this effect is that a strong focus in practice on this core idea of many legal systems makes it harder to proof a person guilty, leading to an extension of court processes beyond what appears to be optimal for economic growth. Thus, in this interpretation both variables may characterize particularly slow judicial processes and this delay in decisions comes at the cost of lower income growth. In terms of the relative impact of the judicial variables on the average growth rate, we find a higher partial $R^2$ for presumption of innocence. Note that the added explanatory power of both judicial variables is substantial and similar to those of the core explanatory variables derived from the Solow model. Both procedural indicators have an inelastic impact on the average economic growth rate, with timeliness being somewhat more elastic.

In the next step, we add the formalism indicators to the model and estimate the general model outlined in equation (4), the results of which are recorded in Table 4. This can, hence, be interpreted as a horse race between the competing theoretical approaches.

**Table 4: Specific model for the per capita GDP growth rate in % (equation (4))**
**Included judicial variables: Procedural indicators and formalism indicators (tenant)**

| Remaining variables | Coeff. | SE | Partial-$R^2$ | Elasticities |
|---|---|---|---|---|
| Initial GDP in 1985 in US $ | -0.0018** | 0.0003 | 0.43 | -1.17 |
| Investment to GDP ratio in % | 0.664** | 0.190 | 0.18 | 0.92 |
| Population growth in % | -0.993** | 0.195 | 0.32 | -1.09 |
| Presumption of innocence | 37.70** | 6.682 | 0.36 | 0.46 |
| Timeliness | -18.00** | 4.162 | 0.25 | -0.52 |

| | | | | |
|---|---|---|---|---|
| Right to council | -19.80* | 8.304 | 0.09 | -0.51 |
| Written vs. oral | 13.51* | 6.174 | 0.08 | 0.88 |
| Military control | -8.241** | 2.945 | 0.12 | |
| South America | -8.687** | 2.834 | 0.14 | |
| Transition countries | -14.20* | 5.891 | 0.09 | |
| Constant | 32.58** | 6.186 | 0.23 | |

| | |
|---|---|
| (1) No of observations | 67 |
| (2) SE equation | 7.26 |
| (3) $R^2$ | 0.75 |
| (4) Model selection criterion: Adj. $R^2$ | 0.701 |
| (5) Model selection criterion: Hannan-Quinn | 7.095 |
| (6) Joint test remaining variables | $F(10,56)$ = 16.5** |
| (7) Testing-down from general model | $F(24,32)$ = 0.30 |
| (8) Heteroscedasticity test | $F(18,37)$ = 0.62 |
| (9) Normality test | $Chi^2(2)$ = 0.20 |
| (10) RESET test | $F(1,55)$ = 0.24 |

*Notes*: Estimation method: OLS. The elasticity estimates are computed at the means of the respective variables. *(**) indicates significance at a 5% (1%) level.

Of the 34 variables in the general model, only 10 remain significant, while the other variables can safely be removed given an extremely low F-test value of the reduction test (see line 7 in the lower panel). The diagnostic tests are yet again fine.

With an $R^2$ of 0.75 we observe a further increase in fit and there is also an improvement in terms of the model selection criteria. The three economic core variables are still significant and there are only minor changes with regard to their absolute and relative influence on income growth. As in the previous model, we also find that countries in South America, affected by economic transition, and/or under military rule show a lower growth rate. Regarding our variables of interest, timeliness and presumption of innocence are again significant. In addition, a stronger factual implementation of the right to council has a positive impact on the economic growth rate. Thus, another procedural indicator appears to be of relevance. This finding underlines the advantages of our econometric methodology compared

to the widely used method of a blockwise comparison of variables, as this variable is only significant in conjunction with the formalism variables. If we had only compared the impact of legal indicators group-by-group, we would not have been able to uncover this effect. The final judicial variable comes from the set of formalism indicators put forward by Djankov et al. (2003).

