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Political Influence on the Central Bank- International Evidence

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**Political Influence on the Central Bank -
International Evidence**

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Center for the Study of
the Economy and the State

The University of Chicago

WORKING PAPER SERIES NO. 114

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ABSTRACT

Political influence on the central bank, which was measured roughly in earlier work by looking at the overall frequency of turnover of the governor, is measured here with more sensitivity by looking at the probability that a governor will be replaced shortly after a political change of government. The governor changes about half the time within six months of a non-constitutional or other radical change of government -- a military coup or a restoration of democracy. The governor is much less likely to change within six months following a routine change in the head of government -- about one fourth of the time in developing countries and one tenth in industrial. In all categories of countries, the average probability per month of a governor change is significantly higher in the period shortly after a political change. Countries vary widely around the average, so that higher probabilities of a governor change after a political change and higher frequency of governor change each reveals additional information about the degree of autonomy. These more sensitive indicators correlate statistically with inflation and its variability, and with real growth and real interest rates. The differences in vulnerability of the central bank to political instability, in political instability itself, and in central bank turnover in non-political periods seem to be a major part of the explanation for why the developing countries have, on average, higher and more variable inflation than industrial countries.

JEL Classification : E4, E5, H11 (E42 and E58 in particular).

Keywords : Central Bank Independence, Political Influence, Governors' Turnover, Inflation, Growth, Interest Rates.

I. INTRODUCTION

Economists and policy makers generally feel that the degree of autonomy of the central bank (CB) from political authorities is an important determinant of policy choices and of economic performance. Empirical verification of these presumptions has been difficult, however, because the autonomy of the CB is not easily quantified. Most previous studies have used legal indices from CB charters to quantify the autonomy of the CB (Parkin (1987), Grilli, Masciandaro and Tabellini (1991), Alesina and Summers (1993)). These measures help account for cross country inflation differentials within industrial economies but not within developing countries. Low inflation is not associated with legal CB independence in developing countries because of the small degree of association between actual and legal independence among those countries.¹ Hence more behavioral indices of independence are called upon. Cukierman, Webb and Neyapti (1992) and Cukierman (1992) made an initial step in this direction by using the actual average term in office of the governor as a proxy for central bank independence in developing countries.² This paper presses the inquiry further by taking account of how turnover of the governor relates to political events.

¹Within industrial countries the frequency of replacement of a CB governor in periods which are within three months of the time he should have been replaced according to the law is more than ten times higher than the same frequency in other periods. The same ratio in developing countries is only 2.2.

²They found a significant negative association between this proxy and inflation across developing countries. The use of this proxy is based on the presumption that below some threshold a shorter term in office of the chief executive officer of the bank is associated with lower CB independence. It should be noted, in this context, that actual terms in office in developing countries are substantially lower than in industrial countries. Cukierman 1994 shows theoretically how the expected length of tenure of the CB governor relates inversely to inflation, via the governor's effective rate of time preference.

Although considerable evidence now establishes the negative association between inflation and central bank autonomy, the reduction of political influence on the central bank is not the only institutional device for assuring price stability. Regardless of whether it has a dependent central bank, a country may still enjoy price stability if it consistently pegs its currency to that of a country with stable prices. Examples include Argentina in recent years, Belgium, Netherlands, and some francophone African countries. An even stronger commitment to maintain a fixed exchange rate is to use a foreign currency for legal tender, as in Panama. But it should be emphasized that central bank autonomy and various degrees of commitment to a fixed exchange rate are **complementary** institutional arrangements and are not mutually exclusive. This paper focuses on the documentation and the effects of the varying degrees of political influence on the central bank. We and others have investigate the effects of exchange rate commitments elsewhere.³

A variety of research -- theory, case studies and statistical analysis -- shows that political instability worsens macro-economic policy and outcomes (Edwards and Tabellini 1992; Haggard, Kaufman and Webb 1992; Haggard and Webb 1994). The effects are strongest on inflation, but other variables such as growth and the real interest rate are also affected. Some of this effect may come from the direct effects of political change on policy, particularly fiscal. Some also comes from the effect on institutions, such as the central bank, and on their ability and incentive to follow policies for the long-run benefit of the economy.

³ Empirical investigations of the effect of exchange rate pegs on inflation appear in Cukierman, Rodriguez and Webb (1995) and in Anayadike-Danes (1995). Cukierman, Kiguel and Liviatan (1992) offers a general discussion of dollarization.

