



Massey University

Department of Applied and International Economics

Discussion Paper No. 06.07

April 2006

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a 'Free Lunch' to Countries?**

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Te Kōwhiri
ki Pūrehuroa

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Discussion Paper 06.07
ISSN.1174-2542
Price: \$10

DOES CENTRAL BANK INDEPENDENCE REALLY OFFER A 'FREE LUNCH' TO COUNTRIES?

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ABSTRACT

Delegating monetary policymaking to an independent central bank is supposed to generate greater price stability without much cost. This paper provides an overview of the underlying theory and empirical evidence on the relation between central bank independence and economic performance, chiefly average annual inflation and growth rates. Owing to differences in the indices and analytical methods used and the mix of countries and time periods studied, the results are mixed. Whereas a robust negative relation between legal independence and inflation is widely reported for industrial countries, the evidence on independence and growth is tenuous. For less developed countries it is the turnover of the central bank governors that is positively associated with inflation. Using recently constructed sets of indices of central bank independence for 29 industrial and 56 developing countries and employing simple bivariate correlation analysis, this paper confirms most of the a priori expectations. The paper argues that central bank independence promotes economic growth not directly but through fostering a stable price environment conducive to long-term investment required for growth. Less developed countries have to take measures to lower the turnover rate of their central bank governors to experience and potentially benefit from independence.

Keywords: *central bank independence; credibility; inflation; economic growth.*

¹ A earlier version of the paper was read at the conference on "Maximizing Economic Freedom in West Africa to Achieve Growth and Poverty Reduction" organized by the Institute of Economic Affairs and Friedrich Naumann Foundation, 14 November 2005 in Accra, Ghana.

1. INTRODUCTION

From the spate of countries that have adopted reforms aimed at making their central banks more independent over the last 15 to 20 years (see Appendix I), one can easily get the impression that the issue of central bank independence (CBI) is a new phenomenon. But as Fraser (1994) has pointed out, the articulation of the need for CBI dates back more than 180 years to David Ricardo who, in a paper on the establishment of a national bank in 1824, stated:

‘It is said that Government could not be safely entrusted with the power of issuing paper money; that it would most certainly abuse it ... There would, I confess, be great danger of this if Government – that is to say, the Ministers – were themselves to be entrusted with the power of issuing paper money. But I propose to place this trust in the hands of Commissioners, not removable from their official situation but by a vote of one or both Houses of Parliament. I propose also to prevent all intercourse between these Commissioners and Ministers, by forbidding any species of money transactions between them. The Commissioners should never, on any pretense, lend money to Government, nor in the slightest degree be under its control or influence ... If Government wanted money, it should be obliged to raise it in the legitimate way; by taxing the people; by the issue and sale of exchequer bills; by funded loans; or by borrowing from any of the numerous banks which might exist in the country; but in no case should it be allowed to borrow from those who have the power of creating money’.

Early last century, Keynes also expressed his thoughts on CBI while testifying before the 1913 Royal Commission into an Indian central bank. The ideal central bank, he said, ‘would combine ultimate government responsibility with a high degree of day-to-day independence for the authorities of the bank’. He added that it would be desirable ‘to preserve unimpaired authority in the executive officers of the bank, whose duty it would be to take a broad and not always commercial view of policy’ (Fraser, 1994, p. 1).

The renewed interest in CBI may be ascribed to developments starting in the early 1970s when the worldwide ‘stagflation’ and the breakdown of the Bretton Woods system and of the European Exchange Rate Mechanism necessitated the search by national authorities for a new anchor for achieving price stability. And since inflation is largely a monetary phenomenon, the central monetary authority or the central bank has a major role to play. During the 1960s and 1970s many governments attempted to control inflation through interest rate ceilings, credit guidelines, reserve asset and security ratios for financial institutions and wage or price controls but this *regulatory* approach became less and less effective over time (Dalziel and Lattimore, 2004, p. 50). The charter and design of the typical central bank those times assigned several objectives and granted little or no operational autonomy to the central monetary authority as the ultimate authority in monetary policymaking resided with the executive arm of the government which could instruct the central bank how monetary policy should be implemented. Since the 1980s many countries have adopted policies

aimed at restricting the ability of governments to use monetary policy for short-term political reasons so that central banks can concentrate on price stability.

CBI implies autonomy or operational freedom of the central bank from interference by the political authorities. The degree of autonomy depends on how much discretion the central bank has (1) in setting the objective(s) of monetary policy, be it/they price stability, currency stability, target rates of inflation, unemployment or growth of GDP (*goal* independence) and (2) in the use of monetary instruments (e.g., open market operations, reserve requirements, discount windows or credit auctions) to achieve the objectives (*instrument* independence). Usually, the monetary policy objectives are established in a legislative framework and the central bank may not have discretion although it might be consulted in the formulation of monetary policy. It is in the implementation of monetary policy that the balance in the decision-making roles of the central bank and government shapes the degree of instrument independence.

Despite the fact that most of the empirical studies find no correlation between CBI and the growth rate of an economy, paradoxically more countries are making their central banks independent. It is the view of this paper that regardless of that seeming paradox, CBI can be rationalised on both theoretical and empirical grounds. To bring the key relevant underlying issues to the fore, this paper provides an overview of the theoretical and empirical literature on CBI and economic performance. Further, to update some aspects of the empirical evidence, the paper utilises relatively recent sets of indicators of CBI for 29 advanced and emerging market economies and 56 developing countries to estimate the correlations between CBI and economic growth and inflation. For the industrial countries the paper finds weak [and expected] negative correlation between CBI and inflation; the correlation between CBI and the growth rate is also weak and negative, suggesting that CBI may not be a ‘free lunch’ for all countries in all periods of time. For the developing countries the paper finds that the higher the turnover rate of the central bank governor (TOR) the higher the inflation rate and the lower the growth rate. Finally, to show that CBI is not impotent or inimical to growth, the paper draws attention to the role of ‘good’ institutions in economic growth and argues that CBI promotes growth not necessarily in a direct manner but through engendering price stability that fosters economic growth. In the case of less developed countries, the widely reported high turnover of central bank governors (a symptom of low actual CBI) and its positive association with inflation strengthens the case for a higher level of actual CBI in those countries.

In the rest of the paper an overview of the theoretical and empirical literature on CBI and economic performance is provided in Section 2. As an update and a check on the empirical findings, a number of hypotheses are tested with some recently constructed sets of indices of legal and actual CBI in Section 3. Section 4 reiterates the lesson from economic history that ‘good’ institutions promote economic growth, and Section 5 concludes the paper.

2. THE RATIONALISATION OF CENTRAL BANK INDEPENDENCE

2.1. Theoretical Underpinnings of Central Bank Independence

In the earlier debates about whether it was better to have discretion or rules in monetary policymaking it had been established that discretionary accommodative monetary policymaking tended to produce inflation. The quantity theory of money predicts that if the growth rate of money supply exceeds the trend rate of growth of real GDP it will cause inflation, at least in the long run; conversely, if money supply does not keep pace with economic growth the resulting credit crunch can lead to a decline in investment expenditure and thereby reduce the economy's production capacity growth. Experience has also shown that in the short term changes in money supply affect economic activity in the direction of change, although the effect fades over time. Reductions in money supply ostensibly to offset inflationary pressures typically end in increases in the real interest rate that can cause an increase in the interest payment burden of government debt, reduce investment spending, and also cause an appreciation of the exchange rate that erodes the competitiveness of the country's exporters in international trade. Hence, to stimulate economic growth in the short term and to avoid credit crunch and the interest rate and exchange rate implications of monetary contractions, governments have tended to adopt over-expansionary monetary policy that produces nothing but inflation in the long run.

Additionally, Nordhaus (1975), Lindbeck (1976) and Hibbs (1977) and other writers on 'political business cycles' had pointed out that when politicians have the power to determine monetary policy they tend to exploit it for electoral gain: engineer a boom (for instance, by reducing the interest rate) just before an election and engineer a recession (for instance, by increasing the interest rate) to bring inflation down after winning the election. These activities, pursued without regard to the inherent dynamics of the economy, can induce greater instability in the economy. The general suggested solution by economists was to take the monetary policymaking responsibility from the hands of politicians and delegate it to an independent central bank.

Central bankers had long known at some level that the credibility of the statements they make matters for the rate of inflation but it was not until Kydland and Prescott (1977) expounded on the dynamic inconsistency² of low inflation policy (which was further clarified and popularised by Barro and Gordon, 1983) that it became clear theoretically why credibility is important for effective monetary policymaking. However, the critical issue of how a central bank is supposed to obtain credibility in the first place was modelled initially by Rogoff (1985) who enunciated that the appointment of an independent and inflation-averse central bank governor who is unlikely to renege on his commitment would enhance the inflation-fighting credibility

² Dynamic inconsistency of low inflation policy is when policymakers having discretion initially announce they are committed to a low-inflation policy but after the private sector has incorporated that information into its expectations the policymakers are systematically tempted to exploit the short-run Phillips curve by creating some inflation in order to expand output or reduce unemployment.

Anticipating that the policymakers will renege on their announced commitment, the private sector will not believe the announcement and will come to expect higher inflation and incorporate that expectation in all their transactions. The result is an economy with higher and higher inflation without any real output gains from the attempts to stimulate it. The self-evident solution to dynamic inconsistency is to take away the discretion and impose binding rules.

of the central bank and allow it to achieve low inflation at little or no cost. But the conservativeness of the appointed governor would not be enough to elicit credibility if the public perceives that the central bank is not sufficiently independent or immune from political interference, especially with respect to financing government deficits. Rogoff's proposed solution was to combine the appointment of the conservative central bank governor with measures to safeguard the independence of the central bank. The inevitable cost of the inflexibility of the conservative central banker, however, is the central bank's inability to react to productivity shocks, implying a trade-off between flexibility and credibility. To fix this, Lohmann (1992) suggested for the government to override the central bank's decisions if a conflict arose. A simple model that formalises the conservatism ideas is presented in Appendix II. In this principal-agent setting, independence without accountability could induce the central bank to behave in opportunistic manner at variance with the maximisation of social welfare and thus create 'democratic deficit' (Nolan and Schaling, 1996; and Briault, Haldane and King, 1997). What Rogoff failed to take adequate account of was the accountability of the central bank. This is where Walsh's (1995) idea of optimal contracts for central bankers detailing the objectives, incentives/penalty for performance and transparency in actions and decisions complemented Rogoff's approach. Svensson (1997, 1998) extends on these ideas. The prevailing practice of conferring instrument independence but not goal independence on the central bank is dubbed as 'constrained discretion'.

