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INFLATION, CENTRAL BANK INDEPENDENCE
AND THE LEGAL SYSTEM

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Inflation, Central Bank Independence and the Legal System

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Abstract:

We argue that a higher degree of *de facto* independence of the legal system from the other government branches as well as public trust in the legal system may reduce the average inflation record of countries through a direct and an indirect channel. The direct channel works by affecting potential output, while the indirect channel helps to increase the *de facto* independence of the central bank. In the empirical section of the paper, we present evidence in favour of both channels in a sample containing both developed and less developed countries. A model that contains a legal system indicator in addition to *de jure* central bank independence, checks and balances within government, and openness can explain a large share of the variation in the logarithm of the inflation rate.

Key Terms: *Judicial Independence, Legal Trust, Central Bank Independence, Inflation.*

JEL classification: *D 72, D 78, H 11, K 42*

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1 Introduction

The determinants of long-run average inflation have received broad attention over the last decade: formal central bank independence was shown to be a good predictor for low inflation in OECD countries, whereas the turnover rate of central bank governors has been identified as an important determinant of inflation rates in Less Developed Countries (some of the original contributions are Cukierman 1992, Cukierman et al. 1992, Debelle and Fisher 1995, Grilli et al. 1991, and Posen 1993. Berger et al. 2001 and Hayo and Hefeker 2002 are surveys).

The creation of a (formally) independent central bank by a government is usually interpreted as an attempt to reduce its problem of credibly committing to a policy of stable money. It has been shown (Kydland and Prescott 1977) that governments with authority over money supply may be subject to time-inconsistent preferences: the promise of expanding monetary supply according to some fixed rule is not credible because once long-term contracts have been agreed upon by private actors, the government has an incentive to expand money supply by more than promised. The delegation of monetary authority to independent central banks with conservative governors (Rogoff 1985) is often considered to be one way of escaping the commitment problem.

Yet, the empirical finding that a close correlation between formally independent central banks and inflation rates only exists in OECD countries points to a possible shortcoming of this simplistic view: if government has the capacity to create a formally independent central bank, it might also be strong enough to overrule its decisions, simply ignore them, or abolish the independent central bank again. This has been coined second-order commitment problem (Moser 1999). One question immediately arises: what are the conditions that enable central banks to act independently of government interventions in some countries but not in others? One answer has been proposed by Keefer and Stasavage (2003) who argue that the number of veto players is crucial: the more veto players there are, the more likely is legal central bank independence (CBI) to correspond with factual CBI. In their paper, Keefer and Stasavage did

not explicitly emphasise the potential role of the judiciary. In this paper, we argue that the factual independence of the judiciary is a potentially important variable for determining inflation through (i) a direct transmission channel (affecting natural unemployment and/or potential output) and (ii) an indirect transmission channel (affecting *de facto* CBI). We measure the impact of the legal system by an indicator for *de facto* JI suggested by Feld and Voigt (2003), by an indicator for legal trust, which has been derived from the World Values Survey (World Values Survey Study Group 2000), and by a factor derived from these two variables.

We find that a highly independent or trustworthy legal system is systematically correlated with the turnover rate of central bank governors, which can be interpreted as a crude proxy for (the inverse of) *de facto* CBI. Thus, the judiciary affects inflation indirectly via *de facto* CBI. In addition, we show that the independence of the legal system helps to directly explain low inflation rates. If the derived factor based on *de facto* JI and legal trust is added to the equation conventionally used for explaining long-run average inflation, the coefficient of determination increases from 0.48 to 0.68 in our sample. Based on these results we argue that in order for monetary policy to be successful, it is not sufficient to set up a (formally) independent central bank but that other policy areas – such as the judicial one – explicitly need to be taken into account.

The paper is organized as follows: the next section contains a description of the rationale for the two major hypotheses, namely (i) that the degree of factual CBI might be influenced by factual judicial independence and that (ii) the inflation rate might be influenced by the factual independence of the judiciary independently from the degree of formal CBI. Section three introduces the econometric model, section four contains a discussion of the estimated results for the indirect channel of transmission, and section five discusses the results for the direct channel. The last section summarises the argument and contains some policy conclusions.

2 On the Relevance of the Judiciary for Inflation

Independence of both judiciary and central bank means that its representatives can expect their decisions to be implemented even if they are not in line with the (short-term) interests of government members. Independence also means that judges or board members of central banks do not have to anticipate other negative consequences as a result of their decisions such as (i) being expelled, (ii) being paid less, or (iii) being made less influential. We further propose to distinguish between *de jure* and *de facto* independence with regard to both CBI and judicial independence (JI). *De jure* CBI would be equivalent to CBI as measured on the basis of legal documents whereas *de facto* CBI would be equivalent to CBI as factually implemented. Cukierman (1992, 370) clarified that CBI does not mean that the board members can do whatever they want but rather their ability to stick to the objective of price stability without outside interference. Tighter constraints on the central bankers (e.g. on borrowing to the government) can thus translate into *higher* degrees of independence.

The second order commitment problem shortly described in the introduction implies that simply delegating competence to some formally independent agency such as a central bank might not be sufficient to turn promises into credible commitments. The capacity to credibly commit might depend on other institutional features such as a factually independent judiciary. If the judiciary is factually independent, the government is able to make credible commitments. The promise – made in t_0 – to pay bondholders x% interest on their bonds in t_1 is credible if a third party, i.e. neither the government nor the bondholders, has the power to ascertain who has breached the contract and if its decisions are binding even if they are not in the interest of one of the parties, e.g. the government. This is exactly the definition of judicial independence chosen above. If the judiciary is factually independent in this sense, the government is restricted in its actions. But the flipside is that this enables the government to make credible commitments. In the example, interest rates can be expected to be lower.

Due to the second order commitment problem, the delegation of competence to a formally independent central bank or judiciary is not sufficient to allow the government to make credible commitments. It is not *de jure* independence that counts but rather *de facto* independence. This theoretical point has recently been confirmed by empirical evidence. On the basis of 73 countries, Feld and Voigt (2003, 2004) show that *de jure* JI is largely irrelevant for economic growth, whereas *de facto* JI does seem to be conducive to economic growth in a significant and robust manner. With regard to CBI, we expect similar results. In fact, the observation that *de jure* CBI is a good predictor for inflation rates only in OECD countries, whereas the turnover rate fares better in LDCs can be interpreted as a corroboration of this insight. It would imply that in OECD countries, *de jure* CBI is approximately equivalent to *de facto* CBI, whereas the two systematically deviate in LDCs. The main focus of our analysis will therefore be on *de facto* indicators. We distinguish between two transmission mechanisms through which a factually independent judiciary could be conducive to low inflation: a direct one and an indirect one. The indirect one is based on the assumption that a high degree of *de facto* JI leads to a high degree of *de facto* CBI (assuming a high level of *de jure* CBI), which, in turn, leads to low levels of inflation. The direct one is based on the insight that high levels of *de facto* JI lead to more output. The indirect transmission channel is presented first.

