# Unbundling Judicial Independence#

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## Abstract

Feld and Voigt (2003, 2006) have introduced a *de jure* and a *de facto* indicator to measure judicial independence (JI). Estimating the impact of JI on economic growth in a cross-country study, they find that *de jure* JI does not have an impact, while *de facto* JI has a robust and highly significant positive impact on economic growth. In this paper, we dig deeper into the empirical effects of JI in order to highlight the potential transmission channels through which an independent judiciary affects economic outcomes. Formulated differenty: we try to "unbundle" the effects of judicial independence (Acemoglu and Johnson 2005). More specifically, the impact of JI on physical and human capital as well as on labor and total factor productivity are analyzed. A factually independent judiciary is hypothesized to induce additional investment in human and physical capital and increase total factor productivity. It turns out that higher levels of *de facto* JI are robustly linked with higher investment into human but not into physical capital. Moreover, higher degrees of JI are robustly correlated with higher levels of total factor productivity.

Key words: Judicial Independence, Positive Constitutional Economics, Economic Growth.

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#### 1 Introduction

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Feld and Voigt (2003, 2006) introduced two new indicators that measure judicial independence (JI). Their first indicator deals with *de jure* independence, i.e. the independence of courts as it can be deduced from legal documents. Their second indicator deals with *de facto* independence, i.e. the degree of independence that courts factually enjoy. 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 has a robust and highly significant positive impact on economic growth in a sample of 73 countries. The impact of *de facto* JI on economic growth is robust to outliers as well as to the inclusion of several additional economic and institutional control variables. Concerning the institutional environment, their results indicate that the positive impact of *de facto* JI on economic growth is stronger in presidential than in parliamentary systems as well as in systems with a high extent of checks and balances. Furthermore, *de facto* JI appears to be effective independently of the age of a constitution.

JI can be hypothesized to have important effects in two altogether different interaction situations: (1) In cases of conflict between private parties: As long as both sides expect the judiciary to be impartial and hence independent from pressure emanating from either of the contract partners or any other party, the propensity to enter into such contracts in the first place can be assumed to be higher, which will lead to more welfare-enhancing transactions taking place and, hence, to higher economic growth. (2) In cases of conflict between government and the citizens, the citizens are in need of an organization that has the power to adjudicate even against government in case it has not followed the law.<sup>1</sup> Both interactions may occur to a different extent if investment in physical or in human capital takes place. The higher the specificity of the assets affected by a contract or the specificity of investment in a jurisdiction, the more easily a hold-up will occur. Investment specificity is different for different types of investment, such that JI may also affect investment in human or physical capital differently. Although the correlation bet-

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To be precise, one could add a third paradigmatic interaction situation in which an independent judiciary could have beneficial effects, namely in cases of conflict between various government branches. In the absence of an impartial arbiter, conflicts between government branches are most likely to develop into simple power games. An independent judiciary can keep them within the rules laid out in the constitution. This could be especially relevant in federally structured states.

ween *de facto* JI and economic growth in our previous studies is highly robust, some questions as to the transmission channels thus remain:

- (1) As income can be thought of as the result of economic growth over long periods of time, JI is to be reflected in the variation of income levels. Is it?
- (2) Does a factually independent judiciary induce additional investment?
- (3) Are there differential effects on human as opposed to physical capital?
- (4) Does judicial independence affect total factor productivity?
- (5) Is it possible to evaluate the relative importance of either of the channels just outlined?

These are tough questions. This paper attempts to answer at least some of them. In a nutshell, these are the more important answers (1) Controlling for (physical and human) capital as well as for total factor productivity, JI does not add explanatory power for explaining differences in output per worker. (2/3) High degrees of factual JI are robustly correlated with investment into human capital, but not into physical capital. (4) Differences in *de facto* JI are highly correlated with differences in total factor productivity. (5) De facto JI affects investment in human capital more strongly than total factor productivity.

The remainder of the paper is organized as follows: the next section develops a number of conjectures concerning possible transmission mechanisms through which an independent judiciary might lead to higher growth. In section three, the two indicators for measuring JI are presented and critically discussed. In section four, our estimation approach is described. Section five presents the results and section six concludes.

## **2** Some Theory

Douglass North (1981, 20) has described the existence of the state as both necessary for economic development but also as a source of man-made economic decline. Time and again, inadequately specified and insufficiently enforced property rights have been the root cause for economic demise. In order to fulfill its potential role as a catalyst for economic growth, the state needs to be strong enough to enforce efficient property rights. Yet, if it is thus strong, it is also strong enough to attenuate them or to ignore them altogether. This could be called the dilemma of the strong state: a government which is strong enough to enforce its own promises – e.g. with regard to private property rights – is also strong enough not to enforce them. The (physical) strength of the state embodies its greatest weakness, namely the inability to make credible promises.

Why should anybody invest (i.e. incur sunk costs) in a country whose government is too strong to make its own promises credible? The incapacity of credibly committing to one's own promises can have enormous costs for economic development, e.g. by inducing potential investors to withhold factual investment. If there was a player who was independent from government but who commanded sufficient competence to ensure the enforcement of government promises and who had sufficient incentives to do so, this player could alleviate the problem of the dilemma of the strong state. It is argued here that the judiciary can have exactly that function.