2.2. The Empirical Literature

2.2.1. Measurements of Central Bank Independence

The usual approach to the quantification of independence has been to create an index of CBI based on elements in the charter or statutes of the central bank that the authors consider to be proxies for independence, for example, the provisions for appointments to and dismissal from the board; the setting of objectives and choice of policy instruments; and the conditions for the financing of government deficits. Such indices reflect *legal* independence or *de jure* autonomy. For a variety of reasons, the application of the law might be quite different to the letter of the law and therefore legal independence would fail to reflect the actual independence that the central bank experiences. To complement legal independence, Cukierman (1992) pioneered indices of *practical* independence (or *de facto* autonomy) from, for example, the rate of turnover of central bank governors and from the answers to a questionnaire administered to 'qualified' central bank staff.

One of the earliest attempts at constructing an index of CBI was by Bade and Parkin (1985) who measured the degree of legal CBI in the post-Bretton Woods era in 12 OECD countries according to the extent of *financial* and *policy* independence that the central banks enjoyed. The financial factors were the ability to set the remuneration of the central bank governing board members, control the central bank's budget and allocate its profits. The policy factors were the ability to appoint the central bank board members, the proportion of board members appointed by the government and whether it was the government or the board who had the final authority on monetary policy. Countries were given scores of 1 through 4 in each category, with 4 being the highest and 1 being the lowest level of CBI. The authors found that whereas financial

independence was not a significant determinant of inflation, policy independence was a significant determinant of inflation in the expected direction.

An alternative early measure of legal CBI based on *economic* and *political* factors in 18 OECD countries over the period 1950-1989 was created by Grilli, Masciandaro and Tabellini (1991) [hereafter, GMT]. Whereas the political factors utilised by GMT were the same as the policy factors employed by Bade and Parkin, the economic factors GMT considered were the ability of the government to determine the conditions under which it could borrow from the CB and the monetary instruments of choice. In each category the scale ranged from 0 to 7; the higher the score the more independent the central bank was deemed to be. GMT discovered that the negative correlation between inflation and the economic factors was statistically significant but that between inflation and the political factors was not.

Alesina and Summers (1993) constructed a 'hybrid' index of legal CBI by averaging the indices produced by Bade and Parkin and GMT. Alesina and Summers, however, expanded the number of countries in Bade and Parkin's sample with four more countries and used data for the 1955-1988 period. They also found a negative correlation between CBI and inflation.

The indices constructed by Cukierman (1992) for 70 countries over the 1950-1989 period are much more comprehensive than those from other authors. As noted earlier, unlike the other authors, Cukierman (1992) went beyond the legal measures to produce practical measures of CBI. Legal CBI (LCBI) was determined from answers to 16 questions covering the four areas of the terms and conditions for appointing and dismissing the chief executive officer or the governor [4 questions]; the formulation of monetary policy [3 questions]; the objectives of monetary policy [1 question]; and the conditions for lending to government [8 questions]. Each of the questions is given a numerical score ranging from 0 (the lowest level) to 1 (the highest level). The variables and the steps taken to arrive at a final score for each central bank are amply explained in Chapter 19 of Cukierman's book. Practical independence has two parts: the turnover rate (TOR = the inverse of the average tenure) of the central bank governor; and the index constructed from the answers elicited from a questionnaire dealing with the actual practice (QCBI). The scores for the index on practical CBI also range from 0 to 1.

To reflect the changes in central bank statutes and other developments that have taken place since Cukierman published his data on CBI in 1992, a number of researchers have undertaken to update the data on legal CBI and TOR. Two of such data sets are the legal CBI data constructed by de Souza (2001) and the TOR data constructed by Sturm and de Haan (2001). De Souza provides data on legal CBI (LCBI and not on TOR) in his quest to assess the relationship between indicators of legal CBI and indicators of central bank accountability. The legal variables used by de Souza are in large part based on Cukierman's variables but de Souza employed different numerical codings to reflect revisions in the charters/statutes of 32 central banks (including the European Central Bank) as at December 2000. In contrast to the 16 questions and 4 categories used by Cukierman, de Souza used 9 questions covering 3 categories: personal independence [3 questions]; political independence [4 questions]; and economic and financial independence [2 questions]. The scores for the questions ranged from 0 to 1. See Appendix III for the questions, and Appendix IV for the

scores on de Souza's LCBI. Sturm and de Haan (2001) studied only less developed countries for whom TOR is deemed to be a better indicator of CBI than LCBI. They provide TOR figures that cover the 1990-98 period. The updated CBI data by de Souza (2001) and Sturm and de Haan (2001) have been highlighted because this study will use them to test some hypotheses. The data on LCBI have been provided in Appendix V and those on TOR are provided in Appendix VI.

2.2.2. Empirical evidence on CBI and economic performance

A lot of studies have been done on the relationship between CBI and economic performance. However, because the theoretical justification for CBI is based on the quest for low and stable inflation, most of the empirical work is focused on the relationship between CBI and inflation. Pollard (1993) does a comparative review of the empirical studies done up to 1993 and Berger, de Haan and Eijffinger (2000) provide a comprehensive survey of the empirical studies done up to 2000. Apart from the pioneer study by Bade and Parkin (1985), the vast majority of the studies used Cukierman's indicators or modifications thereof and a fair proportion utilised the Alesina-Summers and GMT indicators as well. A few authors constructed and analysed their own indicators (e.g., Loungani and Sheets, 1997; and Fry, 1998). The preferred analytical methods have been cross-country and/or pooled regressions of either inflation or the annual average growth rate on the aggregated and disaggregated indicators³ of CBI plus control variables of the authors' choice. Some of the control variables utilised are period dummies, labour market centralisation, partisan effects, public opinion about inflation and financial sector strength, among others. It may be noted that there was an explosion of studies on CBI particularly in the late 1990's.

Owing to the variations in the indicators and methodology used and the set of countries and sample period studied, the results are mixed. Findings of negative and zero correlations between inflation and CBI have been reported. Cukierman (1992) and Cukierman, Webb and Neyapti (1992) found significant negative relation between inflation and legal CBI for developed countries but insignificant relation for less developed countries. Other studies have found that the relationship breaks down under alternative measures of CBI (Campillo and Miron, 1997) or when influential observations are excluded (Sturm and de Haan, 2001) and when controlling for additional macroeconomic variables (Posen 1993, 1995; Eijffinger *et al.*, 1997; Fuhrer, 1997; Loungani and Sheets, 1997; Walsh, 1997; Hall and Franzese, 1998; and Ismihan and Ozkan, 2003). Franzese (1999) found that CBI has the strongest [negative] effect on inflation when the government is leftist, union density is high, economy is not open, inflation abroad is high, financial sector is small and wage bargaining coordination is low. Recently, Jácome and Vázquez (2005) using panel

³ Both the legal and practical indicators of CBI utilised in empirical studies have been criticised as being inadequate in reflecting the complexity of CBI: legal CBI, for not capturing the role of personalities, changing policy-making environment like from controls to market-based policies, and other determinants of economic (i.e., inflation) performance; and TOR, where a low (high) TOR value could be caused by either high (low) degree of actual autonomy or low (high) degree of autonomy because of subservient (assertive) central bank governors who pander (do not pander) to government and stay at post for long (short) periods. In response, many researchers have incorporated other variables in their multiple regressions to address the 'omitted variables' weakness of simple regressions. Researchers using TOR have tried to model threshold levels of TOR beyond which TOR most likely reflects low CBI.

regressions found a negative relationship between legal CBI and inflation in 24 Latin American and Caribbean countries but failed to find a causal relationship running from CBI to inflation. In transition economies, CBI is not related with inflation in the early stages though the relationship is negative when controlled for price deregulation, wars and sustained levels of liberalisation (Cukierman, Miller and Neyapti, 2002). Lybek (1999) found a negative relationship between CBI and inflation for the former Soviet Union. Somewhat against the grain, Daunfeldt and de Luna (2003) report that in a majority of the OECD countries price stability was achieved before more independence was given to the central banks.

The evidence on economic growth and CBI is rather tenuous. Most studies find no correlation but one or two studies have found fragile or positive relation between growth and CBI (Fujiki, 1996; and Akhand, 1998). Fuhrer (1997) reports that CBI is related to lower levels of growth and higher unemployment rate. Jordan (1997) reports CBI only matters during disinflation periods: sacrifice ratio and output loss are higher the more independent the central bank. This finding is corroborated by Down (2004). The ambiguity in the empirical evidence on CBI and growth forces us to re-invoke theory to clarify the nexus between CBI and growth. In the short run, because of price and wage stickiness and the trade-off between inflation and unemployment, there is positive correlation between inflation and the growth rate. However, in the long run, high and variable inflation increases uncertainty that discourages long-term investment and reduces economic growth. Studies confirming a negative correlation between inflation and economic growth rate include Fischer (1993), Cukierman *et al.* (1993) Rudebusch and Wilcox (1994), Barro (1995) and Bruno and Easterly (1998). And so it would seem that there is no straightforward answer to the question raised in the topic of this paper. Although CBI does not seem to affect growth directly, if high CBI lowers inflation and low inflation fosters economic growth, then by contributing to lowering inflation, CBI may be expected to promote economic growth (provided other growth-enhancing factors are in place).

Despite the mixed and sometimes conflicting results, on balance, it is fair to summarise the main findings as:

- Legal CBI is negatively correlated with the inflation rate and uncorrelated with output growth in industrial economies, suggesting CBI is a ‘free lunch’;
- Legal CBI is uncorrelated with inflation and output growth in less developed countries;
- Legal CBI is a poor indicator but TOR seems to be a good indicator of actual CBI in less developed countries;
- TOR is uncorrelated with inflation in developed countries but positively correlated with inflation in less developed countries;
- the negative correlation between legal CBI and inflation is stronger in those countries (both developed and developing) with checks and balances (Keefer and Stasavage, 1999; and Moser, 1999).