Countries that rely more on written as opposed to oral representations of court processes achieve a higher growth rate. We would interpret these findings as suggesting that in modern economies judicial problems are often quite complex and they are unlikely to be resolved by an oral discussion of laymen, as argued by the "neighborhood" model proposed by Djankov et al. Instead, these problems require a substantial legal input from professional lawyers and written documentations of the court proceedings. It may be interesting to note that when estimating the impact of the procedural variables and their variation over time on per capita growth in a larger sample of 80 countries without the formalism variables, right to appeal appears to be growth enhancing. Clearly, the re-evaluation of a court decision by a higher ranking court is considerably fostered when the first legal process has been extensively documented.

In terms of the relative importance of the variables in Table 4, we conclude that the three economic core variables plus the two procedural variables timeliness and presumption of innocence exhibit the highest partial $R^2$s. In contrast, the additional legal variables right to council and written versus oral have much lower partial $R^2$s. This pattern is not reflected in the estimated elasticities, as growth reacts more elastically to marginal changes in the formalism indicator than to changes in the procedural variables.

We would conclude from estimating the reduced model of equation (4) that growth-enhancing legal systems are characterized by striking a balance between making quick decisions and taking into account the increasing judicial complexity of many cases by providing adequate institutions.

Finally we analyze equation (5), where the Hathaway procedural variables are included together with the formalism indicators computed for collecting a check. This time the reduction process did not yield unambiguous conclusions but three models as the outcome of different reduction paths. One of the models includes the regional dummy South America instead of the judicial indicator "independent procedural actions" in the process of collecting a check. Another model substitutes the regional dummies for South America and transition countries by the economic freedom index. However, both model selection criteria (as well as Akaike and Schwarz) clearly prefer the model presented in Table 5.

**Table 5: Specific model for the per capita GDP growth rate in % (equation (5))**
**Included judicial variables: Procedural indicators and formalism indicators (check)**

| Remaining variables | Coeff. | SE | Partial-$R^2$ | Elasticities |
|---|---|---|---|---|
| Initial GDP in 1985 in US $ | -0.0015** | 0.0003 | 0.36 | -0.98 |
| Investment to GDP ratio in % | 0.689** | 0.190 | 0.19 | 0.95 |
| Population growth in % | -1.072** | 0.120 | 0.33 | -1.18 |
| Presumption of innocence | 35.63** | 6.831 | 0.32 | 0.44 |
| Timeliness | -19.15** | 4.107 | 0.27 | -0.55 |
| Independent procedural actions | -12.07* | 5.654 | 0.07 | -0.25 |
| Military control | -6.776* | 3.043 | 0.08 | |
| Transition countries | -13.17* | 6.165 | 0.07 | |
| Constant | 36.19** | 5.484 | 0.43 | |

| (1) No of observations | 67 |
|---|---|
| (2) SE equation | 7.64 |
| (3) $R^2$ | 0.71 |
| (4) Model selection criterion: Adj. $R^2$ | 0.668 |
| (5) Model selection criterion: Hannan-Quinn | 7.146 |
| (6) Joint test remaining variables | $F(8,58)$ = 17.6** |
| (7) Testing-down from general model | $F(26,32)$ = 0.50 |
| (8) Heteroscedasticity test | $F(15,42)$ = 0.99 |
| (9) Normality test | $Chi^2(2)$ = 0.02 |
| (10) RESET test | $F(1,57)$ = 0.08 |

*Notes*: Estimation method: OLS. The elasticity estimates are computed at the means of the respective variables. *(**) indicates significance at a 5% (1%) level.

The coefficient of determination of this model is somewhat lower than the one of the previous model, which would also be preferred in terms of the model selection criteria. However, none of the diagnostic tests indicates any problems with regard to the underlying statistical

assumptions. The core economic variables have not changed much, and we get significant effects again from the dummy for transition countries and military rule.

With regard to the legal variables, we get yet again significant estimates for presumption of innocence and timeliness. This time another formalism variable survives the testing-down process, namely the number of independent procedural actions in the example of collecting a bounced check. The larger this number, the lower is the average per capita growth rate. Arguably, this variable reflects yet again the negative growth effects of legal actions that require an undue input in terms of time and money. Evaluating the relative importance of the variable independent procedural actions we have to note that it has neither a particularly large partial $R^2$ nor a high elasticity.