So the research agenda includes the question of the relative importance of different channels through which political instability influences economic outcomes, as well as the underlying questions of whether and how political instability affects institutions like the central bank. It seems likely that different kinds of political instability would have quite different effects. If political changes reflected changes in basic attitude toward economic policy or if they were traumatic and irreversible for the politicians involved, then the instability would motivate politicians to control the central bank tightly and keep it at their disposal to help them stay in power. On the other hand, if the political changes were alternations in power of two or three parties that shared a consensus on many basic tenets of economic policy, then they might agree to grant the central bank considerable autonomy to pursue price stability, so the aspect of economic policy on which they agreed would not suffer from the political contests over other issues. These questions motivated the research for this paper, although it does not answer all of them.

This paper presents new behavioral indices of political influence on the central bank. The indices focus on the propensity of the chief executive officer of the bank, (to whom we refer as "governor" although his title may be president or chairman) to lose his office following a political transition. The data base and the indices derived from it were designed to address four specific questions derived from the broader questions in the previous paragraphs.

Is turnover at the CB significantly different shortly after political transitions than in other periods? To answer this question we compare the frequency of governor changes in periods shortly after a political transition with the frequency in other periods. We refer to these other periods as "non-political", while recognizing that even then some turnover may

result from political influence. Nevertheless, in the presence of heavy political influence we should expect significantly higher frequency of CB governor changes in periods immediately after political transitions, which we call "political periods", than in the non-political periods. The tests presented in the paper suggest that this is indeed the case for the entire sample of 64 countries, for the subgroup of developing countries and, surprisingly, for the industrial economies as well. Given this result, the frequency of CB governor changes in political periods can serve as an index of the extent of political influence over the CB, which leads to more refined indicators of CB autonomy.

For how long after a political change does it increase the probability of a change of the CB governor? To answer this question we examine a number of short intervals following political transitions and calculate the frequency of changes at the CB within each interval. These frequencies are high on average immediately after a political transition and usually decrease with the length of the lag period. There is a limit to how far out one can extend the lags for examination, because if they go out too far, then countries with frequent political change would have little or not times in which to record a benchmark frequency of governors' turnover. To find the cutoff between political and non-political periods we look for the largest lag interval for which: 1) the frequency of changes at the CB within this interval is significantly higher than the frequency at lags of ten or more months and; 2) The frequencies in all intervals beyond this one do not significantly differ from the frequency in the ten-or-more months interval. The demarcation line between political and non political periods is then defined as the upper bound of the critical lag interval. With this procedure periods within six months of the latest political transition are defined as political in the overall sample

and in most subsamples, and any period beyond that is non political.

Is the political vulnerability of the CB systematically related to the level of economic development and the type of political regime? We calculate a measure of political vulnerability of the CB and examine its relation with a country's level of development and the nature of its regime (always democratic, always authoritarian or mixed). Vulnerability of the CB is defined as the fraction of political transitions that are followed, within the subsequent political periods, by a replacement of the CEO of the bank.

Frequent removal from office of the bank's CEO following political transitions probably reflects gross political influence, since his term in office is not shielded by law or custom from political changes. This type of influence has been common in developing economies, such as Botswana, China, Costa Rica, and Indonesia, and has been particularly high in countries that switch between democratic and authoritarian regimes, such as Brazil, Chile, India, Korea, Nicaragua, Peru, and Uruguay. In Argentina before the 1990s, even though the law specified a four-year term, the governor was always replaced when the government changed. Among industrial economies gross political influence on the CB is rare - Sweden is said to be an exception -- but more subtle and mild influences are common.⁴

Is the political vulnerability of the CB systematically related to measures of economic performance such as inflation, growth and interest rates? Cross-section and panel-data regressions provide evidence on this question.

⁴ For instance in the United States, the index of CB vulnerability is zero implying the absence of gross political influence. But, as documented in Havrilesky (1992), there are several other, milder, channels of political influence on the Federal Reserve.

The paper is organized as follows. Section II presents the data set and discusses the conventions used to organize it. The procedure for distinguishing between political and non political CB governor changes is developed and applied in section III to the entire sample as well as to broad subgroups of countries. Section IV discusses indices of CB political vulnerability for broad subgroups of countries and investigates the effect of different types of political transitions on CB vulnerability. The effects of vulnerability and of non political turnover on inflation, growth and real rates are briefly examined in section V. Section VI estimates empirically how much of the strong cross sectional association between inflation and its variance is due to their common association with CB vulnerability and non political turnover. This is followed by concluding remarks.