Rational governments are aware of this dilemma and thus have incentives to announce the creation of independent agencies such as an independent judiciary. Yet, if they are strong enough to create an independent judiciary, they might also be strong enough to abolish it again, or at least to ignore its decisions should they not be in their short-term interest. On the other hand, rational investors will not let themselves be fooled by believing simple government announcements to create an independent judiciary. The problem of self-commitment is thus reiterated on another level; it has also been called a second-order commitment problem (Moser 1999). This is the reason why we present two different indicators of JI: the *de jure* indicator captures the letter of the law. It is thus an attempt to operationalize the promises of the government with regard to the independence of the judiciary. The second indicator is a *de facto* indicator. It captures the degree to which government promises have actually been kept. It is hypothesized that simple government promises will not have substantial effects on economically relevant dispositions of rational actors. It is further hypothesized that the proven track record of a factually independent judiciary will have effects on economically relevant dispositions.

Until now, the importance of judges being independent from pressures exerted through the other government branches for cases in which private citizens and government are in conflict has been emphasized. But JI is also relevant in other settings. Government could have an interest in a specific outcome of a case in which only private law subjects are involved. Pressures from other government branches being absent, JI also implies absence of undue pressures by the private law parties involved. These can include both threats (to be carried out if the judges do not decide as one wants to) and promises (to be carried out if the judges do decide as one wants to).

A judiciary can be called independent if judges can expect their decisions to be implemented regardless of whether they are in the (short-term) interest of other government branches upon which implementation depends. It further implies that judges – apart from their decisions not being implemented – do not have to anticipate negative consequences as the result of their decisions, such as (a) being expelled, (b) being paid less, or (c) being made less influential. As explained above, the judiciary can only be a solution to the government's commitment problem if two conditions are met: (1) the judiciary is sufficiently independent as just defined and (2) the judiciary has incentives to enforce the promises made by government. The second condition is, of course, not trivial: judges can be highly independent and highly corrupt, but they can also be lazy, remain uninformed, become overly active and so on.<sup>2</sup> We are interested in the economic effects of judicial independence and will therefore not deal with the second condition.

Suppose a judiciary is both formally and factually independent and has incentives to implement the letter of the law, i.e. enforce the promises government has made by passing legislation and issuing administrative acts on the basis of existing legislation. There are two very different channels through which this could have an effect on economic outcomes:

(1) In cases of conflict between private parties: If they had voluntarily entered into a contract and one of the parties believes that the other side has not fulfilled its contractual obligations, impartial dispute resolution can be important. In this case, an independent judiciary can help private parties to make credible commitments – and not just utter cheap promises. As long as both sides expect the judiciary to be impartial and hence independent from pressure emanating from either of the contract partners or any other party, they can save on transaction costs while negotiating their contract. On average, lower transaction costs will lead to a higher number of welfare-enhancing transactions. This can also be thought of as the *private law channel* as it would make contracts on the basis of private law more attractive. This should – all else equal - lead to a higher number of contracts, a deeper division of labor, a higher degree of specialization and, hence, to higher overall welfare.

(2) In cases of conflict between government and the citizens, the citizens are also in need of an organization that can adjudicate who has acted according to its promises. Ideally, this task is performed by a judiciary that is independent from the other two government branches. This can also be thought of as the *public law channel*.

<sup>&</sup>lt;sup>2</sup> Voigt (2004) is a first attempt to estimate the economic effects of different degrees of factually implemented judicial accountability.

Acemoglu und Johnson (2005) have recently proposed to unbundle the effects of institutions in a very similar way: they call the institutions involved in our first paradigmatic interaction situation *contracting institutions*, and those involved with our second interaction situation *property rights institutions*. Acemoglu and Johnson are interested in disentangling the relative importance of the two kinds of institutions. We expect the judiciary to have effects via both kinds of institutions and are interested to estimate the relative importance of both the private and the public law channel.

Suppose private law institutions are unreliable, unpunctual and judges are not independent from the parties in conflict. This would mean that the transaction costs of contracting are expected to be high: If an agent is interested in the content of the contract, she would hesitate to enter into contracts that are adjudicated upon by judges who might decide on them by drawing on criteria entirely unrelated to the content of the contract. If she is afraid that her potential contracting partner would be better in bribing judges, she might thus abstain from entering into such contracts. If this were the end of the story, a lower number of contracts were to be expected and, at the end, less welfare created.

But further suppose that the potential gains from trade are attractively high. It is then conceivable that alternative dispute resolution mechanisms that do not rely on adjudication backed by the state offer their services to private law subjects who are in conflict over the interpretation of a contract. That this can be attractive for private firms is proven by their heavy reliance on private arbitration in international trade. Now suppose that public law – as oppose to private law - institutions are unreliable and judges not independent from government. The possibility of contracting around the state in such cases seems almost absurd precisely because the state is part of a transaction. Taking these considerations into account, it is thus hypothesized that the public law channel is far more relevant than the private law channel regarding its effects on economic growth.

This implies the possibility that the quality and/or efficiency of the private law can substantially deviate from the quality and/or efficiency of the public law of a country. But is this more than a logical possibility? Would one expect to find it empirically? An encompassing analysis of the quality (and/or efficiency) of the two main parts of legal systems would have to take the quality of the substantial rules explicitly into account. When we ask for the effects that an independent judiciary has for the quality of legal systems, we do not take this effect explicitly into account but rather focus on the reliability with which government promises are enforced, i.e. the adequacy of the promises itself is not part of the analysis. This is thus an important caveat.

It has been argued that even autocratic governments would have incentives to set up a rather efficient private law as this increases income – and tax receipts. Among other things, public law determines the amount of discretion the government has at its disposal. If autocratic governments value discretion, then the efficiency of public law created by autocrats could suffer. It has thus been hypothesized that there are more incentives to create an efficient private law than to create an efficient public law (Grady and McGuire 1999). If the factual independence of the judiciary is assumed to be given, one could, hence, conjecture that there are no important differences in the implementation of private law between democratic and autocratic states but that these differences might be significant with regard to the factual implementation of public law. This implies that the level of autocracy/democracy should explicitly controlled for in the empirical part.