3. TESTS OF SELECTED HYPOTHESES WITH NEW DATA SETS

As a check and an update on the empirical literature, a number of hypotheses were tested using the scores for de Souza's (2001) LCBI, the TOR data from Sturm and de Haan (2001) and the data on inflation and growth rates from the World Development Indicators (2005) for the countries sampled in the respective data sets. The hypotheses tested are the bivariate correlations between LCBI and inflation and growth rate, and between inflation and growth rate for developed and emerging market economies; and the bivariate correlations between TOR and inflation and growth rate, and between inflation and growth rate for less developed countries. To maintain the relevance of the CBI indicators, the time period considered was 1990 to 2004. Consequently, the average annual rates of inflation and growth for the 15-year period were utilised. However, since out interest is more in the relationship between economic growth and CBI, the average annual growth rates for the 15-year period were disaggregated into averages for three sub-periods of 5 years each so that the correlation between CBI and growth for the sub-periods could be tested for.

In de Souza's sample, Argentina and Turkey, which posted average annual inflation rates of more than 151% and nearly 61%, respectively, were clearly outliers and they were dropped from the sample; the European Central Bank, being an institution and not a country, was also dropped. That left 29 industrial and emerging market economies in the sample; the data used for the analysis are furnished in Appendix V. Of the 80 or so countries considered by Sturm and de Haan, those that did not have data for some of the years and those that had inflation rates in the 100's and 1000's were dropped from the sample. In effect, 56 less developed countries were analysed and their data are provided in Appendix VI.

The scatter plots and the best-fitting linear trend lines of the CBI indicators versus economic performance variables and of growth versus inflation for the developed countries and for the developing countries are presented in Figures 1 to 6 and Figures 7 to 12, respectively. The graphical representations are captured quantitatively in the summary statistics and correlation matrices provided in Table 1.