II. THE DATA

To assess and quantify the degree of political influence on the CB we have put together a multi-country data set on political and on CB instability. Political instability is measured by counting political transitions of various types. Instability at the CB is measured with data on the frequency and timing of replacement of CB governors. The research focuses on variables that were available from a large number of countries on a uniform basis.

The sample consists of 64 countries with matched data on political and on CB instability. It includes all the major industrial and developing countries, but excludes most East Bloc countries.⁵ The data cover 1950-89, where possible, but start later for countries that achieved political independence or established a central bank after 1950. The data are divided

⁵ Appendix table A1 lists the countries.

into two sub periods: 1950-71, corresponding to the Bretton Woods era, and 1972-89. In each sub period as well as in the total period, a country is included only if data are available for at least 10 years. With shorter periods, the data would quite likely be unrepresentative.

Political transitions. Instability of the executive branch of government seems most relevant for central bank autonomy. Consequently we selected four types of political change as indicators of political instability: change of the head of government, change of the party in government, change of the fundamental rules of government as embodied in switches from authoritarian to democratic regimes or vice versa, and irregular changes of government from one authoritarian ruler to another. These types of changes form a hierarchy, so that each political event is coded as a single type - either a change of the head of government without change of party, a non-violent change of party without change of type of government, and an irregular change of authoritarian government without change of form of government (a coup), or a change of the form of government between democratic and authoritarian (a coup against a democratic government or a restoration of democracy). We refer to these as low level, middle level, type-2 authoritarian, and high level political instability.⁶

Our previous research indicated that the autonomy of the central bank differed markedly between industrial and developing countries (Cukierman, Webb, and Neyapti 1992). Here we examine whether this distinction is also important for the effects of political instability

⁶ Data come from and were checked against several sources. The most comprehensive single source, and usually the initial one, is Europa Yearbook. Changes of only the economic team (not necessarily including the central bank) are even lower level political events that may be relevant for assessing central bank autonomy. To investigate this, we have begun collecting data on changes of the Minister of Finance or Treasury. These data are less readily available than information on changes of the head of government, and we do not yet have information on a broad enough sample to report the results.

on the central bank. Within each economic group, countries are divided into subgroups with democratic regimes for the whole period, with authoritarian regimes throughout, and with regimes that alternate between a democratic and authoritarian. We classified as democratic only the countries and periods in which the head of government was chosen as a result of competitive elections. The classifications thus differ somewhat from what one would code as the degree of political liberty, such as with Gastil's indices. We chose to exclude from our data political events that challenged and perhaps threatened to change a government but did not do so -- strikes, riots, attempted coups, and elections where the previous government was reelected. To assess the implications for an institution like the central bank, it seemed better to focus on institutionally well-defined events that actually changed the government to which the bank reported.

Changes at the central bank. The raw data on instability at the CB consists of the actual dates of changes of the CEOs of the central banks in our sample countries. CB governors' turnover is only an imperfect indicator of actual CB independence in developing countries (For more discussion of this proxy, see Cukierman, Webb and Neyapti, 1992; chapter 19 of Cukierman, 1992; Cukierman, Kalaitzidakis, Summers and Webb, 1993). Low turnover does not always imply a high level of CB independence - a relatively subservient governor may stay in office longer precisely because he does not stand up to the executive branch. This may be true for countries with exceptionally low turnover rates such as Iceland, Denmark, and Britain and for countries with stable authoritarian governments. In such countries, low frequency turnover is probably unrelated to independence. On the other hand, above some critical turnover rate, CB independence is very likely lower the higher the

turnover rate of the governor. Sufficiently high turnover rates make the tenure of the CB governor shorter than that of the executive branch and thus make the governor more susceptible to influence by the executive branch and more discouraged from trying to implement longer-term policies. Since the electoral cycle is at least four years in most countries, the threshold turnover is probably between 0.2 and 0.25 (average tenure of four to five years). In addition, for very short terms of office, such as three years or less, it is generally more difficult to implement long term policies (such as the maintenance of price stability) for any electoral cycle. One limitation of the turnover variable is that all the industrial countries have turnover rates at or below the critical rate in the period we examine. Turnover rates in developing countries, however, span a range that goes well above the critical point.

The measures of political influence on the CB developed here consider the links between political instability and subsequent turnover at the CB and hence appear to be relevant for both industrial and developing economies. They also make it possible to distinguish between the frequencies of changes at the CB in political periods, as defined earlier, and in non-political periods. A relatively high frequency of turnover in the political periods indicates substantial influence of political instability on the CB. A relatively high level of turnover the rest of the time, at least beyond some threshold (a high non-political CB governors' turnover) most likely indicates that the CB is more dependent even in politically tranquil times.