But specifying whether JI displays its effects primarily via public or via private law is not the only way to unbundle JI. Another focus relies more directly on established growth theory in which growth is explained by three explanatory variables, namely (investment in) physical capital (K), differences in the availability of human capital (H) and some measure of productivity (A). Expressed in terms of a Cobb-Douglas production function, this leads to equation 1:

$$Y_{i} = K_{i}^{\alpha} \left( A_{i} H_{i} \right)^{1-\alpha} \tag{1}$$

Traditionally, the portion of growth not explained by differences in factor input was attributed to technological progress ("Solow residual"). By now, the Solow residual is often interpreted as indicating total factor productivity and we know that differences in productivity are a lot more important than differences in traditional factor inputs for explaining differences in output per worker across countries (Hall and Jones 1999).<sup>3</sup>

There are good reasons to suppose that the factually realized level of JI has an effect on all three variables: investment means to incur sunk costs. Investment is expected to be more profitable if the promises made by government are credible. Since it is hypothesized here that a factually independent judiciary serves exactly

<sup>&</sup>lt;sup>3</sup> Hall and Jones (1999) show that growth rates are subject to major fluctuations. Results of empirical estimates thus heavily depend on the analyzed time-period. In order to circumvent this problem, they propose to analyze income levels instead – as they are nothing else but accumulated growth rates over a very long period of time.

that function, higher levels of judicial independence should induce higher levels of investment. Investment is a very broad term, encompassing investment in both physical and human capital. What effect do we expect to be stronger, the one via investment in physical capital or the one via human capital?

It is difficult to make clear-cut predictions: one could argue that apart from human rights abuses, human capital is more difficult to attenuate than physical capital be-



cause it is more mobile than physical capital. This would imply that higher levels of factual JI should lead to an increase in the ratio of physical to human capital. If physical capital is already invested, human capital is more mobile than physical capital. Should a government try to behave opportunistically with regard to human capital, an exit option might be more readily available than with regard to physical assets. Additionally, it could be argued that investment in human capital does not only have instrumental value, i.e. might be undertaken without having expected payoffs in mind. This would imply that a certain level of investment into human capital would even be expected under extremely unfavorably institutions. However, investment in physical capital is more mobile ex ante than investment in human capital as firms are less restricted to invest in alternative locations than individuals are restricted to migrate to other countries. Moreover, a high degree of personal specialization (as a consequence of investment in one's human capital) implies a high degree of dependence on a well-functioning division of labor. Secure property rights are particularly important if individuals are requested to invest in specific human capital. A hold-up of investment with a high specificity is more easily possible in the case of human than physical capital and needs particular protection. This holds for example in the case of research and development. Successful research needs liberty and the absence of tight state restrictions. Finally, it can be hypothesized that the inflow of foreign direct investment is more directly dependent on high levels of JI than domestic investment. This hypothesis appears plausible as long as capital is not perfectly mobile.

But high levels of JI could have effects on growth that are not entirely captured via the two input factors. Hall and Jones (1999) also refer to total factor productivity as the quality of social infrastructure. The hypothesis advanced here is that JI is an important part of social infrastructure and that it should therefore cause total factor productivity to increase. One plausible assumption is that high levels of JI could lead to more welfare-enhancing transactions taking place and, hence, to higher growth.

#### **3** How to Measure Judicial Independence

Feld and Voigt (2003) measure judicial independence by a *de jure* and a *de facto* indicator. For simplicity reasons, these indicators assess the independence of the highest court of a country, no matter whether it is a supreme court or a constitutional court. In many states, the judiciary is made up of thousands of decision-makers and, therefore, radical simplification is necessary. The focus on the highest court seems warranted because even though judges are personally independent, the ultimate control of court decisions lies with the highest courts, as they review – on the initiative of the parties involved – the lower court decisions. The independence of the highest court thus seems crucial.

Secondly, these indicators are constructed as objective (as opposed to subjective) indicators. A subjective indicator of JI would ask for the perception of judicial independence amongst those being polled. For those who live under the respective rules, their perception is surely an important element determining their behavior. However, the norms of what an ideally independent judiciary would look like will most likely be different in different parts of the world. Data obtained by polls are thus not easily comparable. The two new indicators are therefore based on factual information. In principle, anybody re-measuring JI in the countries covered should end up with the same indicator values.

The indicator measuring *de jure* JI is constructed relying on up to sixteen variables, the indicator measuring *de facto* JI on up to ten.<sup>4</sup> All variables can take on values between 0 and 1 and the sum of the available variables is divided by the number of variables for which information is available. This is done because not all variables are available for all sample countries. One thus ends up with two variables (*de jure* and *de facto* JI) that lie between 0 and 1. We managed to receive

<sup>&</sup>lt;sup>4</sup> For a more detailed list of the variables contained in these indicators, see the appendix in Feld and Voigt (2003). Any questions concerning the data can be addressed to the authors.

data from about 80 countries (the data can be obtained by the authors upon request).

## 3.1 Measuring de jure Judicial Independence

Let us now take a quick look at the individual variables contained in the *de jure* indicator: The independence of judges is dependent upon the <u>stability</u> of the set of constitutional provisions within which they operate. Formally, the stability of the powers and procedures of the court depend on how difficult it is to change them. If they are specified in the constitution itself, we expect a greater degree of independence than if they are simply fixed by ordinary law. This presupposes that constitutional law is more difficult to change than ordinary legislation.

The <u>appointment procedure</u> of judges may have a notable effect on the independence of the court. As it is *inter alia* supposed to protect citizens from illegitimate use of powers by the other government branches as well as to settle disputes between the branches of government, it ought to be as independent as possible from the other branches. We hypothesize that the most independent procedure for judicial appointment is by professionals (other judges or jurists). The least independent method is appointment by one powerful politician (prime minister or a minister of justice, e.g.).