The likelihood that factual CBI will remain low although CBI is formally high is (an inverse) function of the government's capacity to credibly commit to its promises. The relevant promise refers to a monetary policy which is carried out independently from the (short-term) interests of the government by a central bank. The government's capacity to credibly commit to its promises crucially depends on the factual independence that the judiciary enjoys. *Ex post*, the judiciary can be interpreted as an attempt of coming to terms with the commitment problem of the state. The laws passed by the legislature will be more credible if it is another branch that decides on their interpretation and enforcement. The hypothesis that a high degree of *de facto* JI is

conducive to a high degree of *de facto* CBI is based on the assumption that a high degree of *de facto* JI can also be interpreted as a proxy for a high probability that government will remain within the constraints spelled out in legal documents, the constitution included. Only if the judiciary is factually independent from government interference can economic agents trust that formally passed laws will factually be implemented. A general expectation that formally passed laws will factually be implemented includes, of course, the expectation that a formally independent CBI will also turn out to be factually independent. The argument does not necessarily imply that the governing board of a central bank has the competence to take a government to court if it believes the government to renege on the rules concerning the bank's independence.[1]

Yet, some courts play exactly that role. Art. 14,2 of the Statute of the European System of Central Banks, e.g., gives governors of national central banks who are fired by their governments before the end of their term the possibility to take their case to the European Court of Justice. If the Court is assumed to be factually independent, getting rid of governors who pursue policies not in the (short-term) interest of their respective governments will thus be difficult. This, in turn, increases *de facto* CBI.

But the opposite also holds: a judiciary that is factually dependent on government can prevent a central bank from becoming factually independent. The Constitutional Court of Colombia, e.g., interpreted the constitutional "right to a worthy house" (art. 51) as implying that the state must provide house subsidies for the entire population and further specified that the Central Bank should establish a permanent real interest-rate ceiling on housing loans (Clavijo 2000). This can

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[1] Keefer and Stasavage (2003) put forward an alternative institutional channel that leads to higher *de facto* CBI. They argue that the introduction of a formally independent central bank will be more credible if it takes place in a system with a high number of veto players. The presence of multiple veto players with different preferences makes government policies more difficult to change and thus more credible. Hence, a high number of veto players would make the degree of *de jure* CBI a reliable proxy for *de facto* CBI.

be interpreted as an example for how a rather dependent judiciary (the value for *de facto* JI in Colombia is below the sample average for all countries) can interfere into the policy competence of a central bank and thereby prevent it from becoming factually independent.

Another example from Latin America shows that the mere threat of the executive to go to (a dependent) court if the central bank does not implement the government's preferred policy might be sufficient to make the central bank give in. The factual independence of the Supreme Court of Venezuela is clearly below the mean, it ranked 61st out of 86 countries in 2000. Venezuelan President Hugo Chavez wanted the Bank to cut interest rates, Bank governor Domingo Maza Zavala responded saying that the Bank would not accept pressure from anyone. Chavez, in turn, announced that he would go to the Supreme Court, and the Bank did indeed cut rates (Central Banking, 2003).

In Argentina, a number of former central bank governors have been tried in court for decisions they made while in office. "Putting former governors on trial is an old tradition in Argentina" (Central Banking, 2002). The Argentine judiciary ranks 67th out of 86 with regard to factual independence. If governors anticipate that they might be tried later on for decisions not in tune with government interests, they will be more likely to make decisions that please governments. This is just another connection between a factually dependent judiciary and a factually dependent central bank.

Our hypothesis that *de facto* CBI is, at least partially, determined by the degree of factual judicial independence might be criticized by pointing towards a potential endogeneity problem. Even though both variables are determined through the political process, there are good arguments in favour of judicial independence determining CBI – and not vice versa. The independence of the judiciary is usually guaranteed in the constitution, whereas the independence of the central bank is typically only secured via ordinary law. Constitutions are not only the more fundamental documents; they are also passed before other laws are.

Let us now turn to the non-CBI related transmission mechanism, i.e. to the hypothesis that a high degree of *de facto* JI does not work via a high degree of *de facto* CBI, but rather influences the inflation rate directly. This argument can be demonstrated within the framework of two simple but widely used models. Our first direct argument linking inflation and the legal system starts from the assumption that an independent and trustworthy legal system reduces transaction costs in the economy, as contracts can be more easily enforced and risk premia will be lower. Trust can be interpreted as another way to solve the time-consistency problem mentioned above. If general legal trust is high, private agents will not expect a government to renege on its promises by, for example, initiating a burst of unanticipated inflation for achieving short-term economic objectives. If the probability of surprise inflation is low, wage contracts need not contain a premium, leading to higher degrees of price stability. In addition, the danger that supply shocks cause sustained second-round effects through a wage-price spiral can be avoided. Again, private agents do not expect the government to additionally boost prices through lose monetary policy. This line of reasoning can be illustrated using the seminal model by Barro and Gordon (1983), which has been primarily used to illustrate the consequences of time-inconsistency within the framework of monetary policy setting, the indirect channel from the legal system via CBI to inflation sketched above. In its simplest form the model consists of the following two equations:

Phillips-curve: $\quad u = u^n - \alpha(\pi - \pi^e)$,

CB loss function: $\quad L(u, \pi) = u + \gamma \, \pi^2$,

where: $\pi \quad = \quad$ inflation rate,

$\quad \pi^e \quad = \quad$ rationally expected inflation rate,

$\quad u \quad = \quad$ unemployment rate,

$\quad u^n \quad = \quad$ natural unemployment rate,

$\quad \gamma = \quad$ relative weight of inflation in central bank loss function,

$\quad \alpha = \quad$ inflation-unemployment trade-off parameter.

The conventional argument related to CBI focuses upon the size of the expected inflation rate in conjunction with γ. It is argued that a higher degree of credible inflation aversion reduces the time-inconsistency problem induced by the incentive of the central bank to surprise the private agents. This can be achieved by placing a high and credible weight upon the price stability objective, i.e. γ should be high. It is here where, for instance, Keefer and Stasavage (2003) bring in their hypothesis of a high number of veto players. Here we would like to stress a different relationship. First, we assume that a more independent or trustworthy legal system reduces transaction costs. Second, lower transaction costs cause overall economic efficiency to improve, which again will cause a fall in the natural unemployment rate. This direct effect of the legal system on the inflation rate is due to the specification of the Phillips-curve, which implies that following a reduction in the natural rate of unemployment inflation will also be lower in the rational expectations long-run equilibrium.

A second framework that helps to illustrate the direct channel from the legal system to inflation is the Svensson model (1997), which describes an economy using three equations.

Aggregate supply curve: $\pi_{t+1} = \pi_t + \alpha_1 y_t + \varepsilon_{t+1}$,

Aggregate demand curve: $y_{t+1} = \beta_1 y_t - \beta_2 (i_t - \pi_{t+1|t}) + \eta_{t+1}$,

Central bank loss function: $L = E_t \sum_{\tau=t}^{\infty} \delta^{\tau-t} \frac{1}{2} \left[(\pi_t - \pi^*)^2 + \lambda y_t^2 \right]$,

where:
π_t = inflation in period t,

y_t = output gap $(y_t - y^*)$ in period t,

y^* = potential output,

i_t = nominal interest rate,

$\pi_{t+1|t}$ = expectation of π_{t+1} in period t,

π^* = central bank's inflation target,

λ = relative weight on output stabilization.

Aggregate supply is characterized by a Phillips-curve, which describes the change of inflation as dependent upon the lagged output gap. Lagged income and real interest rates determine aggregate demand. The central bank minimizes its loss function by optimally adjusting its monetary policy instrument, the short-term nominal interest rate.