III. POLITICAL CHANGE AND THE TIMING OF CENTRAL BANK TURNOVER

To what extent does political instability translate into instability at the central bank? Are

there systematic differences in central bank turnover between periods immediately following a political change and non-political periods? If there are differences, how does their magnitude vary with country characteristics? To answer these questions this section measures political instability by the frequency of political transitions, as defined in the previous section, and instability at the central bank by the turnover of the governors.

Before attempting to give precise answers to these questions it is instructive to take a broad look at the data. The first line of Table 1 presents CB turnover figures (measured as the number of CB governor changes per month) for various time periods following a political transition. Thus, the average frequency of governors' changes within the same month or one month following a political transition is 0.071. The same frequency within two to three months following a political transition is 0.027 and it is only 0.012 in periods which are located at least ten months after a political transition.⁷ These numbers correspond to average terms of office of 1.2, 3.1 and 6.9 years respectively.⁸

⁷ When a given CB governor change occurs within a short time after two or more previous political transitions, the CB change is attributed only to the most recent political transition.

⁸ Let x be a turnover number from Table 1. Then, the corresponding average term in office, in years, is given by $1/12x$.

**TABLE 1: FREQUENCIES OF CB GOVERNORS' CHANGES AT VARIOUS LAG
INTERVALS FOLLOWING THE LATEST POLITICAL TRANSITION
- FULL SAMPLE**

Lag interval in months	0-1	2-3	4-6	7-9	10 or more
Frequency (per MONTH)	0.071	0.027	0.026	0.014	0.012

The numbers in Table 1 can be interpreted as estimates of the probability of one CB governor change conditional on being within a time segment that follows a political transition by i to $i+2$ (or by i to $i+3$) months.⁹ Table 1 reveals that, for the entire sample of countries, this probability decreases monotonically with the number of months that have elapsed since the last political transition. It is almost three times larger in time segments that are zero to one month following a political transition than in time segments that are two to six months after a political transition. This probability drops further -- to about a half of its value in the 2-6 months time segments -- for time periods seven or more months after a political transition.

CB changes within zero to one months of a political transition are highly likely to result directly from the political change, while CB changes more than nine months after a political

⁹ This interpretation requires the probability of two or more changes within the subperiod to be negligible. Since the basic time interval -- two months -- is short, this assumption is supported by the data.

transition are unlikely to be the result of a change in government and are more likely, to be *relatively* non-political. The challenge is to find the average lag across countries, presumably between one and nine months, at which to set the cutoff between political and non-political periods. We take the probability of turnover in the months long after a political change (ten months or more) as a background rate, against which to compare months in the intermediate range. The political period would then be defined to include months at all lags (after a political change) for which the average rate of CB turnover is significantly higher than the background rate.

Appendix 2 describes the tests for differences between the probability of CB governor change in the ten-or-more lag periods and each of the shorter lag intervals, using the normal approximation to the binomial distribution. It shows that the probability of a turnover at the CB is significantly larger for the 0-1, 2-3, 4-6 lag periods than for the 10-plus lag periods. There is no significant difference in the average probability of a CB governor change at the 7-9 months lag following a political change and this probability in the 10-plus lag period. The evidence in appendix 2 therefore supports a choice of six months following a political transition as the cutoff between political and non-political periods.

In summary, for the entire sample of countries the evidence supports the view that instability at the CB rises in periods following political transitions and that this increase is significant. Furthermore the most likely cutoff between political periods, with a relatively high probability of a change in governor, and non political periods with a lower probability is six months following the latest political transition. Finally, the estimated probability of a change at the CB is more than 3 times larger in periods that have been identified as political

than in periods that have been identified as non political. These results taken together suggest that the chief executive officers of central banks are, on average, more likely to be replaced after political transitions than in other periods. Thus, political instability increases instability at the central bank and weakens its independence from political authorities.

The profile of estimated probabilities of a change at the CB varies between industrial and developing countries and between countries with different types of political regime. For political regime types we distinguish: countries with democracy the whole time, countries with authoritarian regimes the whole time, and countries alternating between a democratic and an authoritarian regime (mixed regime). Most industrial countries are democratic for the whole time. There are no authoritarian-only countries within this group during the period under investigation, and only two (Spain and France) who belong to the mixed-regime group. Developing countries include all three subgroups -- democratic-only, authoritarian-only, and mixed.