<u>Judicial tenure</u> will be crucial for the independence of the judiciary. We assume that judges are most independent if they are appointed for life (or up to a mandatory retirement age) and cannot be removed from office, save by legal procedure. Judges are less independent if terms are renewable because they have an incentive to please those who can reappoint them.

Further, if their <u>salaries</u> are determined by the members of one of the other government branches, this raises incentives to take the preferences of these members explicitly into account. General rules that their salary cannot be reduced increase, in turn, the independence of the judiciary.

Another component of judicial independence is the <u>accessibility</u> of the Court and its ability to initiate proceedings. A court which is accessible only by a certain number of members of parliament or other officials, will be less effective in constraining government vis-à-vis its citizens than a court which is accessible by every citizen who claims that her rights have been violated.

If the <u>allocation of cases</u> to the various members of the court is at the discretion of the chief justice, his influence will be substantially greater than that of the other court members. It follows that in such an institutional environment, it could be interesting to try to "buy" just the chief justice. We expect independence to be larger if there is a general rule according to which cases are allocated the responsibility of single members of the court (Salzberger 1993).

The competencies assigned to the constitutional court do not bear directly on its independence. Yet, highest courts must have certain competencies in order to be able to check the behavior of the other government branches. If the constitution is interpreted as the most basic formal layer of rules that is to restrain (and to enable) government, then the competence of the court to check whether legislation is in conformity with the constitution is crucial. This is also known as the competence to constitutional or judicial review.

If courts have to <u>publish their decisions</u>, others can scrutinize them and the reasoning can become subject to public debate. This can be interpreted as making it more difficult for representatives of the other government branches to have irrelevant considerations influence their decisions. The transparency will be even higher if the courts publish dissenting opinions.

## 3.2 Measuring *de facto* Judicial Independence

To assess *de facto* JI, up to then variables have been used. Again, each of the eight variables can take on values between 0 and 1 where greater values indicate a higher degree of JI.

The *de jure* indicator is based on various legal documents. Even if they are changed frequently, exact values can be calculated for every single point in time, depending on the formal validity of the respective documents. This does not hold for *de facto* JI. The factual term length of Highest Court judges cannot be calculated right after a new constitution has been passed but will be the result of years of living with the legal documents. We therefore base the *de facto* indicator on quite a long period, namely that between 1960 and the year 2000. This means, of course, that the indicator will be very sticky in comparison to the *de jure* indicator. A number of countries experienced substantial breaks during those four decades and it might be difficult to count in experiences that were made under now defunct regimes. The countries of Central and Eastern Europe are a case in point: all of them passed new constitutions after 1990. According to the time span proposed by our indicator, the treatment of the judiciary by socialist regimes still weighs heavily on today's *de facto* values. We chose this approach because we think the past matters for how JI is evaluated by citizens and other potential investors. A government will not be able to build up a reputation as law-abiding or JI-respecting overnight. Here is a list of the variables used:

A crucial aspect of the *de facto* JI will be the <u>effective average term length</u> of the members of the highest court.<sup>5</sup> For simplicity, we assume a linear relationship between effective average term length and factual independence. If the actual term length and the one to be expected on the basis of the legal foundations deviate, a low level of factual independence is assumed because the removal of a judge before the end of term is a serious breach of JI.

The influence of a judge depends on the <u>number of</u> other <u>judges</u> who are members of the same court. By increasing the number of judges, the weight of those judges who do not decide along the lines of the preferences of the median members of the other branches can supposedly be diminished. Frequent changes in the number of judges thus lead us to expect a low degree of factual independence.

The importance of an adequate income was already discussed with regard to the *de jure* indicator. With regard to the *de facto* situation, we were interested to learn whether the <u>incomes of judges</u> have at least remained constant in real terms. But the efficacy of courts does not only depend on the income level of judges but also on the number of clerks employed, the size of the library, the availability of modern computer equipment etc. We have tried to take this aspect into account by asking for the development of the <u>court's budget</u> as an organization.

Any change in the basis of the legal foundation of the highest court will increase uncertainty among its potential users, i.e. will be counter to one of the most fundamental functions of the law. <u>Frequent changes of the respective legal rules</u> are here interpreted as an indicator for low *de facto* independence.

The *de facto* degree of judicial independence is low if decisions of the highest court, in order to be implemented, depend on some action of one (or both) of the other branches of government and this <u>cooperation is not granted</u>. The more frequently this has been the case, the less independent is JI supposed to be factually.

<sup>&</sup>lt;sup>5</sup>. This variable is closely reminiscent of the turnover rate calculated for central bank governors and used as a proxy for their *de facto* independence. Henisz (2000) has calculated this variable for the tenure of supreme court judges for 45 countries for the period from 1960 to 1990.

#### **4** The Estimation Approach

Feld and Voigt (2003, 2006) show that *de facto* JI is both statistically and economically significant for economic growth in a very robust manner, i.e. even after controlling for a host of economic and institutional variables. The traditional concern of economists with economic growth has been criticized recently and it has been proposed to pay more attention to explain differences in income levels rather than in growth rates. Income levels can, of course, be interpreted as consequences of differences in (long run) economic performance. The case for income levels becomes even more convincing if the insight by Easterly, Kremer, Pritchett and Summers (1993) is taken into account according to which growth rates within countries are only weakly correlated over time. Analyzing only a limited number of periods might thus lead to erroneous conclusions. If one is interested in longrun effects, there is a case for using income levels as the dependent variable.<sup>6</sup>

The estimation approach of our former papers relied on the following equation:

$$\Delta Y_i = \alpha M_i + \beta J I_i + \gamma Z_i + \varepsilon_i, \qquad (1)$$

where  $\Delta Y_i$  is average real GDP growth per capita of country *i* between 1980 and 1998,  $M_i$  is a vector of standard explanatory variables of country *i*,  $JI_i$  are the *de jure* and *de facto* indicators of judicial independence in country *i*,  $Z_i$  is a vector of additional explanatory variables in country *i* that are introduced to check the robustness of the baseline model and to consider the interaction with the constitutional, legal and political environment of a country. Finally,  $\varepsilon_i$  is an error term.