Fig. 1: Legal Independence and Average Annual Inflation 1990-2004

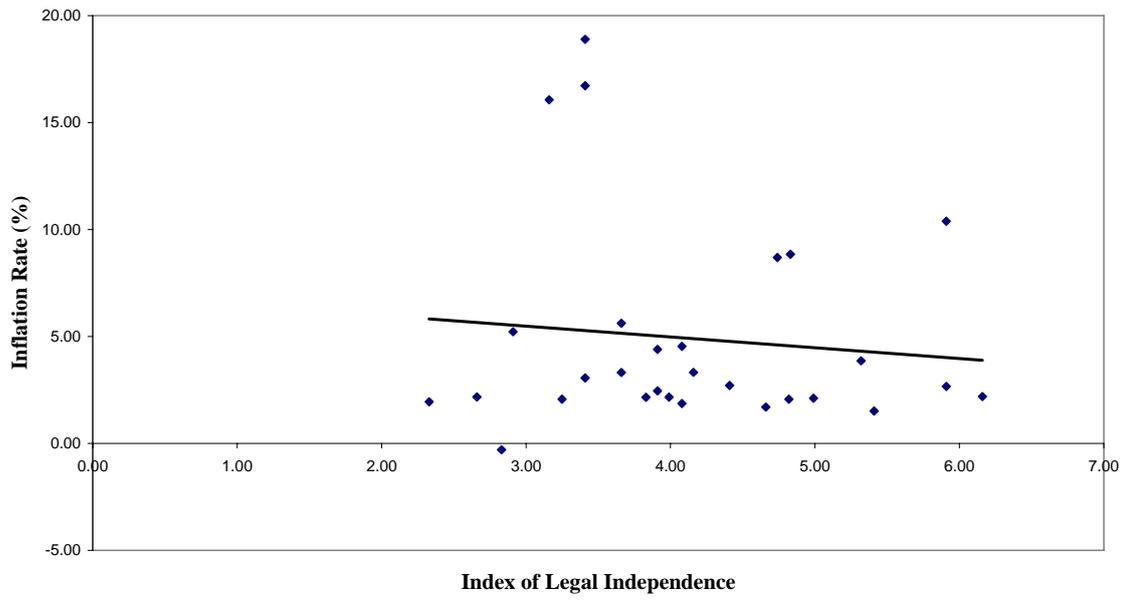


Fig. 2: Inflation versus Growth Rate: Average Annual Rates 1990-2004

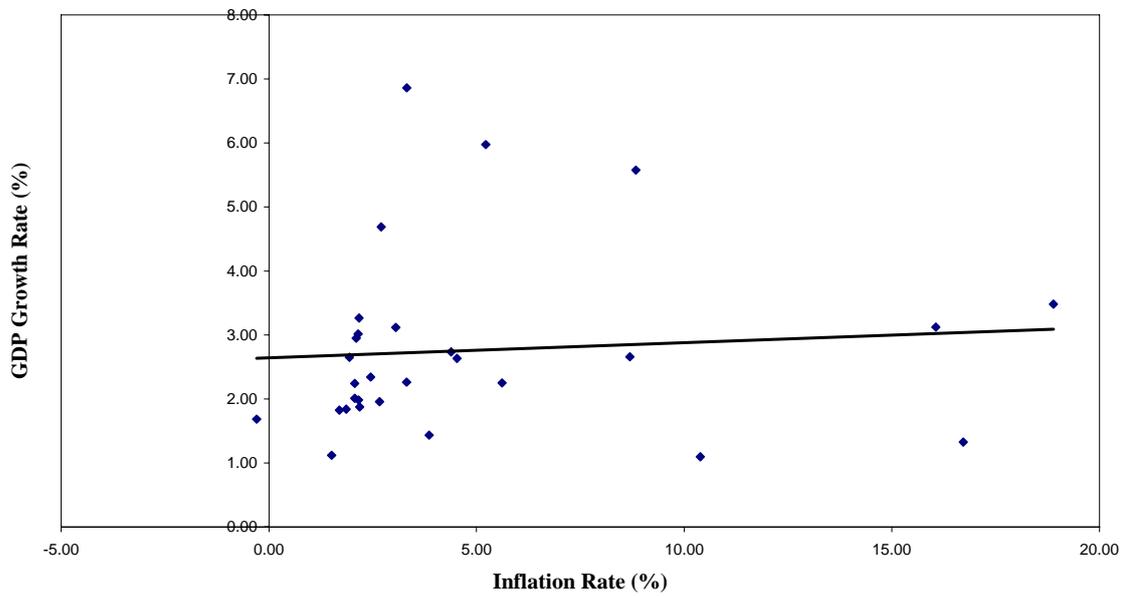


Fig. 3: Legal Independence and Average Annual Growth Rate 1990-2004

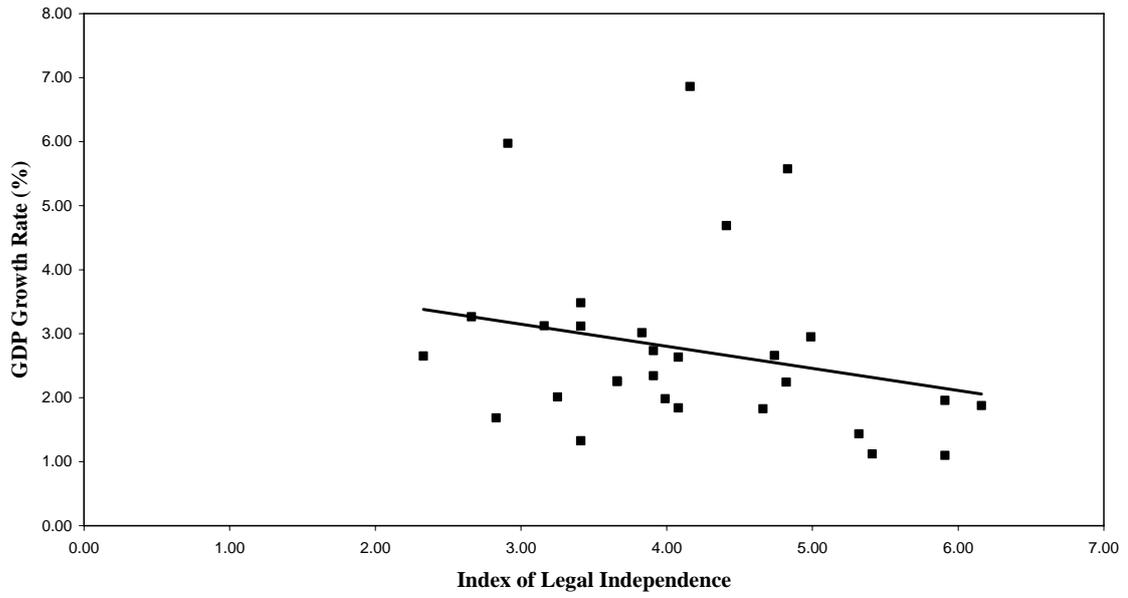


Fig. 4: Legal Independence and Average Annual Growth Rate 1990-1994

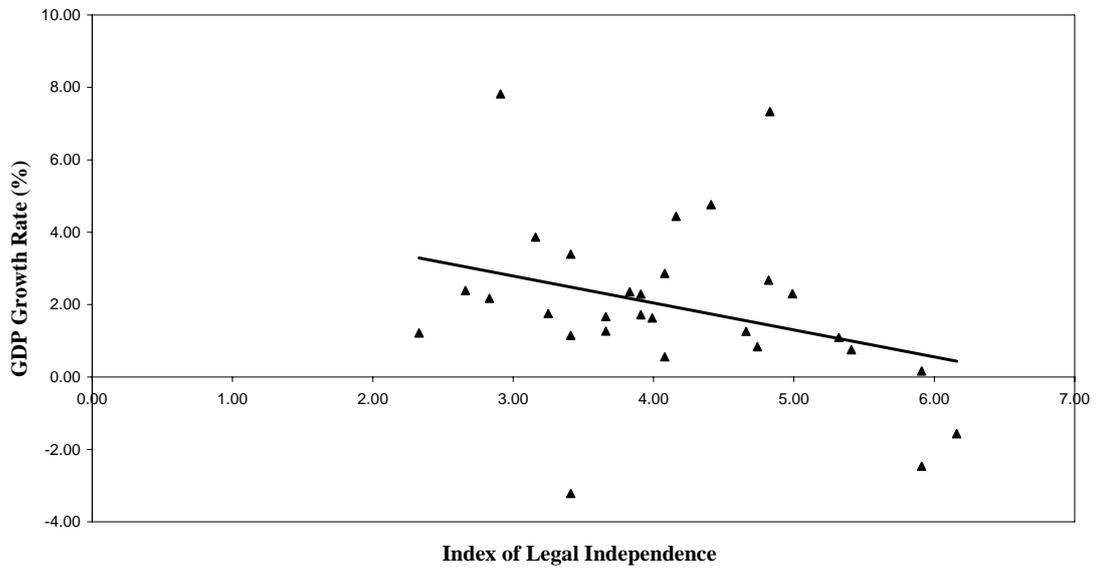


Fig. 5: Legal Independence and Average Annual Growth Rate 1995-1999

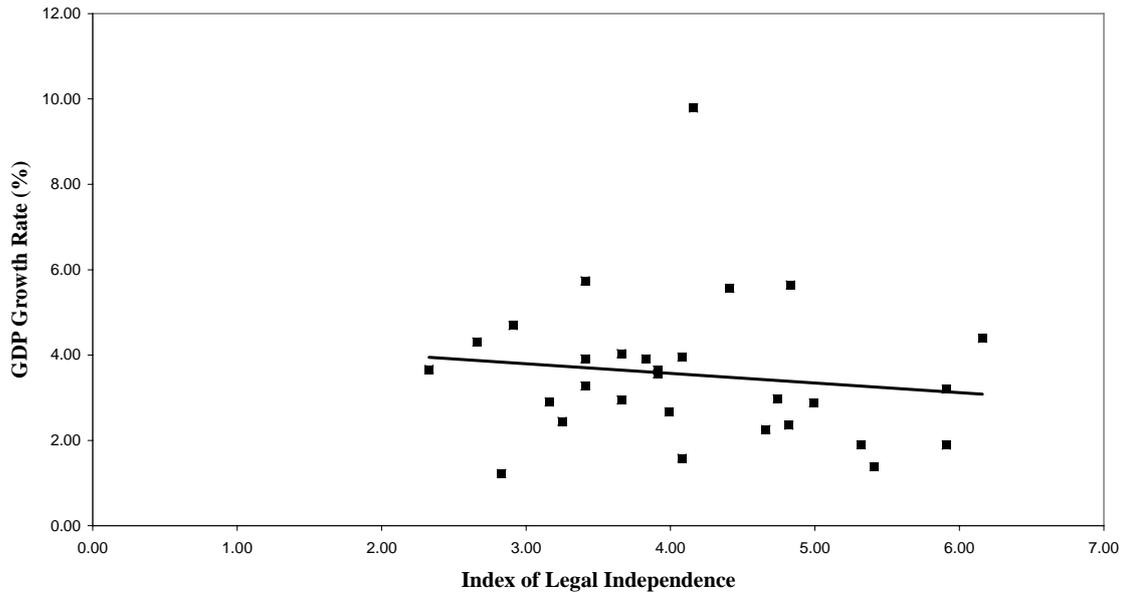


Fig. 6: Legal Independence and Average Annual Growth Rate 2000-2004

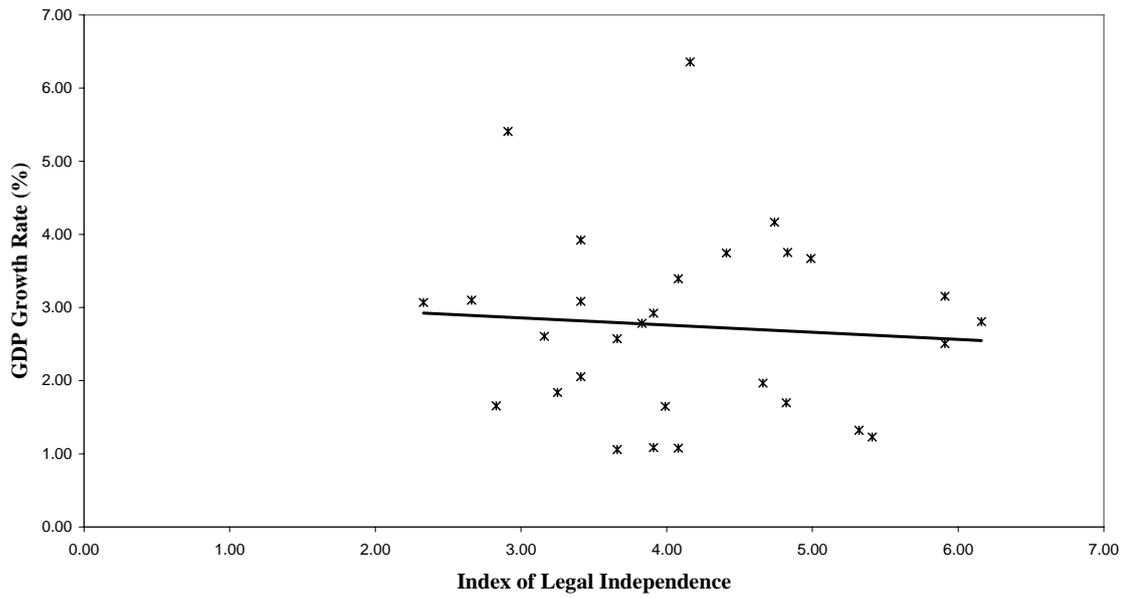


Fig. 7: Turnover Rate and Average Annual Inflation 1990-2004

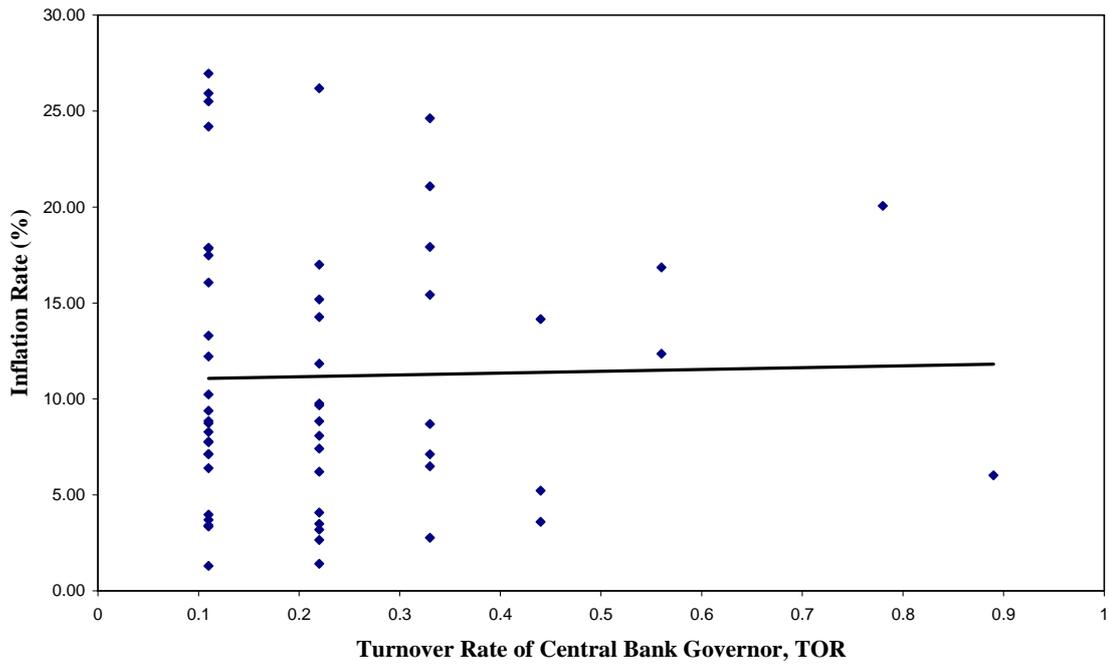


Fig. 8: Inflation versus Growth Rate in LDCs: Average Annual Rates 1990-2004

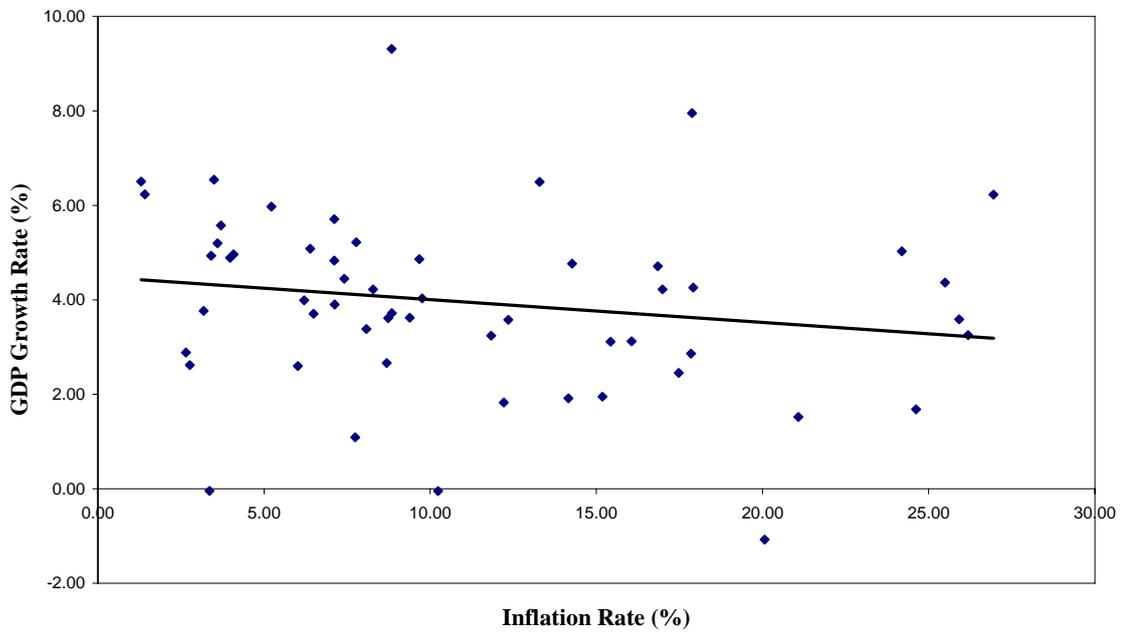


Fig. 9: Turnover Rate and Average Annual Growth Rate 1990-2004

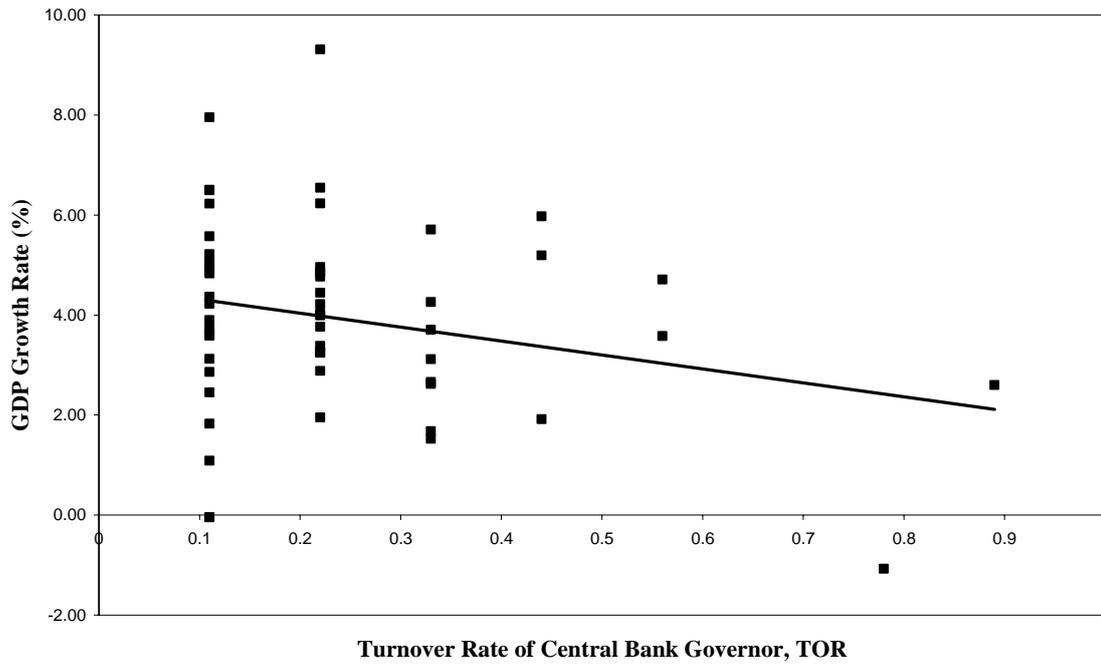


Fig. 10: Turnover Rate and Average Annual Growth Rate 1990-1994