Table 2 presents the estimated probabilities of CB governor changes at various lags following a political transition for the different subgroups of countries. The probabilities of CB turnover are higher in developing countries than in industrial countries at all lags following a political transition. The frequencies decline monotonically for developing countries but have two peaks for industrial countries -- one in the initial 0-1 interval and a second lower peak in the 4-6 month interval. The tests reported in Appendix 2 reveal that for developing countries the appropriate cutoff between political and non political periods is still at 6 months, and there is clear evidence of a link-running from political instability to instability at the CB.

TABLE 2: FREQUENCIES OF CB GOVERNOR CHANGES AT VARIOUS LAG INTERVALS BY SUBGROUPS OF COUNTRIES

Country Group	No.of countries	<u>No.of months since a political transition</u>				
		0-1	2-3	4-6	7-9	10 or more
Industrial:						
All	19	0.058	0.015	0.028	0.008	0.014
Democ. only	17	0.049	0.017	0.031	0.004	0.014
Mixed	2	0.130	0.000	0.000	0.059	0.019
Developing:						
All	45	0.205	0.083	0.070	0.043	0.030
Democ. only	8	0.122	0.000	0.139	0.000	0.011
Author. only	21	0.196	0.037	0.013	0.053	0.024
Mixed	16	0.218	0.108	0.078	0.046	0.029

The evidence is less dramatic for industrial countries but still supports the view that in those countries the average frequency of CB changes in the 0-1 month interval after a political change is significantly higher than the background frequency in the ten-plus range. Although there is no significant difference between the frequencies in the 2-3 month interval and in the ten-plus interval within the group of industrial countries, the difference in frequencies between the next, 4-6 interval, and the ten-plus interval is significant at roughly the 0.03 level. The frequency in the 7-9 month interval, however, does not differ significantly from the background frequency. Thus, for industrial economies we could locate the cutoff between political and non political periods either after the 0-1 interval or after the 4-6 interval. To maintain compatibility with developing countries, most of the subsequent discussion uses the six-month cutoff.

The average frequencies of CB turnover within the three political subgroups of

developing countries is summarized in the lower part of Table 2. In all three, the frequencies in the 0-1 month interval are substantially higher than in the subsequent intervals. Statistical tests reveal that in all three cases the difference in frequencies between the 0-1 month interval and the ten-plus interval is significant. Comparing the three subgroups, the average frequency of CB instability in the 0-1 month interval is highest on average in the countries with mixed regimes, second highest in authoritarian-only countries, and lowest in democratic-only developing countries.¹⁰

The tendency of mixed regimes to have higher frequencies than democracies in the 0-1 range also appears within the industrial countries, although this finding is based on only two mixed industrial countries, Spain and France. Also, as was the case for industrial democracies, there is a second peak in the 4-6 month interval for democratic-only developing countries.

IV. POLITICAL VULNERABILITY OF CENTRAL BANKS

Computing the frequency of CB turnover in periods at various lags from political changes was important for assessing the size and duration of the effect of political changes on the propensity for CB turnover. For a summary measure of political influence, however, we compute an index of the political vulnerability of the CB, defined for each country as the fraction of political transitions that are followed promptly by a replacement of the CB governor:

¹⁰ But the corresponding frequency in the group of industrial democracies is even smaller.

$$V(i) = \frac{\text{Number of CB governor changes within } i \text{ months following a political transition}}{\text{Number of political transitions}}, i = 1, 6.$$

The vulnerability index for a country is similar to the frequency of CB turnover in political periods and would be identical if the time unit in the frequency measure were as long as the whole political period, say seven months (0 to 6 month lag), and if none of the political periods in that country were truncated by the end of the sample period or another political transition in quick succession.

Table 3 reports average values of the index of CB political vulnerability for industrial and for less developed countries as well as for democratic, authoritarian and mixed regimes within each group. The overall average value of vulnerability is 0.24, i.e., a little less than a quarter of all political transitions are followed by a replacement of the CB governor within 6 months. As with the frequency of turnover, the vulnerability varies widely across country groups and subgroups. Political vulnerability is over three times larger in developing countries than in industrial countries. A similar picture (not shown) emerges when the sample is broken into two subperiods (50-71 and 72-89). Central banks of developing countries with mixed regimes are the most vulnerable on average.