For a final evaluation of the empirical analysis, we want to consider the questions of whether there are particular outliers in the sample and whether results would break down when we consider low versus high income countries. Judging from the model selection criteria equation 4 results in the best specification. Figure 1 displays the original series and the fitted values when countries are ordered alphabetically (see Table A3 in the Appendix for list of included countries).

**Figure 1: Actual average growth rates and fitted values based on model in Table 4**
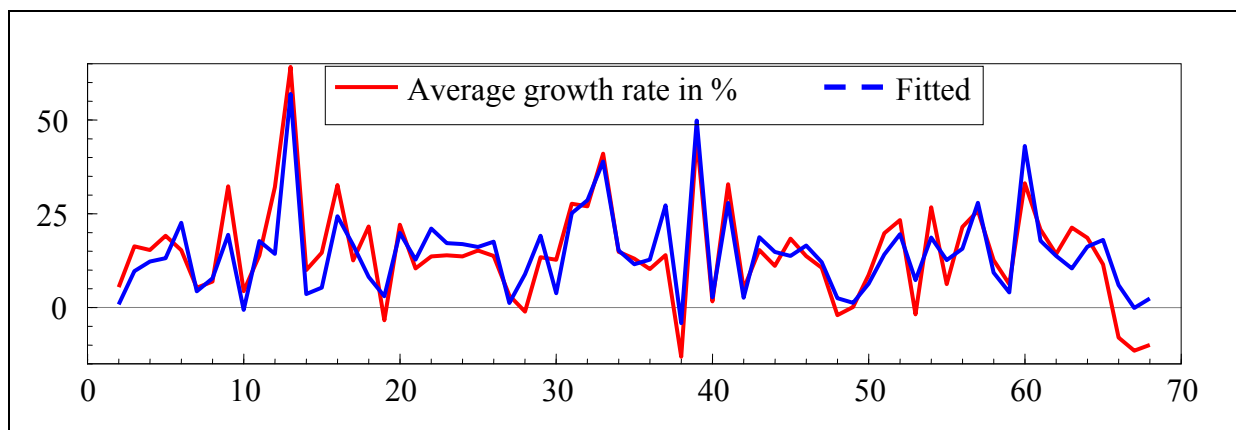


It is apparent that the fit is good and that there are no obvious outliers over the full sample except for two observations on African countries at the end of the sample.

It might be the case that the results are not robust over different groups of countries. In particular, there may be concern that there are noteworthy differences between high and low income countries. To analyze the stability of the estimated model, we order the data from poor to rich countries using initial per capita incomes and estimate the model recursively. Figure 2 presents the one-step ahead residuals with significance bands based on +/- 2 standard errors.

**Figure 2: Recursive estimation after ordering from low to high income countries:**
**One step-residuals with +/- 2 SEs**
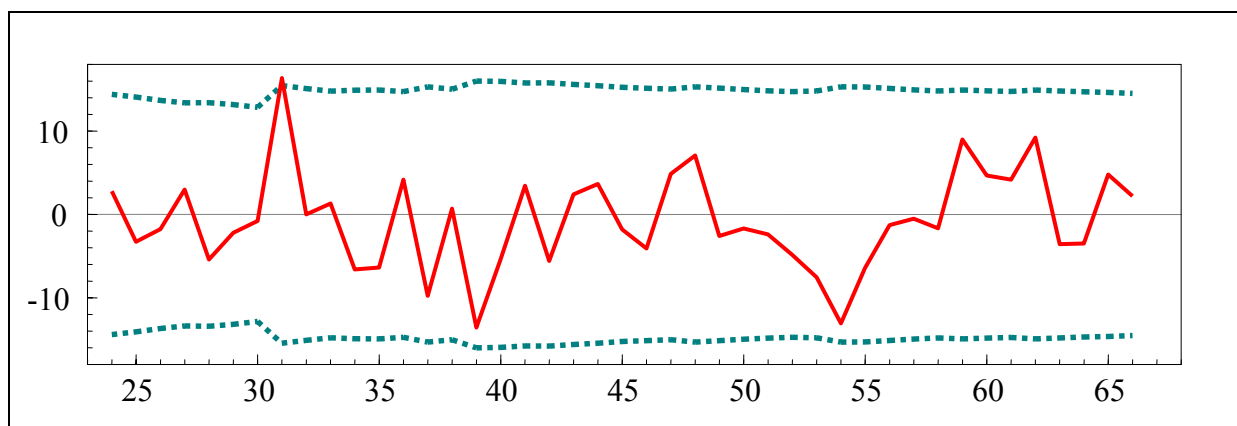