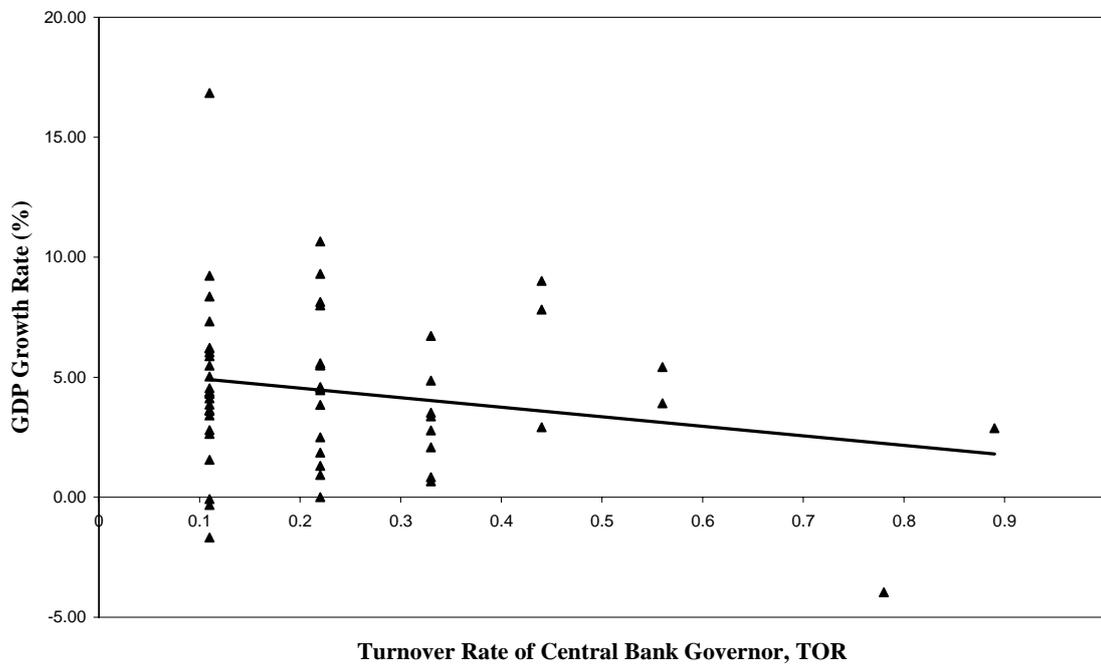


Fig. 11: Turnover Rate and Average Annual Growth Rate 1995-1999

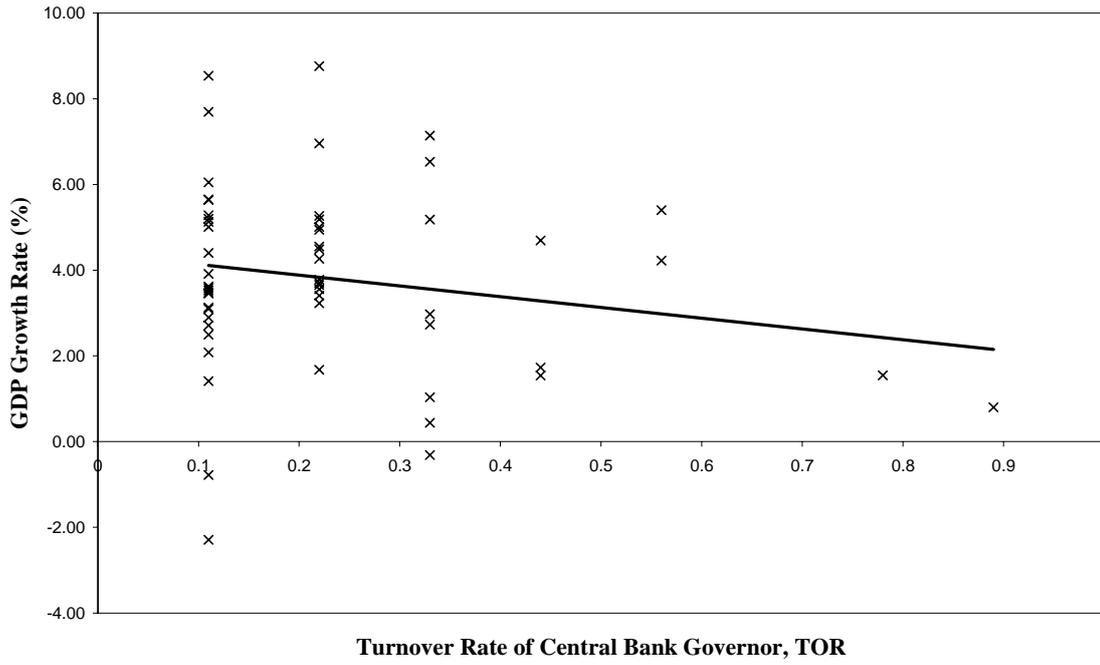


Fig. 12: Turnover Rate and Average Annual Growth Rate 2000-2004

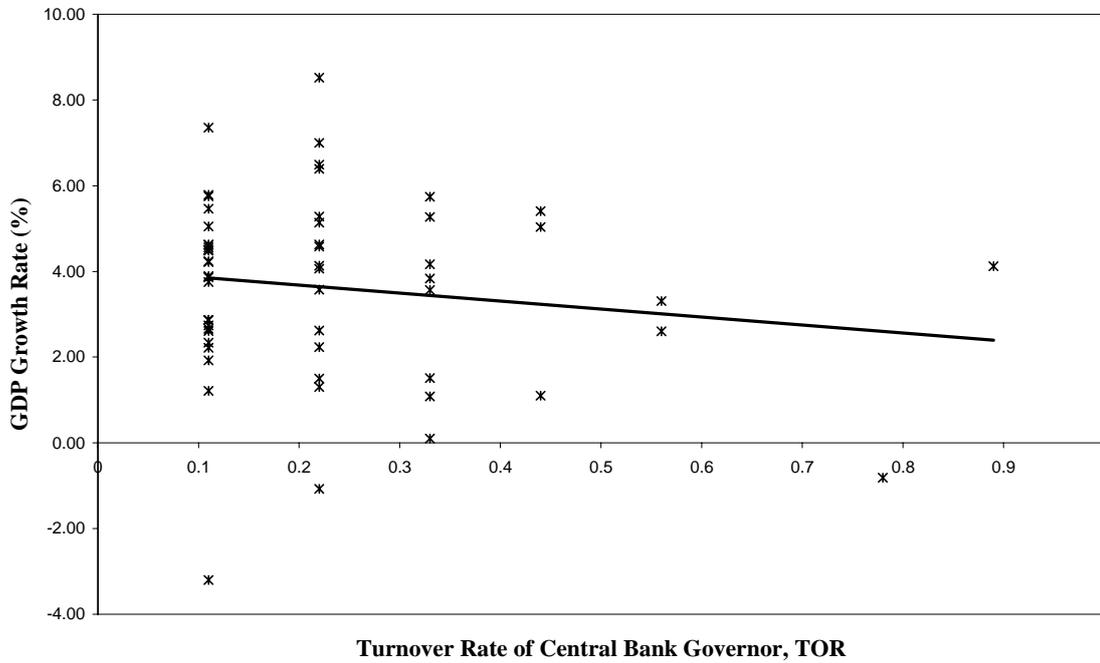


Table 1
Summary Statistics of the Data and Correlation Matrices

Country Group	Variable	Correlation with:				
		INF90-04	GR90-04	GR90-94	GR95-99	GR00-04
Developed and Emerging Markets	INF90-04 [4.91] (23.82)	1				
	GR90-04 [2.76] (1.99)	0.082	1			
	GR90-94 [1.95] (5.52)	0.166	0.791	1		
	GR95-99 [3.54] (2.92)	0.174	0.844	0.408	1	
	GR00-04 [2.75] (1.63)	0.286	0.744	0.274	0.710	1
	LCBI [4.13] (1.02)	-0.105	-0.247	-0.319	-0.133	-0.078
Less Developed Countries	INF90-04 [11.19] (51.13)	1				
	GR90-04 [3.95] (3.62)	-0.182	1			
	GR90-94 [4.42] (11.04)	-0.250	0.788	1		
	GR95-99 [3.80] (4.76)	-0.051	0.708	0.258	1	
	GR00-04 [3.62] (4.61)	-0.045	0.719	0.283	0.466	1
	TOR [0.23] (0.03)	0.022	-0.244	-0.200	-0.192	-0.144

Notes

INF90-04 = average annual rate of inflation 1990-2004.