The vector  $M_i$  consists of three variables, which are robustly linked to economic growth according to previous studies (de Haan and Sturm, 2000): the level of initial real GDP per capita (in our sample, 'initial' is 1980), investment in percent of GDP averaged over the period 1980 to 1998, and the percenttage of secondary school attainment in the total population aged 15 and older in 1980. There is a potential endogeneity problem in this approach as investment is used as an independent variable but might itself be dependent on JI. Estimating the effect of JI on investment rates is difficult, however, as we do not have time series data at our disposal.

<sup>&</sup>lt;sup>6</sup> It might be worth emphasizing that our former papers are based on the growth rates of 19 periods (namely from 1980 to 1998) which is, after all, a not too short period.

It has been noted that differences in output per worker across countries are substantial and that differences in productivity are a lot more important than differences in input for explaining this variation (Hall and Jones 1999). Their results are based on a Cobb-Douglas production function that the authors estimated for 127 countries. As already described above, they start from a C-D function

$$Y_{i} = K_{i}^{\alpha} \left( A_{i} H_{i} \right)^{1-\alpha}, \tag{1}$$

where  $K_i$  stands for physical capital,  $H_i$  for the amount of human capital augmented labor and  $A_i$  is a measure of productivity. For convenience, they rewrite the production function as

$$\mathbf{y}_{i} = (\mathbf{K}_{i}/\mathbf{Y}_{i})^{\alpha/(1-\alpha)}\mathbf{h}_{i}\mathbf{A}_{i}$$
<sup>(2)</sup>

with  $y \equiv Y/L$  and  $h \equiv H/L$  where h is human capital per worker.

This equation allows to conveniently decompose the differences in output per worker, which can be attributed to differences in the capital-output ratio, differences in educational attainment and differences in productivity. In the following, we use the method of Hall and Jones to compile an updated data set and to (i) estimate the effect of *de facto* JI on output per worker and then (ii) look how the capital-output ratio, the educational attainment variable and productivity are correlated with *de facto* JI. In concreto, we estimate a model in which output per worker is explained by the capital share, human capital per worker, and the measure of productivity or technological progress:

$$\log y_i = \beta_0 + \beta_1 J I_i + \beta_2 \log k_i + \beta_3 \log h_i + \beta_4 \log A_i + u_i$$
(3)

with  $k \equiv K/Y$  and  $\beta_2 \equiv \alpha/(1 - \alpha)$ . Equation (3) is first estimated by OLS to test on direct effects of JI on output per worker. In a second step, it is tested whether JI has an impact on the components of output per worker, i.e. the capital to output ratio, human capital per worker and productivity, in order to find out the indirect effects of JI on output per worker. Finally, we test the robustness of these results using several additional control variables.

## **5** The Estimation Results

#### **5.1 The Baseline Results**

The estimation results for equation (3) are presented in *Table 1*. The first regression for the whole sample of 129 countries in column (1) simply reflects that

the capital output ratio, human capital per worker and productivity are explaining output per worker almost completely. This result follows logically from the decomposition procedure applied by Hall and Jones (1999), such that the high significance levels of these coefficients are not surprising. As slightly more than 10 percent of the variance of output per worker cannot be explained by this model according to the  $R^2$ , other explanatory factors could still contribute to its explanation. The Jarque-Bera test statistic indicates that the hypothesis of normal distribution of the residuals can be rejected at the 1 percent significance level. Excluding the outlier does, however, not alter the results.

Variables	log Y/L	log Y/L	log Y/L	Y/L	
<i>De jure</i> Judicial Indepen- dence	-	-0.056 (0.92)	-0.074 (1.28)	4113.55 (0.52)	
<i>De facto</i> Judicial Indepen- dence	-	0.037 (0.92)	0.034 (0.90)	12072.74** (2.38)	
$Log \left(K_i/Y_i\right)^{\alpha/(1-\alpha)}$	0.219** (3.78)	0.325** (5.24)	0.307** (5.18)	_	
Log h <sub>i</sub>	0.365** (7.93)	0.358** (7.03)	0.351** (7.25)	_	
Log A <sub>i</sub>	0.716** (23.83)	0.686** (19.78)	0.707** (21.00)	_	
Investment to GDP ratio	-	-	-	1034.10** (6.05)	
Number of school years of the population older than 25	-	-	-	2562.60** (4.80)	
Constant	-0.450	-0.513	-0.486	-18422.57	
$\overline{R}^2$	0.897	0.929	0.937	0.709	
SER	0.093	0.073	0.070	9564.04	
JB.	115.578**	0.006	0.287	0.399	
Observations	129	79	78	78	

 

 Table 1: OLS-Regressions of Output per Worker in 2000 on Judicial Independence and Controls, Baseline Specifications

The numbers in parentheses are the absolute values of the estimated t-statistics. '\*\*', '\*' or '(\*)' show that the estimated parameter is significantly different from zero on the 1, 5 or 10 percent level, respectively. SER is the standard error of the regression, and J. -B. the value of the Jarque-Bera-test on normality of the residuals.