Now the argument linking inflation and *de facto* JI starts from a related but slightly different angle, namely the relationship between real growth and potential output. As demonstrated by Feld and Voigt (2003), higher *de facto* JI facilitates real GDP growth. Since this is not a business cycle phenomenon but a long-term trend, it will affect potential output positively. The output gap in the aggregate supply curve becomes negative. In the next period, this effect will start generating downward pressure on the inflation rate. Since the inflation rate is persistent, there will be a gradual dynamic adjustment towards a lower inflation rate. At the same time, the central bank will begin to reduce interest rates to exploit the gain in terms of lower inflation for more output. The resulting increase in actual output will start narrowing the output gap until it is zero in equilibrium. While the equilibrium inflation rate is the same before and after the positive shock in potential output, the *average* inflation rate computed over the relevant adjustment period will be lower in the situation after the shock. Note that this channel works for different combinations of central bank preferences and economic structures. Both economic structure and preferences will influence the dynamic path of prices and thereby the average inflation rate over the transitional period. For instance, a high value for λ leads to a gradual adjustment of inflation to its long-run target, as the central bank tries to avoid large negative output fluctuations. Since we do not know the structural and preference parameters in practice, it is difficult to make precise quantitative predictions. However, at least qualitatively, higher *de facto* JI will lead to lower average inflation rates independently of any time-inconsistency considerations.

To summarize, we have developed two theoretical hypotheses that link inflation and legal system both in a situation of a long-run equilibrium as well as a business cycle adjustment

situation. We call this a direct effect of the legal system on inflation, as it does not involve the intermediary stage of CBI, which lies at the heart of the previous hypotheses discussed in the literature. Hence, we would expect that a higher degree of judicial independence or confidence in the legal system should lead to lower inflation over and above their effect on the credibility of monetary policy through CBI.

3 Estimation Approach and Data Description

So far, two main hypotheses have been developed: firstly that *de facto* JI should be a good predictor for *de facto* CBI and secondly that indicators signalling a high degree of factual JI or a high degree of confidence of the population in the legal system should affect the inflation rate directly. In order to test the first hypothesis, some proxy for factual CBI is needed. Most previous studies have relied on the turnover rate of central bank governors (defined as "the actual average term of office of CB governors") which has been suggested by Cukierman (1992, 383) or a modified concept, namely the political vulnerability of central bank governors which indicates the probability that central bank governors will be removed from their offices during the six months following a change in government (introduced by Cukierman and Webb 1995).

De facto CBI has thus been operationalized by the turnover rate (TOR) of central bank governors as measured by Cukierman and Webb (1995). The higher the turnover rate, the more dependent is the central bank governor perceived to be. This is, of course, a very crude proxy for the factual independence of a central bank. The government might have other means to influence monetary policy than by exchanging the central bank governor. The expulsion of a central bank governor can even be interpreted as the governor having resisted government influence because otherwise the government might not have resorted to such a drastic means as firing the governor. Indeed, it could even be argued that central bank governors who always act according to the wishes of government have a very low probability of ever losing their job.

Interpreted like this, low turnover rates could even stand for low independence! However, due to the lack of better proxies, we rely on the TOR here too as a proxy for *de facto* CBI. [2]

We employ three indicators for the influence of the legal system. First, an indicator for *de facto* JI which is described in more detail in Hayo and Voigt (2003).[3] For simplicity reasons, this indicator measures the independence of the highest court of a country only, 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, this indicator is constructed as an objective - as opposed to subjective - indicator. A subjective indicator of *de facto* JI would ask for the perception of independence amongst those being polled. For those who live under the respective rules, their perception is surely an important element determining their behaviour. However, the norms of what an ideally independent judiciary would look like will most likely be different in different parts of the

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[2]   The limitations of the turnover rate of central bank governors as a rather crude proxy for *de facto* CBI could be addressed by developing a better indicator. It seems, e.g., reasonable not to constrain attention to the central bank governor but to take the average term lengths of all board members into account. A government can also influence monetary policy by changing the number of board members: increasing their number could give the government the possibility to bring in bankers whose preferences are more in line with its own. Decreasing the number could give government the possibility to get rid of those central bankers whose preferences are least in line with government preferences. Any change in the number can be interpreted as increasing uncertainty and thus possibly having some effect on *de facto* CBI. Factual independence might also depend on being paid adequately and, moreover, on the budget of the bank because that can be an important determinant of the quality of its research department, the technical equipment and the like. A broader indicator would, of course, not only enable us to increase our knowledge concerning the interplay between the legal and the monetary system but also to be more precise concerning the impact of *de facto* CBI on inflation in general.

[3]   The Appendix contains more information on how the indicator was constructed.

world. Data obtained by polls are thus not easily comparable and the *de facto* JI indicator is therefore based on factual information. In principle, anybody measuring *de facto* JI in the countries covered should end up with exactly the same data (see the Appendix for a more detailed description of the *de facto* JI indicator). The resulting indicator for *de facto* JI lies between 0 and 1 and is available for 86 countries.

In the theoretical section, it was argued that the confidence of the population in the legal system might be an alternative to the *de facto* JI indicator. While the previous indicator is based on an objective assessment, this is clearly a subjective measure of the trustworthiness of the legal system by those who are exposed to it. We thus re-estimate equations 1-4 using this subjective indicator. This variable is based on three waves of the World Values Survey (1981, 1990, and 1995-97). About 1000 randomly selected people in about 50 different countries and regions were asked a multitude of questions concerning values and attitudes (see World Values Study Group 2000). The actual question used here is worded as follows: "Please look at this card and tell me, for each item listed (here: The legal system), how much confidence you have in them, is it a great deal, quite a lot, not very much or none at all?"

Comparing the *de facto* JI indicator and legal trust, we find that they are positively correlated with a coefficient of 0.18, which is not particularly high. Therefore, we also compute the common variation of these objective and subjective indicators. We apply principle components analysis to derive the underlying factor. The resulting factor explains almost 60% of the common variance, and the loadings of both variables on the factor are sufficiently high with about 0.77. We then use the component scores to construct a series representing a new indicator variable named legal factor.

We interpret this factor as the degree of functionality of the legal system in a country. The two underlying variables are quite different, as is apparent from their relatively low correlation coefficient. First, the *de facto* JI indicator is based on objective elements, while the legal trust

variable consists of a subjective assessment of confidence in the legal system. Second, none of the variables directly captures the notion of a well-functioning legal system. Thus, these indicators contain a lot of noise for our question of interest. Constructing the legal factor allows to concentrate on the common variance that, at least in our view, reflects the *de facto* working of the legal system.

Thus, we have three *legal indicators* for analysing the impact of the legal system on *de facto* CBI and actual inflation. The *de facto* JI indicator is constructed as an objective indicator of judicial independence, the second indicator is based on the subjective confidence of the population in the legal system, and the third indicator is based on the common variance of the first two. Reflecting the arguments above, we consider the legal factor to be the most interesting of these indicators from both, a theoretical and empirical point of view.

We propose to test the *indirect* channel between inflation and the legal system by estimating the following regression for the turnover rate (TOR) of the countries i in the sample (i = 1,..N):

(1) $TOR_i = \beta_0 + \beta_1 \text{ Legal Indicator}_i + \beta_2 \text{ CEO}_i + \varepsilon_{1i}$,

CEO is a control variable that captures the formal term of office, in particular the legal protection of the tenure of the central bank governor. An effective legal protection for the central bank governor implies a negative coefficient. Regarding the legal system indicator, our theory also predicts a negative sign.