Table A1 in the appendix presents the vulnerability of central banks to all types of political transitions for individual countries by subgroups. Within each subgroup central banks are arranged in descending order of their political vulnerability. By this measure Sweden has the most politically vulnerable CB among industrial democracies. Among democratic-only developing countries, the CB of Botswana is the most vulnerable, and among developing

countries with mixed regimes the Argentine CB is the most vulnerable, with, occasionally, more than one change of governor in the first six months after a political change.¹¹

TABLE 3: POLITICAL VULNERABILITY OF CENTRAL BANKS BY COUNTRY GROUPS, 1950-1989

Country Group	Vulnerability		Frequency of Political change (per annum)
	Within 6 months	Within 1 month	
All	0.24	0.13	0.26
Industrial	0.10	0.05	0.31
Developing	0.34	0.19	0.24
Industrial:			
Democratic only	0.10	0.05	0.30
Mixed	0.12	.12	0.33
Developing:			
Authoritarian only	0.22	0.18	0.15
Democratic only	0.28	0.10	0.17
Mixed	0.38	0.20	0.31

The last column of Table 3 reports the average frequency of political transitions per annum for each country group. Industrial countries have more frequent political transitions than developing countries, because they have much more frequent democratic changes of government, with and without party changes. Within developing countries, the subgroup with mixed regimes has a frequency of political transitions that is about twice that of either democratic only and authoritarian only countries. The latter two have less frequent political

¹¹ In the 1990s, Argentina has vastly increased its commitment to price stability by upgrading the autonomy of its central monetary institution and by endowing it with the authority to function as a currency board.

changes of any type.

We now have four indicators of central bank autonomy: the two developed in the 1992 paper, the index of legal autonomy and the (total) turnover rate of the governor, plus vulnerability and its complement, the frequency of non-political turnover of the governor. Of course the latter two can, with appropriate adjustments of units and a multiplication of vulnerability by the frequency of political transitions in each country, be re-aggregated into the total turnover rate. How different are these four measures? Table 4 shows the matrix of correlation coefficients for them and the frequency of political turnover.

**TABLE 4: CORRELATION BETWEEN VARIOUS INDICATORS OF
CENTRAL BANK AUTONOMY, 1950-1989**

	Legal CBA	Total CB Turn- over	Vulner- ability	Freq. of Polit. Change
Total CB Turnover	-.05			
Vulnerability (6 months)	-.13	+.77		
Non-political	-.02	+.87	+.59	
CB turnover Frequency of Political trans.	+.08	-.03	-.09	-0.31

The various indicators are not closely correlated to one another; even total turnover is not closely correlated with its two derivatives. This happens primarily because the frequency of political transitions, usually an indicator of vibrant democracy, is negatively correlated with the various turnover variables.

How is the political vulnerability of the CB affected by the type of political instability in a country? To answer this question we regressed the indices of CB vulnerability at 0-1 month and 0-6 month lags on various types of political transitions, on a dummy for developing countries and a dummy for purely authoritarian regimes.¹² Table 5 summarizes the results. For the 0-6 months index of vulnerability, the developing-country dummy has a significant positive impact on CB vulnerability, and high-level political instability also does.¹³ These effects show up more weakly with the vulnerability index for the 0-1 month interval.

The vulnerability of central banks to political influence depends on the type of political transition. Table 6 reports the indices of political vulnerability by type of political transition for different country groupings. The fraction 0.61 at the intersection of the developing countries row with the "high level" column means that sixty one percent of high level political transitions in developing countries are followed, within six months, by a replacement of the CB governor. The numbers in the other cells are defined in a similar manner.¹⁴ There is generally little difference between the vulnerability to middle level and to low level political

¹² The estimated equation is a pooled cross-section time series regression in which there are two observations for each country, one for the 1950-71 period and the other for the 1972-89 period.

¹³ The regression with the index of vulnerability for a 0-1 month lag gave qualitatively similar results but with less statistical significance. Since, at least for developing countries, $V(6)$ is a more appropriate measure of vulnerability than $V(1)$, the better fitting regression is also more relevant. The effect of high level political instability is statistically significant if Switzerland is omitted from the sample, which would be reasonable on grounds that the automatic annual change of head of government from the representative of one canton to the next does not reflect a political change in the sense it would elsewhere.

¹⁴ Some of the cells are empty because, by definition, not all types of political transitions occur in all country groups. For example, in always democratic countries there are no high level and authoritarian type 2 political transitions, by definition.

transitions, within each country group. The vulnerability to middle and low level political transitions is more than twice as high in developing countries than in industrial countries. Furthermore this difference seems to be due to the difference in the level of development, rather than to differences in regimes, because vulnerability of democratic developing countries to middle and low level political transitions is more than twice as large as that of industrial democracies. The vulnerability of mixed developing countries to these types of political transitions is of the same order of magnitude as the vulnerability in democratic developing countries.