Adding *de jure* and *de facto* JI reduces the sample to 79 observations, but does not change the results qualitatively (column 2). Both variables are not significantly different from zero, while the main production factors, physical capital, human capital and total factor productivity are the main determinants of output per worker. Excluding the same outlier as in the first basic regression, even though the hypothesis of normality cannot be rejected for the smaller sample according to the Jar-

que-Bera test statistic, leaves the results virtually unchanged too (column 3). For the sake of comparison, the absolute values of output per worker are explained by the investment to GDP ratio, a proxy for human capital, i.e. the average number of school years of the population older than 25, and judicial independence in column 4. This approach could be useful in order to find out how robust the estimates are to the Hall and Jones (1999) method of decomposition. Deviating from the Hall and Jones approach in this fashion, *de facto* JI has a highly significant (at the 1 percent level) and positive impact on output per worker, while investment and human capital have the expected positive signs. Overall, judicial independence has no robust and significant direct impact on output per worker, when the main economic factors are properly controlled for.

The next step in the analysis consists in a test of indirect effects of judicial independence via the main production factors. As discussed above, we expect that judicial independence improves the conditions for investment in physical and human capital as well as the productivity of the economy. Looking at *Table 2*, it turns out that the ratio of physical capital to output is not significantly affected by judicial independence. Neither *de jure*, nor *de facto JI* have any significant effect on the capital output ratio. This also holds if outliers are excluded (not reported). However, *de facto JI* has significant positive effects on human capital per worker (at the 5 percent level), on productivity (at the 1 percent level) and on productivity per worker (at the 5 percent level). Judicial independence has thus indirect effects on output per worker by enhancing productivity and providing a secure environment for human capital investment.

Variables	$log (K_i/Y_i)^{\alpha/(1-\alpha)}$	log h <sub>i</sub>	$log A_i$	Productivity per Worker
<i>De jure</i> Judicial Independence	0.135 (1.19)	-0.029 (0.21)	0.010 (0.05)	0.057 (0.28)
<i>De facto</i> Judicial Inde- pendence	-0.043 (0.57)	0.221* (2.50)	0.421** (3.34)	0.289* (2.18)
$Log \left(K_i/Y_i\right)^{\alpha/(1-\alpha)}$	-	0.827** (7.96)	0.452* (2.25)	_
Log h <sub>i</sub>	0.558** (7.96)	-	-0.181 (1.07)	-
$\text{Log } A_i$	0.141* (2.25)	-0.084 (1.07)	_	-
Investment to GDP ratio	_	-	-	0.015** (3.28)
Number of school years of the population older than 25	_	-	_	0.001 (0.09)
Constant	-0.368	-0.098	-0.025	6.966
$\overline{R}^2$	0.524	0.521	0.183	0.254
SER	0.138	0.168	0.247	0.250
ЈВ.	16.598**	2.715	1.834	1.952
Observations	79	79	79	78

 

 Table 2: Components of Output per Worker in 2000, Judicial Independence and Controls, Baseline Specifications

The numbers in parentheses are the absolute values of the estimated t-statistics. '\*\*', '\*' or '(\*)' show that the estimated parameter is significantly different from zero on the 1, 5 or 10 percent level, respectively. SER is the standard error of the regression, and J. -B. the value of the Jarque-Bera-test on normality of the residuals.

#### **5.2 Robustness Tests**

The robustness of these results is tested in three steps. First we include legal origin and fractionalization variables as well as alternative judicial independence indicators provided by La Porta et al. (2004) and the age of the constitution as additional control variables in the regression of output per worker to find out their direct effects. Second, these variables are included in the regressions of physical and human capital and third, we also include them in the productivity regressions in order to test the robustness of the indirect effects of judicial independence. Legal origin is measured by one multinomial variable because we are not interested very much in the differences between legal traditions. The different legal traditions are coded as follows: if the variable takes on a value of 1, the English common law is captures; 2 captures the French and 3 the German commercial law, 4 is Scandinavian and 5 is Socialist legal origin. This variable is included as a control variable because judicial independence is differently founded, but is also differently important in different legal traditions. The fractionalization variables are obtained from Alesina et al. (2003). They are included because they capture the extent of (potential) conflict between factions in a country. It is important to control for societal heterogeneity because investment may be hampered the more important such conflicts are and because judicial independence becomes the more important the more notorious tensions between groups become. The reasons for an inclusion of alternative indicators of judicial independence and judicial review provided by La Porta et al. (2004) are obvious. It should be noted that their judicial independence and judicial review indicators are correlated with our *de jure* JI variable (r = 0.22 and r = 0.44, respectively), but not with our de facto JI variable (r = 0.04 in both cases). As our previous work has shown, the age of the constitution is an important factor to test robustness of the influences of judicial independence.

The results for output per worker are reported in *Tables 3a* and *3b*. Regarding our judicial independence indicators, robust effects as compared to those in *Table 1* obtain independent from the inclusion of other control variables and regarding output per work on log terms, following the Hall and Jones (1999) approach, or in absolute terms. Also, the main economic factors determining output per worker have robust impacts. It is interesting to note that the effects of legal origin or fractionalization on output per worker are not fully robust. When both groups of variables are included, the effect of legal origin loses significance (from the 1 to the 10 percent level). Fractionalization has no robust direct impact on output per worker. This holds also for judicial independence and judicial review as proposed by La Porta et al. (2004). Although their judicial independence indicator has a significantly positive impact at the 5 percent level on the log of output per worker, it is not significantly different from zero in the equation explaining absolute output per worker. The age of the constitution has a significantly positive effect on output per worker (at the 1 percent level) in each specification.