Overall there is no sign of any instability. In particular, the error bands are quite constant over the course of the sample ordered from low to high initial income and residuals look quite randomly distributed across the income-ordered sample. There is one significant outlier, which is associated with Chile.


## 5 Conclusion and Outlook

We ask whether judicial procedural devices have any systematic consequences on economic growth. Two competing views on the likely effects of judicial procedure are discussed: Djankov et al. (2002) argue that more regulated procedures (in their terms: higher degrees of procedural formalism) have a number of detrimental effects like higher levels of corruption, less fairness in judicial decisions and inferior access to justice. Our own view of judicial procedure is diametrically opposed to Djankov et al.: It is argued that some procedural devices are likely to improve the state's capacity to credibly commit to the promises contained in laws. By making judicial decision-making more transparent and judges more accountable to the law, more trade and investment is expected to take place which will, in turn, be reflected in higher rates of economic growth.

Drawing on a dataset introduced by Hathaway (2002) as well as on the Lex Mundi data, the conjecture that formalism always has adverse effects on growth can be rejected. Those variables that survived our rigorous testing-down process allow us to paint a differentiated picture: (1) written – as opposed to oral – procedures increase growth rates. Written procedures are certainly more costly in monetary terms than oral procedures, but the monetary costs are overcompensated by the respective gains in accountability. (2) The same is argued to occur when the right to council is factually enforced. This also has a positive effect on growth. (3) Timeliness of court action also increases growth. Justice delayed is not only justice denied

but also growth foregone. (4) Increasing the number of individual procedural actions will not only increase the resources needed for running the judicial system but supposedly also increase the length of the judicial process. Our result indicates that there are no offsetting benefits which is reflected in the negative effect that a higher number of individual procedural actions has on economic growth. (5) Finally, the negative effect that the presumption of innocence has on economic growth indicates that some procedural devices can indeed make processes cumbersome with few offsetting effects.

Policy conclusions can only be drawn on the basis of a normative model. Before opting in favor of judical process devices that maximize economic growth, a discussion on the goals to be achieved is in order: some societies might be willing to forego some economic growth if they get a higher probability that innocent suspects will not be falsely convicted. This is not the right place to have that discussion. On a more mundane level, it is also necessary to inquire into the possibility that the optimal mix of procedural devices is a function of a country's state of development: countries where highly qualified legal scholars are scarce and the majority of contracts are simple might need procedures different from those of a country where there are many highly qualified jurists but the average contract is significantly more complex.

Finally, it must be said that more precise data are clearly desirable. The information provided by the U.S. State Department is of great help, yet the "sometimes" category is extremely coarse, and it is highly desirable to have more precise data available.