TABLE 5: CENTRAL BANK VULNERABILITY AND POLITICAL CHANGE,
1950-89

Explanatory Variable	Dependent Variable = Vulnerability	
	0-1 month lag	0-6 month lag
Constant	0.095 (1.62)	0.150 (2.00)**
High level Political change	0.72 (1.36)	1.23 (1.76)*
Authoritarian-2 Transitions	-0.22 (-0.39)	-0.47 (-0.63)
Mid-level Political change	-0.16 (-0.94)	-0.20 (-0.89)
Low level Political change	-0.10 (-0.49)	-0.16 (-0.58)
Dummy Authoritarian	0.032 (0.43)	-0.047 (-0.48)
Dummy Developing	0.097 (1.49)	0.22 (2.53)**
Number of Observations	104	104
R-square Adjusted	0.053	0.131

T-statistics in parentheses

* means significant at 10 percent level

** means significant at 5 percent level

*** means significant at 1 percent level.

**TABLE 6: CENTRAL BANK VULNERABILITY (WITHIN 6 MONTHS)
BY TYPE OF POLITICAL TRANSITION AND COUNTRY GROUP**

Country group	<u>Type of Political Transition^a</u>			
	High Level	Authoritarian-2	Middle Level	Low Level
Industrial	0.00	NA	0.10	0.11
Developing	0.61	0.46	0.25	0.26
Industrial:				
Democratic	NA	NA	0.10	0.10
Mixed	0.00	NA	0.12	0.17
Developing:				
Authoritarian only	NA	0.20	NA	0.23
Democratic only	NA	NA	0.29	0.27
Mixed	0.61	0.56	0.24	0.28

NA = not applicable, because there were no political transitions of that type for that economic category of country.

^a The definitions of type of political transitions are:

- 1) High level - change of regime, from democratic to authoritarian or vice versa,
- 2) Authoritarian 2 - replacement of one authoritarian regime by another one,
- 3) Middle level - change of party without a change in regime,
- 4) Low level - change of head of government without change in regime or party.

The highest level of CB vulnerability occurs in the face of high level political transitions within developing countries with mixed regimes. CB vulnerability to authoritarian-2 transitions is larger than vulnerability to middle and low level transitions by a factor of almost two. The 0.46 figure for vulnerability to authoritarian-2 transitions masks quite different tendencies in authoritarian-only countries, with average vulnerability of 0.20, and in mixed developing countries, with average vulnerability of 0.56.

V. EFFECTS OF CB VULNERABILITY ON THE ECONOMY

Besides being of independent interest, measures of CB autonomy are useful for testing the effect of this autonomy, or its absence, on the economy. Such a project is largely beyond the scope of this paper. Nevertheless, this and the next section briefly report evidence on the relation between some of our measures and the performance of the economy as reflected by inflation, real growth, and real interest rates.

Each of these variables is regressed in pooled cross-section time series on CB vulnerability, on non-political turnover, and on other control variables. Non-political turnover is measured as the average number of non political governor changes (more than six months after the latest political transition) per annum.

Inflation. Previous work has shown a significant positive relationship between inflation or the rate of depreciation in the real value of money (D) and the (total) turnover of CB governors for developing countries (Table 7 of Cukierman, Webb and Neyapti (1992) and Table 20.2 in Cukierman (1992)).¹⁵ Table 7 here extends the effort by relating D and its standard deviation to the index of vulnerability, non-political turnover, various types of political instability and three dummies: one for the Bretton-Woods era, one for having only authoritarian regimes in the period, and one for being a developing country.¹⁶ This formulation makes it possible to evaluate whether political instability leads to inflation only by

¹⁵ $D = \pi/(1 + \pi)$, where π is the annual inflation rate.

¹⁶ The sample consists of two observations on each country. One for the 1950-71 period, corresponding to the Bretton Woods era, and the other for the 1972-89 period.

**TABLE 7: INFLATION AND INSTABILITY AT THE CENTRAL BANK
AND POLITICS, 1950 - 89**

Explanatory Variable	Dependent Variable Inflation Transformed (D)	Standard Deviation of D
Constant	0.042 1.55	0.014 (1.01)
Vulnerability (lag 0-6 months)	0.088 (2.62)***	0.065 (3.68)***
Non-Political Turnover (lag over 6 months)	0.26 (2.65)***	0.13 (2.52)**
High level Political change	0.36 (1.63)	0.29 (2.48)**
Authoritarian-2 Transitions	0.28 (1.24)	0.16 (1.35)
Mid-level Political change	0.042 (0.60)	0.008 (0.225)
Low-level Political change	0.14 (1.73)*	0.047 (1.07)
Dummy Authoritarian only	0.034 (1.08)	0.027 (1.66)*
Dummy first period (1950-71)	-0.082 (-4.11)***	-0.016 (-1.56)
Dummy Developing	-0.013 (-0.43)	-0.009 (-0.59)
Number of observations	104	104
R-square Adjusted.	0.333	0.358

T-statistics in parentheses

* means significant at 10 percent level or lower

** means significant at 5 percent level

*** means significant at 1 percent level.

reducing CB autonomy or also directly. The first regression in Table 7 backs the view that both channels are important.