Variables	log Y/L	log Y/L	log Y/L	Y/L
<i>De jure</i> Judicial Indepen- dence	-0.073 (1.24)	-0.056 (0.97)	-0.068 (1.19)	2503.80 (0.33)
<i>De facto</i> Judicial Indepen- dence	0.043 (1.11)	0.044 (1.15)	0.046 (1.23)	10426.22* (2.11)
$Log \left(K_i/Y_i\right)^{\alpha/(1-\alpha)}$	0.348** (5.80)	0.351** (5.96)	0.361** (6.20)	-
Log h <sub>i</sub>	0.409** (7.85)	0.374** (7.29)	0.407** (7.57)	_
$\text{Log } A_i$	0.661** (19.19)	0.726** (20.70)	0.704** (19.09)	_
Investment to GDP ratio	_	-	-	915.64** (5.31)
Number of school years of the population older than 25	_	_	_	3270.52** (5.45)
Legal origin	-0.020** (2.77)	_	-0.013(*) (1.78)	-2870.75** (3.18)
Religious fractionalization	-	0.027 (0.67)	0.017 (0.44)	-1370.25 (0.25)
Language fractionalization	_	0.039 (1.02)	0.035 (0.93)	507.28 (0.10)
Ethnic fractionalization	_	0.075* (2.13)	0.063(*) (1.78)	-5448.51 (1.19)
Constant	-0.501	-0.624	-0.597	-9413.24
$\overline{R}^2$	0.935	0.938	0.940	0.724
SER	0.071	0.069	0.068	9144.94
JB.	0.906	2.309	0.393	0.878
Observations	79	79	79	78

Table 3a: Robustness Tests (1) for Output per Worker in 2000 and Judicial Independence, OLS

The numbers in parentheses are the absolute values of the estimated t-statistics. '\*\*', '\*' or '(\*)' show that the estimated parameter is significantly different from zero on the 1, 5 or 10 percent level, respectively. SER is the standard error of the regression, and J. -B. the value of the Jarque-Bera-test on normality of the residuals.

*Table 4* contains the robustness tests for the physical and human capital variables. The estimation results reported in *Table 2* for these variables remain largely robust to the inclusion of additional explanatory variables. With respect to the physical capital to output ratio, none of the additional explanatory variables exerts a negative influence. As judicial independence does not significantly affect the capital to output ratio either, these results are not very thrilling. This is slightly different with respect to human capital per worker. Legal origin, fractionalization and the age of the constitution all affect human capital significantly. In these equations, *de facto* judicial independence keeps its significant positive impact on

human capital also and is thus robust to the inclusion of these variables. However, including the alternative judicial independence indicators by La Porta et al. (2004) renders *de facto* JI insignificant. The alternative indicators of judicial independence and judicial review are also not statistically different from zero. Moreover, the number of observations is reduced by one third if these variables are included such that we interpret this result only cautiously.

Variables	log Y/L	Y/L	log Y/L	Y/L
<i>De jure</i> Judicial Indepen- dence	-0.050 (0.72)	1325.29 (0.14)	-0.045 (0.81)	4500.06 (0.64)
<i>De facto</i> Judicial Indepen- dence	0.032 (0.60)	19259.93** (2.89)	0.028 (0.77)	9625.69* (2.12)
$Log \left(K_i/Y_i\right)^{\alpha/(1-\alpha)}$	0.343** (4.82)	_	0.322** (5.74)	_
Log h <sub>i</sub>	0.415** (6.86)	_	0.315** (6.67)	_
Log A <sub>i</sub>	0. 660** (14.88)	_	0.612** (17.24)	_
Investment to GDP ratio	_	809.22** (3.69)	-	925.20** (5.97)
Number of school years of the population older than 25	_	3486.02** (5.32)	_	1862.41** (3.59)
Judicial independence (La Porta et al.)	0.079* (2.17)	1952.04 (0.38)	_	_
Judicial Review (La Porta et al.)	-0.007 (0.47)	1347.94 (0.65)	_	-
Age of the constitution	_	_	0.918** (4.50)	117.27** (4.71)
Constant	-0.593	-23623.85	-0.489	-16761.64
$\overline{R}^2$	0.954	0.781	0.942	0.770
SER	0.066	9075.64	0.066	8460.57
JB.	1.483	0.800	0.055	0.723
Observations	50	49	76	75

Table 3b: Robustness Tests (1) for Output per Worker in 2000 and JudicialIndependence, OLS

The numbers in parentheses are the absolute values of the estimated t-statistics. '\*\*', '\*' or '(\*)' show that the estimated parameter is significantly different from zero on the 1, 5, or 10 percent level, respectively. SER is the standard error of the regression, and J. -B. the value of the Jarque-Bera-test on normality of the residuals.

Finally, the robustness of the productivity regressions is indicated by the results in *Table 5*. Again, the estimated significantly positive impact of *de facto* JI on productivity, in the log or in per worker specification, remains robust to the inclusion of the additional explanatory variables. Legal origin and ethnic fractionalization

affect productivity significantly negatively, while the age of the constitution exerts a significant positive effect.

Overall, the estimation results are straightforward: While there is no direct effect of judicial independence on output per worker which is significantly different from zero, *de facto* JI affects human capital per worker and productivity significantly positively. This indirect effect is robust to the inclusion of other variables.