**Appendix**

**Table A1: Correlation coefficients of judicial variables**

| Eviction of a tenant: | Judiciary | Right to council | Right to defense | Presumption of innocence | Right to appeal | Timeliness | Public | Charges presented |
|---|---|---|---|---|---|---|---|---|
| Professional vs. laymen | 0.13 | 0.14 | 0.12 | 0.02 | 0.01 | 0.28* | 0.04 | -0.08 |
| Written vs. oral elements | 0.35** | 0.19 | 0.22(*) | 0.14 | 0.08 | 0.29* | -0.12 | -0.06 |
| Legal justification | 0.06 | 0.01 | -0.11 | -0.17 | -0.01 | 0.18 | -0.15 | -0.07 |
| Statutory regulation of evidence | 0.42** | 0.39** | 0.15 | 0.16 | 0.03 | 0.32** | 0.15 | 0.29* |
| Control over superior review | 0.09 | -0.08 | 0.01 | 0.15 | 0.03 | 0.13 | -0.19 | -0.06 |
| Engagement formalities | 0.36** | 0.18 | 0.04 | -0.04 | 0.09 | 0.37** | -0.05 | -0.01 |
| Independent procedural actions | 0.36** | 0.36** | 0.34** | 0.27* | 0.29* | 0.41** | 0.25* | 0.18 |

*Notes*: **, *, and (*) indicate significance at the 1%, 5%, and 10% level, respectively.

**Table A2: Correlation coefficients of judicial variables**

| *Collection of a check*: | Judiciary | Right to council | Right to defense | Presumption of innocence | Right to appeal | Timeliness | Public | Charges presented |
|---|---|---|---|---|---|---|---|---|
| Professional vs. laymen | 0.16 | 0.14 | 0.12 | 0.06 | 0.14 | 0.26* | -0.06 | -0.01 |
| Written vs. oral elements | 0.29* | 0.22(*) | 0.22(*) | -0.04 | 0.04 | 0.27* | -0.06 | -0.09 |
| Legal justification | 0.10 | 0.00 | -0.11 | -0.17 | 0.07 | 0.25* | -0.14 | -0.14 |
| Statutory regulation of evidence | 0.40** | 0.36** | 0.15 | 0.19 | 0.02 | 0.31** | 0.16 | 0.26** |
| Control over superior review | 0.13 | -0.04 | 0.01 | 0.16 | -0.01 | 0.14 | -0.16 | -0.10 |
| Engagement formalities | 0.37** | 0.18 | 0.04 | -0.03 | 0.08 | 0.36** | -0.04 | -0.05 |
| Independent procedural actions | 0.45** | 0.38** | 0.34** | 0.32** | 0.20 | 0.47** | 0.23(*) | 0.12 |
| *Legal origin*: | | | | | | | | |
| English | -0.19 | 0.16 | 0.05 | 0.27* | 0.08 | -0.07 | -0.04 | 0.32** |
| French | 0.37** | 0.10 | 0.04 | -0.12 | 0.07 | 0.43** | 0.09 | -0.04 |
| German | -0.08 | -0.13 | 0.11 | 0.08 | -0.06 | -0.26* | 0.11 | -0.11 |
| Scandinavian | -0.31* | -0.30* | -0.27* | -0.24(*) | -0.15 | -0.36** | -0.16 | -0.27** |
| Socialist | 0.03 | -0.05 | -0.01 | -0.15 | -0.09 | -0.10 | -0.10 | -0.17 |

*Notes*: **, *, and (*) indicate significance at the 1%, 5%, and 10% level, respectively.

Table A3: List of 67 included countries

| Argentina | Ecuador | Jamaica | Senegal |
|---|---|---|---|
| Australia | Egypt | Japan | Singapore |
| Austria | El Salvador | Jordan | South Africa |
| Bangladesh | Finland | Korea, Republic of | Spain |
| Belgium | France | Malawi | Sri Lanka |
| Benin | Germany | Malaysia | Sweden |
| Bolivia | Ghana | Mexico | Switzerland |
| Botswana | Greece | Netherlands | Thailand |
| Brazil | Guatemala | New Zealand | Tunisia |
| Canada | Honduras | Norway | Turkey |
| Chile | Hungary | Pakistan | Uganda |
| China | Iceland | Panama | United Kingdom |
| Colombia | India | Paraguay | Uruguay |
| Costa Rica | Indonesia | Peru | Venezuela |
| Cyprus | Ireland | Philippines | Zambia |
| Denmark | Israel | Poland | Zimbabwe |
| Dominican Republic | Italy | Portugal | |

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