As argued above, *de facto* CBI might be determined by the degree of checks and balances as well as by the degree of *de facto* JI. Keefer and Stasavage (2003) propose a model that shows the importance of veto powers, measured by the logarithm of institutional checks, on the turnover rate. This measure for checks and balances (LnCHECKS) was developed by Keefer (2002) and does not only recognize the number of veto players but also takes the electoral rules into account as they affect the cohesiveness of governing coalitions. A high value indicates the

existence of many independent branches of government with veto power over policy change. Thus, the next model also includes the formal term of office of the CEO and the interaction term of their checks variable with the term length of the CEO.

(2) $TOR_i = \beta_0 + \beta_1 \text{ Legal Indicator}_i + \beta_2 \text{ CEO}_i + \beta_3 \text{ LnChecks}_i + \beta_4 (\text{LnChecks*CEO})_i + \varepsilon_{2i}$

Regarding the test of the *direct* channel of the legal system on inflation, we estimate the following equation for the logarithm of the average inflation rate over the period 1980 to 1998:

(3) $LnInflation_i = \beta_0 + \beta_1 \text{ Legal Indicator}_i + \beta_2 \text{ } de\text{ } jure \text{ CBI}_i + \beta_3 \text{ OPEN}_i + \varepsilon_{3i}$

We add two control variables; the indicator of *de jure* CBI, which goes back to Cukierman et al. (1992) and the degree of openness (OPEN).[4] Romer (1993) argues that policy makers have fewer incentives to inflate ex post as imports increase as a share of total consumption.[5] A larger share of the variation in inflation rates may be explained if the veto hypothesis based on checks and balances put forward by Keefer and Stasavage (2003) is interpreted as complementary to our approach. The authors use two different indicators for checks and balances: the LnChecks indicator presented above and the political constraints indicator (POLCON) developed by Henisz (2000), which takes into consideration the number of formal constitutional veto points present in a political system, the issue whether the veto points are controlled by representatives of different parties, and the cohesiveness of the majority that controls each veto point. Since the former turns out to be insignificant, they include the latter in their model. To provide a tough testing ground for our legal indicators, we also choose POLCON. Thus, it seems promising to include the indicators for veto powers within the executive and the legislative into the model and to test for an additional and direct influence of the judicial system on the inflation rate.

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[4]   Forder (1996) and (1998) criticises the existing *de jure* CBI measures based on conceptual and data-based arguments.

[5]   Openness is defined as imports of goods and services divided by GDP over the period 1980 to 1999. The data are from the IMF International Financial Statistics.

(4)   Ln Inflation$_i$ = β_0 + β_1 Legal Indicator$_i$ + β_2 *de jure* CBI$_i$ + β_3 OPEN$_i$ + β_4 POLCON$_i$

    + β_5 (POLCON*CBI)$_i$ + ε_{4i}

There may be doubts that we truly measure the impact of the legal system using our indicators. For instance, it is possible that both the degree of inflation and judicial independence are determined by yet another factor. Since it is not clear what this other factor may be, it appears to be sensible to investigate the robustness of our results by including rather broad indicators of institutional quality. First, there is the consequentionalist argument that those countries with higher incomes must have, *ceteris paribus*, better institutions. Second, geographic circumstances might have been beneficial to institution building. Reflecting these considerations, we employ the logarithm of real income in US dollars and the latitude as control variables.

Finally, we test for the influence of the direct and the indirect channel of the legal system on inflation by including the turnover rate in the equation for the inflation rate (see model 5) in a system of equations that allows for cross-equation correlations of the disturbances.

(5a)   TOR$_i$ = β_0 + β_1 CEO$_i$ + β_2 Legal Indicator$_i$ + β_3 LnChecks$_i$ + β_4 (LnChecks*CEO)$_i$ + ε_{5ai},

(5b)   Ln Inflation$_i$ = β_5 + β_6 *de facto* JI$_i$ + β_7 *de jure* CBI$_i$ + β_8 OPEN$_i$ + β_9 POLCON$_i$ +

    β_{10} (POLCON*CBI)$_i$ + β_{11} TOR$_i$ + ε_{5bi},

    with cov(ε_{5a} ε_{5b}) = $\sigma^2 \neq 0$.

If, on the one hand, we only found the indirect channel to be significant, it would be clear that identified direct effects in models 3 and 4 would be spurious. If, on the other hand, both direct and indirect effects turned out to be significant, then this would be evidence that both transmission channels of the legal system on inflation are present in the data.

4 Estimation Results: *Indirect* Channel of Transmission

In the empirical analysis, the sample size varies depending on the included variables. At a minimum we have 34 countries, more than one third of which are not members of the OECD. The maximum sample sizes are 46 in the turnover rate models and 51 in the inflation rate models, with about one half of the countries being OECD members. Before interpreting the estimates, it is useful to check the statistical properties of the estimated equations. Here we make use of several diagnostics: Tests for heteroscedasticity based on White (1980) using squares of regressors and squares of regressors plus cross-products, respectively. A normality test as suggested by Jarque and Bera (1987) with a small-sample correction. A RESET test for misspecification is based on Ramsey (1969). Within-sample instability tests developed by Hansen (1992).

We commence the empirical analysis by investigating the existence of the *indirect* effect of the legal system via strengthening *de facto* CBI. Models (1a) to (1c) in Table 1 analyse the effect of the legal system indicators on the central bank governor turnover rate, with the legal protection of the tenure of the central bank governor as a control variable. The diagnostic tests for Model (1a) in Table 2 reveal evidence of non-normality in the residuals. To study how this excessive non-normality affects the results, we re-estimate the equation with two dummy variables to compensate for outliers (Brazil and Uganda). It turns out that the outcomes are quite similar (results available upon request), with the marginal significance levels of the variables of interest being somewhat lower. We find that *de facto* JI has a significantly negative influence on the turnover rate. The legal protection of the central bank governor, on the other hand, does not show up as significant in this model. Model (1b) estimates the same regression with legal trust instead of *de facto* JI and the qualitative results are similar. Finally, employing the legal factor in model (1c), we get stronger results, as this legal system indicator is significant at the 1% level.

Note that models (1a) to (1c) suffer to some degree from insample instability, which may indicate some misspecification.

In model (2a), we add the veto power indicator (LnChecks) put forward by Keefer and Stasavage (2003) and its interaction with CEO, the formal term of office for the central bank governor. Table 2 shows that model (2a) suffers from non-normality. As before, re-estimation of the model with additional dummy variables for Brazil and Uganda does not affect results in a noteworthy way. While both, veto power interaction and the *de facto* JI indicator show a negative sign, none of the variables are significant at a 10% level. However, this is partially due to a high degree of collinearity among the included variables as well as with the constant term.

The legal system indicator becomes significantly negative at a 5% level when including the legal trust variable as shown by the estimates of model (2b). None of the other variables are significant. Note that the RESET test indicates some misspecification. Finally, we use the legal factor in model (2c). This time our variable of interest is significant at a 1% level, while the other variables remain insignificant.

To allow for a relationship between LnChecks and the legal system indicators, we also augment the above regression by interacting these two variables. It turns out, however, that the interaction is not significant (results omitted). To summarise, we find that the legal system has a direct influence on the turnover rate over and above the legal protection of the tenure of the central bank governor and institutional veto power. We interpret this as evidence for the *indirect* channel of transmission outlined above. The coefficient of determination of these regressions is not particularly high. This may be due to the fact that the turnover rate is a very noisy indicator of *de facto* CBI.