GR90-04 = average annual GDP growth rate 1990-2004.

GR90-94 = average annual GDP growth rate 1990-1994.

GR95-99 = average annual GDP growth rate 1995-1999.

GR00-04 = average annual GDP growth rate 2000-2004.

LCBI = legal indicator of central bank independence.

TOR = turnover rate of central bank governor.

[...] Figure in square brackets below the variable is the mean of the variable.

(...) Figure in parentheses below the variable is the variance of the variable.

Among the developed and emerging market economies, the correlation between LCBI and inflation for the whole sample period is -0.1045 . The negative sign of the correlation is as expected but the magnitude is not significant as the slope of the trend line in Figure 1 attests. It might be concluded that there is only a very weak negative relation between LCBI and inflation among the industrial countries. Contrary to the expected negative relation, the correlation between inflation and growth is positive 0.082 , which is not significantly different from zero as once again the slope of the linear trend line in Figure 2 attests. Within the industrial countries the ‘high-inflation’ ones have not experienced growth rates lower than those of the low-inflation countries; if anything at all, they posted higher growth rates.⁴ The bivariate correlations between LCBI and the growth rates for the various periods are: 1990 to 2004 = -0.247 ; 1990 to 1994 = -0.319 ; 1995 to 1999 = -0.133 ; and 2000 to 2004 = -0.078 (see the sixth and shaded row in Table 1). The scatter plots and the best fitting [negatively sloping] linear trend lines are presented in Figures 3 to 6. The persistently negative correlation between LCBI and growth rate (albeit not significantly different from zero) perhaps indicates that CBI is not a ‘free lunch’ after all; there seems to be a slight cost to CBI in terms of diminished growth. However, because the magnitude of the correlation has successively decreased over time, it would appear that the cost of disinflation is progressively reduced through learning and adaptation and increasing credibility of monetary policy.

With respect to the less developed countries, the correlation between TOR and inflation for the whole sample period is positive [as expected] but insignificant at 0.022 ; the flattish trend line in Figure 7 underscores this. Unlike in the developed economies, inflation and economic growth within the developing countries are negatively related but not strongly as the correlation coefficient is only -0.182 (see the trend line in Figure 8). Average annual inflation for the industrial countries in the sample utilised in this study is 4.91% whilst that for the developing countries is 11.19% . The differing relationship between inflation and economic growth for the two groups of countries lends credence to the suggestion by Sarel (1996) that above 8% inflation has deleterious effect on growth. TOR is negatively associated with economic growth for the whole period as well as for the three sub-periods, as the numbers reported in the last four cells of the last row of Table 1 denote. The trend lines in Figures 9 to 12 capture this phenomenon. Although none of the correlation coefficients is significantly different from zero, the negative signs are consistent with much of the existing empirical evidence.

4. LESSON FROM ECONOMIC HISTORY: ‘GOOD’ INSTITUTIONS PROMOTE ECONOMIC GROWTH

If there does not seem to be a direct positive correlation between CBI and output growth, suggesting seemingly that CBI is irrelevant to growth, why does the idea of CBI continue to be so popular? And in particular, why should less developed

⁴ The effect of inflation on long-run growth rate can be non-linear. At low levels of inflation the [expected negative] relation between inflation and growth becomes insignificant. Some economists argue that moderate inflation is favourable to growth and there is an optimum level beyond which inflation is harmful to growth (Khan and Senhadji, 2000). Fischer (1996) suggests that the inflation range for an ideal long-run goal of monetary policy is between 1 and 3 percent. Sarel (1996) concludes that the relationship between inflation and growth turns from negative to positive around 8 percent rate of inflation.

countries whose economies have a compelling need to grow if they want to reduce poverty even contemplate it? For a more circumspect answer we have to turn to the literature on economic history and political economy of growth.

From the studies of Adelman (1958), Abramovitz (1986), Rostow (1990) and Rodrik (2003), it can be said that, regardless of the growth model, rate of growth of an economy can be expressed as a function of two general determinants: proximate and ultimate/fundamental determinants. The proximate determinants answer the question “How?” and would include a country’s endowment of input factors such as technology, human capital, physical capital, labour and natural resources. These have been emphasised in the Harrod-Domar, the Solow neoclassical and Endogenous growth models. Economists have shown that successful economies are those with high rates of accumulation of human and physical capital with sustained technological progress. Fundamental determinants answer the question “Why?” and they relate to those variables that have an important influence on a country’s ability and capacity to accumulate factors of production and invest in the production of knowledge. They encompass factors such as openness or integration with the rest of the world, the geography (climate, topography and natural resources) and the institutional framework or the country’s ‘social capability’. Social capability refers to the various institutional arrangements which set the framework for the conduct of productive economic activities and without which market economies cannot function properly (Snowdon and Vane, 2005, p. 636).

Central banks come under the rubric of institutions. From economists’ research in recent years, there is now widespread acceptance of the idea that ‘good’ governance and institutions and incentives structures are an important precondition for growth and development (North, 1990; Alesina and Perotti, 1994; Krueger, 1997; World Bank, 1997, 2002; Olson, 2000; Hibbs, 2001; Acemoglu and Johnson, 2003; and Dollar and Kraay, 2003). Macroeconomic stability is crucial for sustainable long term growth (Fischer, 1993).⁵ Price stability engendered by independent and well-run central banks will go a long way in contributing to macroeconomic stability. Cukierman (1992) notes that the statutes of the less-developed-country central banks are mostly adaptations of those of the developed countries but compliance is not as strict as in the latter countries. Also, in the less developed countries, because of vulnerability of the central bank governors to political change and other reasons, there is a much higher turnover of governors than in the developed countries. This high turnover, it will be recalled, has been found to be positively associated with high inflation. Central bankers are expected to reflect the medium to long term view on monetary policy matters and frequent changes in governors lead to frequent changes in alternative objectives. In the event, no one chief executive is afforded sufficient time to establish a reputation for effective inflation fighting and thereby make monetary policy credible. The credibility of monetary policy is a prime determinant of the sacrifice ratio (the output and employment costs of disinflation). The disruptions to the continuity of leadership manifest their effects in financial system instability and ultimately in higher rates of inflation. If high turnover, which is equivalent to low CBI, is associated with high inflation then it can be inferred that if the less developed countries can manage to attain lower turnover and, by implication, a higher CBI, they

⁵ Fischer (1993) concludes that macroeconomic stability is a necessary but not a sufficient condition for growth. He uses the average rate of inflation, size of budget deficit and black market premium for foreign exchange as measures of sound macroeconomic policy.

can expect lower inflation outcomes. An auspicious finding by this study is that the magnitude of the negative correlation between TOR and growth rate among the less developed countries has been decreasing over the last 15 years (see the last row in Table 1). This evidence suggests that with time if the autonomy granted to central banks translates into longer average tenure of service by capable chief executive officers both the inflation and growth performance of developing countries will improve.

5. SUMMARY AND CONCLUSION

Central bank independence is almost conventional wisdom now. Delegating monetary policymaking to an independent central bank is supposed to generate greater price stability by solving the dynamic inconsistency problem that leads to an inflation bias. In an attempt to answer the question, “Does central bank independence offer a ‘free lunch’ to countries?” this paper has provided an overview of the underlying theory and empirical evidence on the relation between central bank independence and economic performance, chiefly average annual inflation and growth rates. The available literature indicates that owing to differences in the indices of central bank independence and analytical methods used and the mix of countries and time periods studied, the results are mixed. Whereas a robust negative relation between legal independence and inflation is widely reported for industrial economies, the evidence on independence and growth is tenuous. With respect to less developed countries, legal independence has no relation with inflation or growth but their characteristically high turnover of central bank governors is associated with high inflation.

As a check and an update on the empirical evidence, this paper used recently constructed sets of indices of central bank independence for 29 industrial and emerging market economies and 56 developing countries to estimate the correlations between the indices and growth and inflation rates. For the industrial countries the paper found a weak negative relation between legal independence and inflation and negative and successively weaker correlation between legal independence and growth; for the developing countries the paper found a positive correlation between the turnover rate of central bank governors and inflation and weak but successively decreasing negative correlation between the turnover rate and growth. The paper argued that central bank independence promotes economic growth not directly but through fostering a stable price environment conducive to long-term investment required for growth. In the case of less developed countries, by inference, reversing their observed high turnover rate (which is equivalent to low central bank independence) should lead to higher actual central bank independence and lower inflation. The worldwide trend towards increased central bank independence is a positive development.