Variables	$\log_{(K_i/Y_i)^{\alpha/(1-\alpha)}}$	$\log_{(K_i/Y_i)^{\alpha/(1-\alpha)}}$	$\log (K_i/Y_i)^{\alpha/(1-\alpha)}$	log h <sub>i</sub>	log h <sub>i</sub>	log h <sub>i</sub>
<i>De jure</i> Judicial Independence	0.139 (1.19)	0.102 (0.69)	0.132 (1.14)	0.076 (0.60)	-0.091 (0.53)	-0.010 (0.07)
<i>De facto</i> Judicial In- dependence	-0.051 (0.67)	0.105 (0.95)	-0.042 (0.54)	0.178* (2.21)	0.124 (0.95)	0.198* (2.19)
$Log \left(K_i/Y_i\right)^{\alpha/(1-\alpha)}$	_	_	_	0.599** (5.56)	0.681** (4.65)	0.791** (7.43)
Log h <sub>i</sub>	0.511** (5.56)	0.492** (4.66)	0.557** (7.43)	_	_	-
$\text{Log } A_i$	0.134(*) (1.81)	0.048 (0.50)	0.145(*) (1.97)	-0.027 (0.33)	0.106 (0.96)	-0.155(*) (1.75)
Legal origin	0.012 (0.84)	_	_	0.048** (3.07)	_	-
Religious fractionali- zation	-0.010 (0.14)	_	_	0.233** (2.83)	_	_
Language fractionali- zation	0.022 (0.28)	_	_	-0.180* (2.20)	-	-
Ethnic fractionaliza- tion	-0.062 (0.86)	_	_	0.029 (0.37)	_	-
Judicial independence (La Porta et al.)	_	-0.056 (0.71)	_	-	0.098 (1.08)	_
Judicial Review (La Porta et al.)	_	-0.052 (1.67)	_	-	-0.001 (0.03)	_
Age of the constitu- tion	_	_	0.017 (0.04)	-	-	0.860(*) (1.70)
Constant	0.397	0.542	0.368	-0.134	-0.071	-0.073
$\overline{R}^2$	0.511	0.494	0.512	0.611	0.479	0.523
SER	0.140	0.141	0.141	0.151	0.165	0.168
ЈВ.	14.623**	4.161	14.969**	2.863	12.139**	3.756
Observations	79	50	76	79	50	76

 Table 4: Robustness Tests (2) for Physical and Human Capital in 2000 and Judicial Independence, OLS

The numbers in parentheses are the absolute values of the estimated t-statistics. '\*\*', '\*' or '(\*)' show that the estimated parameter is significantly different from zero on the 1, 5, or 10 percent level, respectively. SER is the standard error of the regression, and J. -B. the value of the Jarque-Bera-test on normality of the residuals.

Variables	log A <sub>i</sub>	Productivity per Worker	$log A_i$	Productivity per Worker	$log A_i$	Productivity per Worker
De jure Judicial Inde- pendence	-0.020 (0.11)	-0.006 (0.03)	0.055 (0.23)	0.035 (0.15)	0.040 (0.21)	0.079 (0.40)
<i>De facto</i> Judicial Independence	0.323** (2.79)	0.208(*) (1.68)	0.596** (3.83)	0.565** (3.46)	0.298* (2.52)	0.236(*) (1.83)
$Log \left(K_i/Y_i\right)^{\alpha/(1-\alpha)}$	0.334(*) (1.81)	_	0.123 (0.50)	_	0.363(*) (1.97)	_
Log h <sub>i</sub>	-0.057 (0.33)	_	0.198 (0.96)	_	-0.272(*) (1.75)	_
Log A <sub>i</sub>	_	_	_	_	_	_
Investment to GDP ratio	-	0.009* (2.14)	_	0.008 (1.55)	-	0.013** (2.93)
Number of school years of the population older than 25	_	0.017 (1.19)	_	0.016 (1.01)	_	-0.015 (0.99)
Legal origin	-0.071** (3.10)	-0.072** (3.19)	_	_	-	_
Religious fractionaliza- tion	0.060 (0.47)	-0.128 (0.94)	-	_	_	_
Language fractionaliza- tion	-0.131 (1.07)	-0.082 (0.64)	-	_	_	_
Ethnic fractionalization	-0.320** (2.95)	-0.262* (2.29)	_	_	-	_
Judicial independence (La Porta et al.)	_	_	-0.053 (0.43)	-0.054 (0.43)	_	_
Judicial Review (La Porta et al.)	_	_	-0.002 (0.05)	0.033 (0.64)	_	_
Age of the constitution	_	-	_	_	2.613** (4.28)	2.160** (3.06)
Constant	-0.450	-7.397	-0.016	6.878	0.045	7.001
$\overline{R}^2$	0.346	0.376	0.373	0.441	0.329	0.317
SER	0.221	0.229	0.226	0.222	0.224	0.240
ЈВ.	1.286	2.330	1.659	0.855	3.267	0.615
Observations	79	78	50	50	76	76

Table 5: Robustness Tests (3) for Productivity in 2000 and Judicial Independence, OLS

The numbers in parentheses are the absolute values of the estimated t-statistics. '\*\*', '\*' or '(\*)' show that the estimated parameter is significantly different from zero on the 1, 5, or 10 percent level, respectively. SER is the standard error of the regression, and J. -B. the value of the Jarque-Bera-test on normality of the residuals.

## 6 Conclusions

Recently, Feld and Voigt (2003, 2006) have introduced a *de jure* and a *de facto* indicator to measure judicial independence (JI). In a cross-country study, they find that *de jure* JI does not have an impact, while *de facto* JI has a robust and highly significant positive impact on economic growth. In this paper, we dig deeper into the empirical effects of JI in order to highlight the potential transmission channels by which an independent judiciary affects economic outcomes. More specifically, the impact of JI on physical and human capital as well as on labor and total factor productivity are analyzed. A factually independent judiciary is hypothesized to induce additional investment in human and physical capital and increase total factor productivity. It turns out that higher levels of *de facto* JI are robustly linked with higher investment into human but not physical capital. Moreover, higher degrees of JI are robustly correlated with higher levels of total factor productivity.

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