Table 1: Explaining the turnover rate

Model	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)
Constant	0.51**	0.582**	0.514**	0.39	0.603	0.380
	(0.19)	(0.185)	(0.185)	(0.37)	(0.369)	(0.355)
de facto JI	-0.40(*)			-0.28		
	(0.22)			(0.23)		
Legal Trust		-0.271(*)			-0.348*	
		(0.140)			(0.128)	
Legal Factor			-0.161**			-0.151**
			(0.056)			(0.053)
CEO	0.11	-0.393	-0.300	0.74	0.308	0.512
	(0.30)	(0.339)	(0.304	(0.76)	(0.778)	(0.767)
LnChecks				0.06	-0.023	0.077
				(0.30)	(0.281)	(0.279)
(LnChecks * CEO)				-0.66	-0.652	-0.687
				(0.64)	(0.618)	(0.613)

Table 2: Diagnostic information on models in Table 1

Model	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)
No. of observations	46	34	34	46	34	34
SE	0.339	0.318	0.300	0.328	0.285	0.282
R^2	0.07	0.12	0.22	0.17	0.34	0.34
F-test	$F(2,43) = 1.66$	$F(2,31) = 2.02$	$F(2,31) = 4.30*$	$F(4,41) = 2.15(*)$	$F(4,29) = 3.65*$	$F(4,29) = 3.86*$
Normality test	$Chi^2(2) = 9.67**$	$Chi^2(2) = 4.81$	$Chi^2(2) = 5.30$	$Chi^2(2) = 7.46*$	$Chi^2(2) = 3.79$	$Chi^2(2) = 3.72$
Heteroscedast. test	$F(4,38) = 1.73$	$F(4,26) = 1.19$	$F(4,26) = 1.93$	$F(8,32) = 1.78$	$F(8,20) = 0.40$	$F(8,20) = 0.55$
Heteroscedast. test with cross-products	$F(5,37) = 1.93$	$F(5,25) = 0.91$	$F(5,25) = 1.54$	$F(13,27) = 1.08$	$F(13,15) = 0.39$	$F(13,15) = 0.51$
RESET	$F(1,42) = 1.35$	$F(1,30) = 0.01$	$F(1,30) = 1.37$	$F(1,40) = 0.46$	$F(1,28) = 5.54*$	$F(1,28) = 6.76*$
Instability variance	0.707*	0.523*	0.181	0.503*	0.093	0.054
Instability joint	1.33*	0.939	1.49*	1.41	1.26	1.51

Notes: The symbols (*), *, ** indicate significance at a 10%, 5%, and 1% significance level.

5 Estimation Results: *Direct* Channel of Transmission

Table 3 summarizes the result related to the analysis of the *direct* influence of the legal system on the inflation rate averaged over the period 1980 to 1998.[6] Model (3a) regresses the *de facto* JI indicator, degree of openness, and *de jure* CBI on the logarithm of the inflation rate. First, the diagnostic tests of model (3a) are fine except for deviations from the normality assumption (see Table 4). When including dummy variables for Bolivia, Brazil, and Nicaragua in model (3a), the normality test no longer rejects. The impact of including these dummy variables on the results for the other variables is negligible. We find that the *de facto* JI indicator has a significantly negative impact on the inflation rate at a 1% level. In addition, openness has a significantly negative effect on inflation as shown earlier by Romer (1993). Note that the *de jure* CBI variable does neither display the theoretically expected sign nor is it statistically significant.[7]

Model (3b) uses the confidence in the legal system as an indicator for the legal system. As can be seen from Table 4, there appears to be heteroscedasticity in the residuals. To account for that, we employ robust standard errors based on White (1980) for inference purposes. In general, results are very similar to the ones found for model (3a), except for a higher marginal significance level of the legal system indicator. Finally, model (3c) replaces legal trust with the legal factor. Not only is the legal factor significant at a 1% level, its inclusion has a dramatic effect on the explanatory power, which rises from 0.33 to 0.52. Note, however, that for both models (3b) and (3c) there is evidence of misspecification as indicated by the RESET-test.

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[6]   We also estimated the effect of interacting legal trust and CBI. This variable is highly collinear to legal trust and slightly less significant.

[7]   Freytag (2001) argues that a form of CBI that has not been taken into account by the Cukierman index is fixing the exchange rate. He proposes an indicator that takes into account any external commitments a central bank may have entered into. The correlation between his alternative index for *de jure* CBI and the Cukierman index is relatively small (0.15). However, re-estimating the models with this indicator does not change the results very much.

In Model (4a), we add a variable measuring the political constraints of a government (Polcon) and its interaction with *de jure* CBI. In Keefer and Stasavage (2003), this variable performed better with respect to explaining inflation than the LnChecks variable used in the turnover rate regression. It can be shown that this is also true for our sample (results omitted). The diagnostic statistics are fine and both the *de facto* JI indicator and openness are significantly negative at a 10% level. Now we find that *de jure* CBI is significantly <u>positive</u> at a 5% level, thus contradicting the basic hypothesis of higher CBI leading to lower inflation. This reflects the result that the relationship between formal CBI and inflation breaks down in a sample that includes countries that are not members of the OECD.[8] However, the interaction between political constraints and *de jure* CBI is significantly negative. Only when the checks and balances are sufficiently strong does CBI have a negative impact on the inflation rate, which supports Keefer and Stasavage's argument. For instance, if both CBI and LnChecks take on their mean values, the net effect of CBI on inflation will be positive. POLCON on its own is significantly positive at the 10% level, which is not in accordance with their hypothesis.

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[8]   See Sturm and de Haan (2001) for a discussion of this issue using an extended and edited data base.

Table 3: Explaining the average inflation rate in logs

Model	(3a)	(3b)	(3c)	(4a)	(4b)	(4c)
Constant	4.86**	4.41**	3.94**	-2.14(*)	-1.76	1.23
	(0.78)	(0.86)	(0.63)	(1.21)	(1.49)	(1.27)
de facto JI	-2.96**			-1.92(*)		
	(0.81)			(0.99)		
Legal trust		-1.27(*)			-1.37**	
		(0.70)			(0.48)	
Legal Factor			-0.94**			-0.78**
			(0.21)			(0.19)
de jure CBI	0.64	-0.96	-0.63	8.10*	9.50*	9.40*
	(1.57)	(1.60)	(1.43))	(3.11)	(4.35)	(3.81)
OPEN	-0.009*	-0.02**	-0.02**	-0.008(*)	-0.02(*)	-0.01(*)
	(0.004)	(0.008)	(0.008))	(0.004)	(0.008)	(0.007))
POLCON				3.14(*)	2.37	3.00(*)
				(1.67)	(2.03)	(1.72))
(POLCON * *de jure* CBI)				-12.2*	-13.7**	-13.4*
				(4.57)	(5.77)	(5.06)

Notes: The symbols (*), *, ** indicate significance at a 10%, 5%, and 1% significance level. Standard errors in model 3b are heteroscedasticity-consistent (HCSE) based on White (1980).