Appendix I

**Countries and Dates of New Laws or Amendments of Existing Laws to Increase
Autonomy of the Central Bank**

Date of New Law or Latest Amendment	Countries	Number
1913	USA	1
1968	Kuwait	1
1973	West African States	8
1980	United Arab Emirates	
1981	Bahrain	1
1989	Malawi	1
1992	Barbados, Colombia, Jordan, Mozambique, Philippines,	5
1993	Morocco, Peru	2
1994	Madagascar, Malaysia, Trinidad & Tobago, Turkmenistan	4
1995	Bolivia, China, Tanzania	3
1996	Armenia, Cambodia, El Salvador, Tajikistan, Zambia	5
1997	Angola, Eritrea, South Korea, Kyrgyz Rep., Namibia, Paraguay, Qatar, Rwanda	8
1998	Belgium, Fiji, Finland, Italy, Nigeria, Spain	6
1999	Botswana, Estonia, Kazakhstan, Lao PDR, Liberia, Norway, Romania, Singapore, Ukraine	9
2000	Bahamas, Brazil, France, Lesotho, Netherlands, Oman, Papua New Guinea, Sierra Leone, South Africa, Switzerland, Tunisia, Uzbekistan, Yemen	13
2001	Canada, Croatia, Georgia, Hungary, Iceland, Jamaica, Japan, Kenya, Lithuania, Moldova, Nicaragua, Portugal, Sweden, Turkey, United Kingdom, Venezuela	16
2002	Australia, Austria, Bulgaria, Cape Verde, Chile, Cyprus, Czech Rep., Germany, Guatemala, Honduras, Latvia, Macedonia, Nepal, Pakistan, Russia, Slovenia, Sudan	17
2003	Argentina, Bosnia & Herzegovina, New Zealand, Serbia	4
2004	Poland	1

Source: Lybek and Morris (2004).

Appendix II

A Simple Model of How the Independence and Conservativeness of the Central Banker Reduces Inflation

Starting with a model in which the government (G) and the central bank (CB), whose preferences between output (y) and inflation (π) differ, establish differential targets for inflation (π_G^* and π_{CB}^*) and output (y_G^* and y_{CB}^*) as pioneered by Anderson and Schneider (1986). The further the deviation of the actual levels from the targets the greater the disutility each authority suffers. The loss functions for the government and the central bank can be represented, respectively, as equations (1a) and (1b)

$$L_G = \frac{1}{2} \alpha_G (\pi - \pi_G^*)^2 + \frac{1}{2} \beta_G (y - y_G^*)^2 \quad \beta_G \geq \alpha_G \quad (1a)$$

$$L_{CB} = \frac{1}{2} \alpha_{CB} (\pi - \pi_{CB}^*)^2 + \frac{1}{2} \beta_{CB} (y - y_{CB}^*)^2 \quad \alpha_{CB} \geq \beta_{CB} \quad (1b)$$

where α = weight on inflation stabilisation; β = weight on output stabilisation; * = desired/targeted level of the variable. The parameter α_{CB} may be interpreted as a measure of the conservativeness of the central banker. The two bodies can choose to cooperate or not cooperate. Non-cooperation, which assumes the central bank has both goal and instrument independence, leads to suboptimal outcomes. At any rate, in reality central banks do not have goal independence but may have instrument independence, which is a form of cooperation where the political principals determine the goals and central banks as agents are allowed instrument independence to pursue the goals they have been assigned. With cooperation, monetary policy depends on both the central bank's and the government's preferences, with the weight on the central bank's preferences increasing in its independence. Representing the degree of political independence that the central bank has with $0 \leq \gamma \leq 1$, the monetary policy-making problem is to choose inflation so as to minimise the weighted average loss function

$$L = \gamma L_{CB} + (1 - \gamma) L_G \quad (2)$$

subject to the constraint posed by the aggregate supply and expectations about inflation. If $\gamma = 1$ it means the central bank fully determines monetary policy; if $\gamma = 0$, it means the government fully determines monetary policy. The constraint is captured by the Lucas supply function:

$$y = y_n + \theta(\pi - \pi^e) + v \quad (3)$$

where y = log of output, π^e is expected inflation; and v represents supply shocks.

Assuming away supply shocks to simplify the analysis, v drops out of equation (3) and substituting the result into equation (2) yields:

$$\begin{aligned} L &= \gamma \left[\frac{1}{2} \alpha_G (\pi - \pi_G^*)^2 + \frac{1}{2} \beta_G (y - y_G^*)^2 \right] \\ &\quad + (1 - \gamma) \left[\frac{1}{2} \alpha_{CB} (\pi - \pi_{CB}^*)^2 + \frac{1}{2} \beta_{CB} (y - y_{CB}^*)^2 \right] \\ &= \gamma \left[\frac{1}{2} \alpha_G (\pi - \pi_G^*)^2 + \frac{1}{2} \beta_G (y_n + \theta(\pi - \pi^e) - y_G^*)^2 \right] \\ &\quad + (1 - \gamma) \left[\frac{1}{2} \alpha_{CB} (\pi - \pi_{CB}^*)^2 + \frac{1}{2} \beta_{CB} (y_n + \theta(\pi - \pi^e) - y_{CB}^*)^2 \right] \end{aligned} \quad (4)$$

If we further assume that rational expectations hold (i.e., $\pi = \pi^e$ and $y = y_n$) and the government and central bank target the same rate of inflation (i.e., $\pi_G^* = \pi_{CB}^* = \pi^*$ the socially optimal rate of inflation) but maintain their respective preferences about output, equation (4) can be re-written as:

$$L = \gamma[\frac{1}{2} \alpha_G(\pi - \pi^*)^2 + \frac{1}{2} \beta_G(y_n - y_G^*)^2] + (1 - \gamma)[\frac{1}{2} \alpha_{CB}(\pi - \pi^*)^2 + \frac{1}{2} \beta_{CB}(y_n - y_{CB}^*)^2] \quad (5)$$

The first order condition for minimisation requires setting the partial derivative of L with respect to π to zero and solving for π .

$$\frac{\partial L}{\partial \pi} = \gamma\{\alpha_G(\pi - \pi^*) + \beta_G[y_n - y_G^*]\} + (1 - \gamma)\{\alpha_{CB}(\pi - \pi^*) + \beta_{CB}[y_n - y_{CB}^*]\} = 0 \quad (6a)$$

$$\pi[\alpha_G \cdot \gamma + \alpha_{CB}(1 - \gamma)] = \gamma\{\alpha_G \cdot \pi^* - \beta_G[y_n - y_G^*]\} + (1 - \gamma)\{\alpha_{CB} \cdot \pi^* - \beta_{CB}[y_n - y_{CB}^*]\} \quad (6b)$$

$$\pi = \pi^* - [\beta_G \cdot \gamma(y_n - y_G^*)] / [\alpha_G \cdot \gamma + \alpha_{CB}(1 - \gamma)] - [\beta_{CB}(1 - \gamma)(y_n - y_{CB}^*)] / [\alpha_G \cdot \gamma + \alpha_{CB}(1 - \gamma)] \quad (6c)$$

If the central bank has some independence (i.e., $0 < \gamma < 1$) and both bodies do not target the natural rate of output but rather some levels lower than it, the inflation attained will be lower than the socially optimal rate. The inflation outcome will be lower the greater the independence of the central bank (i.e., the closer γ is to 1). The converse is true.

Appendix III
De Souza's Coding Scheme for CBI Indicators

ISSUE	CRITERIA	POINTS
	Personal Independence	
1	Appointment of the central bank (CB) board members.	
	a) All the appointments to the CB board are made independently of the government.	1.00
	b) More than half of the appointments to the CB board are made independently of the government.	0.66
	c) Less than half of the appointments to the CB board are made independently of the government.	0.33
	d) Gov't has influence in all the appointments to the CB board.	0.00
2	Mandate duration of more than half of the CB board members.	
	a) Equal to or more than eight years	1.00
	b) Between six and eight years.	0.75
	c) Five years.	0.50
	d) Four years.	0.25
	e) Less than four years.	0.00
3	Government (or other fiscal branches representatives) participation at CB meetings, where monetary decisions are taken.	
	a) No government representation at CB meetings.	1.00
	b) Gov't is represented at CB meetings, but without right to vote.	0.50
	c) Gov't is represented at CB meetings, with right to vote.	0.00
	Political Independence	
4	Ultimate responsibility and authority on monetary policy (MP) decisions.	
	a) CB has the ultimate/final responsibility in MP decisions.	1.00
	b) CB has not the ultimate responsibility in MP decisions.	0.00
5	Price stability.	
	a) It is the sole objective.	1.00
	b) It is one of two objectives, but preference is given to price stability.	0.66
	c) It is one among various other objectives.	0.33
	d) Law does not establish anything about policy objectives.	0.00
6	Banking supervision.	
	a) Not considered in the objectives or functions of the CB.	1.00
	b) It is one of the CB functions or objectives, where we find also price stability as a policy objective.	0.50
	c) It dominates other CB functions or objectives.	0.00
7	Monetary policy (MP) instruments.	
	a) CB enjoys autonomy in MP instruments selection.	1.00
	b) CB is not autonomous in the selection of MP instruments.	0.00
	Economic and Financial Independence	
8	Government financing.	
	a) CB cannot directly finance the government.	1.00
	b) Law allows that CB provides credit facilities to government and other financing help.	0.00
9	Ownership of the central bank's equity capital.	
	a) Government does not own any central bank's capital.	1.00
	b) Government owns less than half of the central banks capital.	0.66
	c) Government owns more than half of the central bank's capital.	0.33
	d) Government owns all the central bank's capital.	0.00

Source: de Souza (2001).