Table 4: Diagnostic information on models in Table 3

Model	(3a)	(3b)	(3c)	(4a)	(4b)	(4c)
Exclusion tests of legal system indicators after including:						
Log Real GDP	$F(1,47) = 3.41(*)$	$F(1,29) = 13.3**$	$F(1,29) = 21.3**$	$F(1,44) = 2.31$	$F(1,27) = 9.42**$	$F(1,27) = 17.3**$
Latitude	$F(1,29) = 8.40**$	$F(1,29) = 5.12*$	$F(1,29) = 14.1**$	$F(1,27) = 6.70*$	$F(1,27) = 8.58**$	$F(1,27) = 14.4**$
No. of observations	51	34	34	51	34	34
SE	1.406	1.293	1.087	1.32	1.037	0.92
R^2	0.27	0.33	0.52	0.39	0.60	0.68
F-test	$F(6,45) = 5.92**$	$F(3,30) = 4.86**$	$F(3,30) = 11.0**$	$F(5,45) = 5.74**$	$F(5,28) = 8.26**$	$F(5,28) = 11.8**$
Normality test	$Chi^2(2) = 12.1**$	$Chi^2(2) = 0.63$	$Chi^2(2) = 1.89$	$Chi^2(2) = 5.52$	$Chi^2(2) = 8.30*$	$Chi^2(2) = 8.31*$
White test	$F(9,40) = 0.50$	$F(6,23) = 4.89**$	$F(6,23) = 1.50$	$F(10,34) = 1.00$	$F(10,17) = 1.07$	$F(10,17) = 0.69$
White test with cross-products	$F(9,37) = 0.48$	$F(9,20) = 3.62**$	$F(9,20) = 1.06$	$F(19,25) = 1.30$	N.A.	N.A.
RESET	$F(1,46) = 1.64$	$F(1,29) = 8.04**$	$F(1,29) = 6.84*$	$F(1,44) = 0.54$	$F(1,27) = 2.19$	$F(1,27) = 1.54$
Instability variance	0.124	0.039	0.062	0.358	0.122	0.089
Instability joint	0.652	0.585	0.529	1.004	1.875	0.867

Notes: The symbols (*), *, ** indicate significance at a 10%, 5%, and 1% significance level. Standard errors in model 3b are heteroscedasticity-consistent (HCSE) based on White (1980).

In model (4b) we use legal trust as the variable of interest and find evidence of non-normality in the residuals (see Table 4). Including a dummy variable for Brazil removes a large extent of this non-normality, while leaving the estimation results unaffected. Again, we find a significantly negative impact of our legal system indicator, this time at a 1% level. These results also carry over to a regression that replaces legal trust with our legal factor. Including the legal factor raises the fit of the equation again, from 0.60 to 0.68.

So far, we have assumed that our three indicators measure what we are interested in, namely the impact of the legal system. As discussed in section 3, it may be the case that both inflation and the legal system are influenced by a third causal factor that we have not controlled for. Since it is unclear what this third factor might be, we use two broad indicators as control variables, namely the logarithm of GDP per capita and latitude. Table 4 provides exclusion tests for our three legal indicators in all models considered when either real income or latitude is included in the regressions. Only in model (4a) is the legal system indicator no longer significant at a 10% level when including real income per capita. Even in that case, the marginal significance level of the exclusion test is 0.14 in the case of the *de facto* JI indicator and 0.43 in case of real income. Thus, we do not find any evidence that our findings for the impact of the legal system on inflation are spurious. To summarize, inflation is lower when countries have a high degree of openness, *de jure* CBI *and* a relatively large number of political constraints, and an independent judiciary. Thus, we found evidence for a *direct* channel from the legal system to inflation.

In the final step of our analysis, we combine models (2c) and (4c) by including the turnover rate in the equation for the inflation rate. We confine this analysis to the legal factor, as it is the theoretically most convincing and the variable with the highest explanatory power of our three indicators. This allows us to see whether both, direct and indirect transmission channel of the legal system are present. The estimation of equations (5a) and (5b) takes place in an efficient full-information maximum likelihood setting (FIML). Since the constant terms are not

significant but highly collinear to the institutional variables, they are removed (exclusion test does not reject: $Chi^2(2) = 1.19$). This does not affect the outcome for the legal factor much (its marginal significance falls from 0.01 to 0.011) but it makes the other institutional variables highly significant. Note that including real GDP per capita or latitude neither has a noteworthy effect on the outcome for the other regressors nor are these variables significant. Table 5 presents the two-equation model estimated by FIML. After including a dummy variable for Brazil in the inflation equation to avoid significant deviations of the residuals from a normal distribution, neither the single equation tests nor the vector tests indicate any statistical problems. All of the variables in the turnover rate model (5a) are statistically significant. The result remains that the legal term of office of the central bank governor has only the desired effects on *de facto* CBI if the institutional setting of the government is characterised by a high degree of veto power. In contrast, a better working legal system has a significantly negative effect on the turnover rate.

Model (5b) shows that all variables in model (4c) remain significant except openness. In particular, the legal factor is significantly negative at a 1% level. Thus, there is strong evidence for a separate direct channel of the legal system on inflation. At the same time, the equation includes the turnover rate, which is significant at a 10% level. The system set-up allows us to consistently test restrictions on the parameters. We find that the combined effect of the legal factor through the direct and indirect channel is -0.74, which, perhaps not surprisingly, is significantly different from zero at a 1% level ($Chi^2(1) = 29.4$). The second hypothesis of interest is whether the direct effect is significantly larger than the indirect transmission channel. In absolute terms, the direct effect is larger, with the difference being 0.29, but statistically, we cannot reject that this difference is equal to zero ($Chi^2(1) = 0.95$).

Table 5: FIML estimation of equations explaining the turnover rate and the inflation rate

Equation	(5a)		(5b)
Dependent variables:	Turnover Rate		Ln Inflation
Regressors:	Coefficient (SE)	Variables	Coefficient (SE)
CEO	1.29** (0.25)	*de jure* CBI	10.1** (1.42)
LnChecks	0.33** (0.12)	POLCON	2.47** (0.71)
CEO*LnChecks	-1.23** (0.31)	POLCON * CBI	-12.5** (2.23)
Legal Factor	-0.15* (0.05)	OPEN	-0.005 (0.005)
		Turnover Rate	1.51(*) (0.88)
		Legal Factor	-0.52** (0.17)
log-likelihood = -33.27			
no. of observations = 34			
Vector normality test: $Chi^2(4) = 5.85$			
Vector heteroscedasticity test: $F(51,27) = 0.49$			
SE of equations	0.288		0.661
Normality	$Chi^2(2) = 4.23$		$Chi^2(2) = 1.32$
Heteroscedasticity	$F(17,11) = 0.97$		$F(17,11) = 0.42$

Notes: The symbols (*), *, ** indicate significance at a 10%, 5%, and 1% significance level. The equation for the inflation rate contains an impulse dummy for Brazil.

We conclude, therefore, that there is evidence for both a direct influence as well as an indirect influence from the legal system to the inflation rate. We cannot exclude the possibility that the impact of the two transmission channels on the inflation rate is rather similar in importance.

Finally, Graph 1 gives an impression of the fit of the two equation system.