Appendix IV

Scores for de Souza's Legal CBI Index

No.	Country or Institution	Independence				
		Personal	Political	Economic and Financial	Total	Ranking
1	Argentina	1.25	1.83	1.00	4.08	14
2	Australia	0.50	2.16	0.00	2.66	31
3	Austria	1.66	2.16	1.00	4.82	9
4	Belgium	1.75	1.50	0.00	3.25	27
5	Canada	0.50	1.83	0.00	2.33	32
6	Chile	2.00	1.83	1.00	4.83	8
7	Czech Republic	2.75	2.16	1.00	5.91	3
8	Denmark	2.16	1.83	0.00	3.99	17
9	EMU - ECB	2.50	2.66	1.00	6.16	1
10	England	1.00	2.66	0.00	3.66	21
11	Finland	2.50	2.66	1.00	6.16	2
12	France	1.50	2.16	1.00	4.66	11
13	Germany	1.25	1.83	1.00	4.08	15
14	Greece	1.58	2.16	1.00	4.74	10
15	Hungary	1.58	1.83	0.00	3.41	24
16	Iceland	1.75	2.33	0.00	4.08	16
17	Ireland	1.00	2.16	1.00	4.16	13
18	Italy	2.16	2.16	1.00	5.32	6
19	Japan	1.00	1.83	0.00	2.83	30
20	Korea	0.75	2.16	0.00	2.91	29
21	Luxemburg	1.25	2.16	1.00	4.41	12
22	Mexico	1.83	1.33	0.00	3.16	28
23	Netherlands	1.75	2.16	0.00	3.91	18
24	New Zealand	1.83	2.16	1.00	4.99	7
25	Norway	1.58	1.83	0.00	3.41	25
26	Poland	1.25	2.16	0.00	3.41	26
27	Portugal	0.50	2.16	1.00	3.66	22
28	Spain	0.75	2.16	1.00	3.91	19
29	Sweden	2.75	2.16	1.00	5.91	4
30	Switzerland	2.08	2.33	1.00	5.41	5
31	Turkey	1.66	1.83	0.00	3.49	23
32	USA	2.00	1.83	0.00	3.83	20

Source: de Souza (2001) and author's calculations.

Appendix V

The Data on Legal CBI, Inflation and Growth Rates

COUNTRY	INF90-04	GR90-04	GR90-94	GR95-99	GR00-04	LEGALCBI
Argentina	151.4893	3.1293	6.7920	2.2500	0.3460	4.08
Australia	2.1720	3.2653	2.3900	4.3060	3.1000	2.66
Austria	2.0667	2.2433	2.6740	2.3580	1.6980	4.82
Belgium	2.0653	2.0120	1.7540	2.4440	1.8380	3.25
Canada	1.9393	2.6500	1.2160	3.6640	3.0700	2.33
Chile	8.8380	5.5747	7.3300	5.6420	3.7520	4.83
Czech Republic	10.3879	1.0971	-2.4625	1.8880	3.1540	5.91
Denmark	2.1580	1.9833	1.6320	2.6700	1.6480	3.99
Finland	2.1860	1.8773	-1.5680	4.3920	2.8080	6.16
France	1.7000	1.8267	1.2560	2.2560	1.9680	4.66
Germany	1.8640	1.8407	2.8640	1.5800	1.0780	4.08
Greece	8.6940	2.6607	0.8400	2.9760	4.1660	4.74
Hungary	16.7233	1.3280	-3.2160	3.2780	3.9220	3.41
Iceland	4.5313	2.6340	0.5580	3.9500	3.3940	4.08
Ireland	3.3227	6.8613	4.4380	9.7880	6.3580	4.16
Italy	3.8607	1.4367	1.0900	1.8980	1.3220	5.32
Japan	-0.2947	1.6853	2.1740	1.2260	1.6560	2.83
Korea, Rep.	5.2207	5.9733	7.8200	4.6920	5.4080	2.91
Luxembourg	2.7067	4.6893	4.7600	5.5620	3.7460	4.41
Mexico	16.0593	3.1233	3.8660	2.8960	2.6080	3.16
Netherlands	2.4513	2.3440	2.2940	3.6520	1.0860	3.91
New Zealand	2.1053	2.9507	2.3000	2.8820	3.6700	4.99
Norway	3.0553	3.1187	3.3900	3.9120	2.0540	3.41
Poland	18.8907	3.4807	1.1500	5.7400	3.0860	3.41
Portugal	5.6160	2.2520	1.6660	4.0320	1.0580	3.66
Spain	4.3900	2.7353	1.7220	3.5600	2.9240	3.91
Sweden	2.6627	1.9580	0.1660	3.2020	2.5060	5.91
Switzerland	1.5113	1.1227	0.7560	1.3820	1.2300	5.41
Turkey	60.9373	4.0927	3.7500	4.0220	4.5060	3.49
United Kingdom	3.3160	2.2633	1.2680	2.9480	2.5740	3.66
United States	2.1500	3.0153	2.3520	3.9100	2.7840	3.83

Notes

INF90-04 = average annual inflation rate (GDP deflator) for the period 1990-2004.

GR90-04 = average annual growth rate for the period 1990-2004.

GR90-94 = average annual growth rate for the period 1990-1994.

GR95-99 = average annual growth rate for the period 1995-1999.

GR00-04 = average annual growth rate for the period 2000-2004.

LEGALCBI = index of legal central bank independence.

Sources: de Souza (2001); World Development Indicators (2005); and author's calculations.

Appendix VI

The Data on TOR, Inflation and Growth Rates for LDCs

COUNTRY	TOR	TENURE	INF90-04	GR90-04	GR90-94	GR95-99	GR00-04
Algeria	0.11	9.09	17.48	2.45	-0.32	3.46	4.22
Bangladesh	0.22	4.55	4.08	4.96	4.59	5.01	5.28
Belize	0.22	4.55	1.42	6.23	8.14	3.56	7.00
Botswana	0.11	9.09	7.78	5.22	4.54	5.65	5.46
Burundi	0.11	9.09	10.24	-0.05	-0.07	-2.29	2.22
Cape Verde	0.11	9.09	3.70	5.57	7.33	5.64	3.75
Chile	0.22	4.55	8.84	9.31	10.66	8.76	8.52
Colombia	0.11	9.09	17.85	2.86	4.31	1.41	2.86
Costa Rica	0.56	1.79	16.85	4.71	5.42	5.40	3.31
Djibouti	0.11	9.09	3.36	-0.04	-1.68	-0.78	2.33
Dominican Rep.	0.33	3.03	17.92	4.26	2.07	7.14	3.56
Ecuador	0.89	1.12	6.02	2.60	2.88	0.80	4.12
Egypt	0.11	9.09	8.28	4.22	3.61	5.20	3.86
El Salvador	0.11	9.09	7.13	3.90	5.87	3.91	1.92
Ethiopia	0.33	3.03	6.49	3.71	0.66	5.18	5.27
Gambia	0.11	9.09	8.74	3.61	2.64	3.58	4.62
Ghana	0.11	9.09	25.50	4.36	4.13	4.40	4.56
Greece	0.33	3.03	8.69	2.66	0.84	2.98	4.17
Guatemala	0.56	1.79	12.35	3.58	3.91	4.22	2.60
Guinea	0.11	9.09	8.85	3.72	3.41	5.01	2.74
Guinea-Bissau	0.33	3.03	24.62	1.68	3.52	0.44	1.08
Haiti	0.78	1.28	20.06	-1.07	-3.96	1.55	-0.81
Honduras	0.33	3.03	15.43	3.11	2.78	2.73	3.83
India	0.33	3.03	7.11	5.71	4.86	6.53	5.74
Indonesia	0.22	4.55	14.27	4.77	7.99	1.68	4.63
Iran	0.11	9.09	24.19	5.03	6.19	3.10	5.79
Jamaica	0.33	3.03	21.08	1.52	3.37	-0.31	1.51
Jordan	0.11	9.09	3.41	4.93	6.22	3.53	5.05
Kenya	0.11	9.09	12.21	1.83	1.56	2.71	1.21
Korea, Rep.	0.44	2.27	5.22	5.97	7.82	4.69	5.41
Lebanon	0.11	9.09	17.88	7.96	16.85	3.13	3.89
Lesotho	0.11	9.09	9.39	3.62	4.36	3.62	2.87
Madagascar	0.22	4.55	15.19	1.95	0.01	3.23	2.62
Malawi	0.22	4.55	26.19	3.25	1.31	6.96	1.50
Malaysia	0.22	4.55	3.49	6.55	9.31	5.19	5.14
Malta	0.22	4.55	3.18	3.76	5.50	4.49	1.30
Mauritius	0.11	9.09	6.39	5.08	5.48	5.28	4.48
Mexico	0.11	9.09	16.06	3.12	3.87	2.90	2.61
Mozambique	0.11	9.09	26.95	6.23	2.80	8.53	7.36
Nepal	0.22	4.55	7.42	4.45	5.50	4.26	3.57
Nigeria	0.11	9.09	25.92	3.59	3.64	2.50	4.63
Pakistan	0.22	4.55	9.76	4.03	4.55	3.41	4.13
Paraguay	0.44	2.27	14.16	1.92	2.92	1.73	1.10
Philippines	0.22	4.55	8.08	3.38	1.86	3.71	4.58
Seychelles	0.22	4.55	2.65	2.88	4.46	5.26	-1.07
Singapore	0.11	9.09	1.30	6.51	9.23	6.05	4.24
Solomon Islands	0.11	9.09	7.75	1.09	4.39	2.08	-3.20
Sri Lanka	0.22	4.55	9.67	4.86	5.58	4.94	4.06
Swaziland	0.22	4.55	11.84	3.24	3.84	3.66	2.23

Syria	0.11	9.09	7.11	4.83	8.37	3.47	2.66
Tanzania	0.22	4.55	16.99	4.22	2.50	3.78	6.39
Thailand	0.44	2.27	3.60	5.20	9.01	1.54	5.03
Trini. & Tobago	0.22	4.55	6.21	3.99	0.93	4.55	6.49
Tunisia	0.11	9.09	3.98	4.89	5.03	5.13	4.51
Uganda	0.11	9.09	13.29	6.50	6.03	7.70	5.76
Vanuatu	0.33	3.03	2.77	2.62	6.73	1.03	0.10

Key

TOR = turnover rate of the central bank governor (the inverse or reciprocal of 'tenure').

TENURE = the average tenure of the central bank governor in years.

INF90-04 = average annual inflation for the period 1990-2004.

GR90-04 = average annual GDP growth rate for the period 1990-2004.

GR90-94 = average annual GDP growth rate for the period 1990-1994.

GR95-99 = average annual GDP growth rate for the period 1995-1999.

GR00-04 = average annual GDP growth rate for the period 2000-2004.

Sources: Sturm and de Haan (2001); World Development Indicators (2005); author's own calculations.

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