Graph 1: Fit of FIML model for turnover rate and log inflation
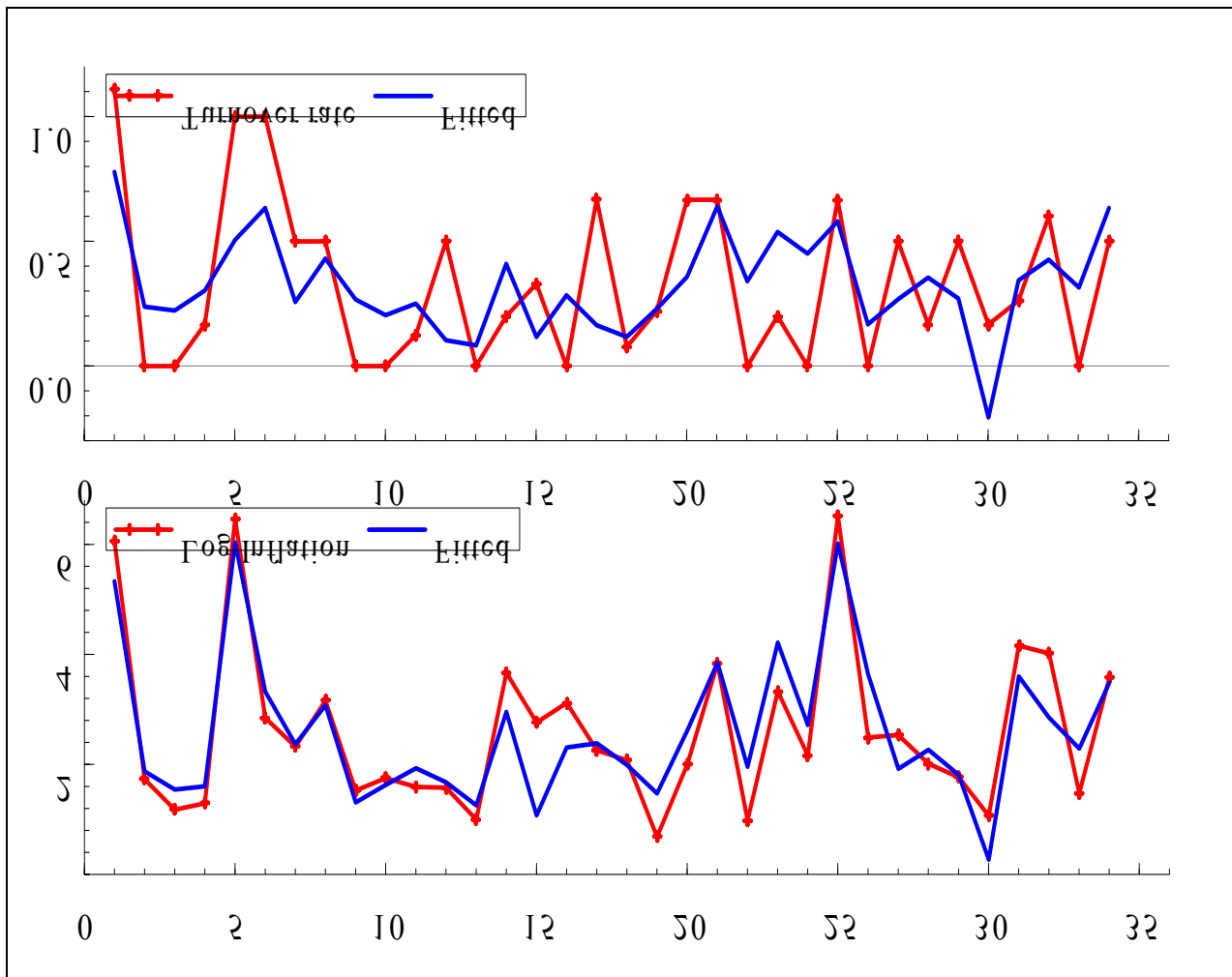
Note: The observations reflect the countries sorted in an alphabetical order (see the Appendix for a list of countries).

It is apparent that we are more successful in explaining average inflation rates across countries than turnover rates. But even in the case of the turnover rate there are few serious mispredictions.

6 Conclusion

This paper analyses the relationship between *de facto* central bank independence, inflation, and the legal system. We argue that a more independent and better functioning legal system is an important determinant of both *de facto* CBI and inflation. The working of the legal system is

measured via three indicators, *de facto* judicial independence, legal trust, and a legal indicator based on these first two indicators. The first is an indicator based on Feld and Voigt (2003), the second is computed from the World Values Survey, and the third is a statistical factor based on the common variance of these two indicators. The influence of the legal system on the inflation rate works via two channels, an indirect and a direct one. The indirect channel works through the strengthening of *de facto* CBI in the case of an independent and trustworthy legal system. The direct channel suggests that higher judicial independence lowers transaction costs within the economy and thereby increases efficiency. Consequently, we would expect a fall in the natural rate of unemployment and an increase in potential output. Within simple but widely used models of monetary policy, we show that this will lead to a reduction of the equilibrium rate of inflation (Barro and Gordon 1983) and a fall of the average rate of inflation over the relevant time period (Svensson 1997).

Putting our hypothesis to the test, we find that there is both empirical evidence of an indirect channel of the legal system affecting inflation via *de facto* CBI as well as for a direct channel. Evidence for the working of the indirect channel is demonstrated within a regression explaining *de facto* CBI as proxied by the central bank governor turnover rate. A higher degree of *de facto* JI or legal trust will decrease the turnover rate, controlling for the influence of the formal terms of office and the checks and balances working within the executive and legislative branches of government. The direct relationship between the legal system and inflation is investigated in a regression explaining the logarithm of the inflation rate. Controlling for the influence of openness, *de jure* CBI, political constraints, and political constraints interacted with *de jure* CBI, we show that our legal system indicators contain a substantial degree of additional explanatory power. In our sample, such a model can explain 68% of the variation in the logarithm of the average inflation rate. We also establish that the direct influence of the legal system on the inflation rate is present even if we control for the working of the indirect channel.

Thus, both channels appear to affect the change in prices as separate channels, although we find more robust evidence for the direct effect. Hence, in addition to traditional factors, such as central bank independence or openness, or alternative factors (surveyed in Hayo and Hefeker 2002), such as interest group influences or public inflation aversion, the legal system appears to be yet another noteworthy determinant of the average inflation rate.

This result has important policy implications. First, to achieve low long-run average inflation rates, it may not be enough to create formally independent central banks, as there is a large gap between *de jure* and *de facto* central bank independence especially in many LDCs. Second, a well-functioning legal system appears to be one pre-requisite for achieving a stable monetary environment. Only in a well-functioning legal system can we expect that the central bank becomes factually independent. Given the actual degree of *de facto* independence of many legal systems in Third World countries, this situation may be a long way off. Policy advise that concentrates on a narrow form of institution building such as creating central bank may turn out to be rather ineffective. The same holds true if such an institution building is part of conditional development assistance or international loan programmes. Thus, changes in the formal CB rules are likely to be much more successful if they are conditional on other reforms in these countries.

Arguably, this advocates a different type of conditionality, namely to build fundamental social institutions first before tackling the task of creating more specialized economic institutions. In our analysis of the impact of the legal system, this would yield a double-dividend: a better working of central bank independence, what we called indirect channel, together with a better working of the economy as a whole, the direct channel in our framework. However, this makes the task of formulating reform proposals for Third World countries or conditions for development aid or loans much more difficult. Not only is it much more ambitious to reform the, say, legal system of a country, it also takes much more time. Time lags, however, are an

important obstacle to monitoring the fulfilment of the conditions and the principle-agent problems are exacerbated.

Appendix

Sample

The countries considered in the empirical analysis are:

In Table 1:

Indicators: Legal Trust and Legal Factor (34 countries):

Argentina, Australia, Austria, Belgium, Brazil, Chile, China, Colombia, Denmark, Finland, France, Germany, Ghana, Hungary, Iceland, India, Italy, Japan, Korea (South), Mexico, Netherlands, Nigeria, Pakistan, Peru, Philippines, South Africa, Spain, Sweden, Switzerland, Turkey, UK, USA, Uruguay, Venezuela.

Indicator: *De facto* JI (46 countries): In addition to the ones above: Botswana, Costa Rica, Egypt, Greece, Israel, Kenya, Malaysia, Nepal, New Zealand, Norway, Panama, Uganda.

In Table 3, Table 5, and Graph 1:

Indicators: Legal Trust and Legal Factor (34 countries): see above

Indicator: *De facto* JI (51 countries): In addition to the ones above: Bolivia, Botswana, Costa Rica, Egypt, Greece, Israel, Kenya, Malaysia, Nepal, New Zealand, Nicaragua, Norway, Panama, Singapore, Uganda, Zambia, Zimbabwe.

Some information on the construction of the *de facto* JI indicator

The indicator for *de facto* JI is based on the following list of eight questions that were sent out to experts in the sampled countries (see Feld and Voigt 2003). The time period they had to evaluate is 1960-1999. The answers to these questions were coded in such a way that the resulting variables take on values between 0 and 1. The unweighted sum of the variables is then divided by the number of variables for which information is available.

(1–3)   A crucial aspect of *de facto* JI will be the effective average term length of the members of the highest court.[9] If the actual term length and the one to be expected on the basis of the legal foundations deviate, this is interpreted as a signal for a low level of factual independence. Removing a judge before the end of term is a serious breach of JI and countries where this has occurred get a low score.

(4)   The influence of a judge depends on the number of other judges who are members of the same court. By increasing the number of judges, the weight of the sitting judges can be reduced. The *de facto* indicator counts how many times the number of judges has been changed since 1960.

(5–6)   In order to be factually independent, judges need to be paid adequately. It was therefore inquired whether the incomes of judges have at least remained constant in real terms since 1960. But the efficacy of courts does not only depend on the income level of their judges but also on the number of clerks employed, the size of the library, the availability of modern computer equipment etc. This aspect has been taken into account by asking for the development of the court's budget as an organization (also since 1960).

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9.   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.

(7)   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. Frequent changes of the respective legal rules are therefore interpreted as an indicator for low *de facto* independence.

(8)   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 cooperation is not granted. The more frequently this has been the case, the less independent is JI supposed to be factually.

References

Barro, R. J. and D. Gordon (1983); Rules, Discretion, and Reputation in a Positive Model of Monetary Policy, *Journal of Monetary Economics* 12: 101-121.

Berger, H., J. de Haan and S. Eijffinger (2001); Central Bank Independence: An Update of Theory and Evidence, *Journal of Economic Surveys* 15: 3-40.

Central Banking (2002); Argentina's Central Bank Sheds Senior Staff – and Governor? In: Central Banking Publications, Newsmakers, 17 May 2002; at: http://www.centralbanking.co.uk/newsmakers/archive/2002/may17.htm.

Central Banking (2003); Fighting a Losing Battle? In: Central Banking Publications, Newsmakers, 14 April 2003, at: http://www.centralbanking.co.uk/newsmakers/archive/2003/apr14.htm.

Clavijo, S. (2000); Central Banking and Macroeconomic Coordination: The Case of Colombia, mimeo, September.

Cukierman, A. (1992); *Central Bank Strategy, Credibility, and Independence*, Cambridge: MIT Press.

Cukierman, A. and S. Webb (1995); Political Influence on the Central Bank: International Evidence, World Bank Economic Review 9:3.

Cukierman, A., S. Webb und B. Neyapti (1992); Measuring the Independence of Central Banks and its Effects on Policy Outcomes, *The World Bank Economic Review* 6: 353-98.

Debelle, G. und S. Fischer (1995); How Independent Should a Central Bank Be? In: J.C. Fuhrer (ed.); *Goals, Guidelines and Constraints Facing Monetary Policymakers*, Federal Reserve Bank of Boston, Conference Series No. 38, Boston: 195-221.

Feld, L. and S. Voigt (2003); Economic Growth and Judicial Independence: Cross Country Evidence Using a New Set of Indicators, *European Journal of Political Economy*, 19(3): 497-527.

Feld, L. and S. Voigt (2004); "Making Judges Independent - Some Proposals Regarding the Judiciary". CESifo Working Paper Series No. 1260. http://ssrn.com/abstract=597721

Forder, J. (1996); "On the measurement and assessment of 'institutional' remedies". *Oxford Economic Papers* 48: 39-51.

Forder, J. (1998); "The case for an independent central bank: A reassessment of evidence and sources". *European Journal of Political Economy* 14: 53-71.

Freytag, A. (2001), Does Central Bank Independence Reflect Monetary Commitment Properly? – Methodical Considerations, *BNL Quarterly Review* 217: 181-208.

Grilli, V., D. Masciandaro and G. Tabellini (1991); Political and Monetary Institutions and Public Financial Policies in the Industrial Countries, *Economic Policy* 13: 341-92.

Hansen, B.E. (1992); Testing for Parameter Instability in Linear Models, *Journal of Policy Modeling* 14: 517-533.

Hayo, B. (1998); Inflation culture, central bank independence and price stability, *European Journal of Political Economy* 14: 241-63.

Hayo, B. and C. Hefeker (2002); Do we really need central bank independence? A critical re-examination, *European Journal of Political Economy* 18: 653-674.

Hayo, B. and S. Voigt (2003); Explaining de facto judicial independence, *Volkswirtschaftliche Diskussionsbeiträge* 47/03, University of Kassel.

Henisz, W. (2000); The Institutional Environment for Economic Growth, *Economics and Politics* 12(1): 1-31.

Jarque, C.M. and A.K. Bera (1987); A test for normality of observations and regression residuals, *International Statistical Review* 55: 163-172.

Keefer, P. (2002); Politics and the Determinants of Banking Crises: The Effects of Political Checks and Balances. In: L. Hernandez and K. Schmidt-Hebbel (eds.): *Banking, Financial Integration, and International Crises*, Santiago: Central Bank of Chile: 85-112.

Keefer, P. and D. Stasavage (2003); The Limits of Delegation: Veto Players, Central Bank Independence and the Credibility of Monetary Policy, *American Political Science Review* 97: 407-423.

Kydland, F. and E. Prescott (1977); Rules Rather than Discretion: The Inconsistency of the Optimal Plans, *Journal of Political Economy* 85: 473-91.

Moser, P. (1999); Checks and Balances and the supply of central bank independence, *European Economic Review* 43: 1569-93.

Posen, A. (1993); Why central bank independence does not cause low inflation: There is no institutional fix for politics, in: R. O'Brien (ed.), *Finance and the International Economy 7*, Oxford: OUP.

Ramsey, J.B. (1969); Tests for specification errors in classical linear least squares regression analysis, *Journal of the Royal Statistical Society* B 31: 350-371.

Rogoff, K. (1985); The Optimal Degree of Commitment to an Intermediate Monetary Target, *Quarterly Journal of Economics* 100: 1169-1190.

Romer, D. (1993); Openness and Inflation: Theory and Evidence, *Quarterly Journal of Economics* 108: 869-903.

Sturm, J.E. and J. de Haan (2001); Inflation in developing countries: does central bank independence matter? New evidence based on a new dataset, *mimeo*, University of Groningen, the Netherlands.

Svensson, L. (1997); Inflation forecast targeting: Implementing and monitoring inflation targets, *European Economic Review* 41: 1111-1146.

White, H. (1980); A heteroskedastic-consistent covariance matrix estimator and a direct test for heteroskedasticity, *Econometrica* 48: 817-838.

World Values Study Group (2000); *World Values Survey 1981-1984, 1990-1993, and 1995-1997*. Interuniversity Consortium for Political and Social Research, Ann Arbor.