In particular the political vulnerability of the CB as well as non political turnover at the bank have a positive and significant impact on inflation (D). Political instability, particularly of the high level sort, contributes to increased inflation, as expected, although not as much as the CB variables. Also, world-wide inflation is lower during the Bretton-Woods period, even after allowing for the effect of other variables. This is consistent with the view that fixed exchange rates have a stronger disciplining effect on policy than flexible rates. But it may also be due to the larger shocks that affected the world economy in the post Bretton-Woods period. The insignificant dummy on the authoritarian-only dummy means having an authoritarian rather than a democratic regime throughout does not help significantly to explain differences in average inflation, once the central bank and political variables are taken into account.¹⁷

The most important result in Table 7 is the insignificance of the dummy variable for developing countries. Inflation is higher on average in developing countries, and this could not have been accounted for by just looking at the overall frequency of turnover at the central bank (Cukierman, Webb, and Neyapti 1992). Once turnover is disaggregated into its constituent parts, however, and account is taken of the different types of political instability, the distinction between developing and industrial countries no longer contributes to explaining differences in inflation outcomes. In other words, the differences in vulnerability of the

¹⁷ There does not need to be a dummy for mixed regime countries, because the variable for high level political changes is non-zero only in mixed-regime countries.

central bank to political instability, in CB turnover in non-political periods, and in political instability can fully account for the developing countries having higher average inflation than industrial countries. The variability of inflation is positively and significantly related to CB vulnerability and non-political turnover. The frequency of high-level political change has a positive and significant effect on the standard deviation of D.

Growth. Recent empirical literature on growth has identified a number of variables such as initial GDP and education that are significantly related to real growth (see Barro (1991) for example). Does the degree of anti-inflation commitment by the monetary authorities, for which our indices of CB autonomy are a proxy, have any significant impact on growth after controlling for these variables? Table 8 answers this question by presenting growth equations that take account of initial GDP, initial primary and secondary education enrollment ratios, a decade by decade change in terms of trade, as well as our indices of CB autonomy.¹⁸ With a full sample of countries, neither of the central bank variables is significant. Brazil, Korea, and Botswana are outliers, however, because they achieved high growth despite high rates of central bank turnover and high vulnerability. With those countries excluded, both indicators of political influence on the central bank have a negative coefficients in the growth regression.¹⁹ This finding supports the view that, other things being equal, higher political dependence of the CB retards growth. It is possible that political vulnerability of the CB is a

¹⁸ The sample consists of, at most, three decade observations on each country.

¹⁹ Botswana could be legitimately be discarded from the sample, because its growth was primarily due to the discovery of diamonds, not to good macroeconomic policy. Brazil and Korea seem to be simply countries where lack of central bank autonomy was not a hindrance to growth, at least not in the period covered here.

**TABLE 8: GROWTH EQUATIONS WITH CENTRAL BANK VULNERABILITY AND
NON POLITICAL TURNOVER: 1960-1988**

	<u>Full Sample</u>	<u>Sample minus Three^a</u>
Constant	-.15 (-.15)	0.73 (0.77)
Initial GDP	-.22 (-2.46)**	-0.25 (-2.83)***
Change in Terms of Trade	28.9 (4.87)***	28.1 (5.01)***
Initial primary education enrollment ratio	2.03 (1.98)**	2.53 (2.55)***
Initial secondary education enrollment ratio	1.59 (1.22)	1.34 (1.04)
Non-political turnover of CB governors	5.80 (1.80)*	-2.39 (-0.66)
Political vulnerability of CB	-.78 (-1.15)	-1.51 (-2.30)**
Dummy for the sixties	1.69 (3.01)***	1.42 (2.61)***
Dummy for the seventies	1.39 (2.74)***	1.11 (2.26)**
Adj. R ²	0.23	0.26
Number of observations	129	120

Pooled cross section-time series (decades). CB vulnerability is characterized in terms of CB governor changes that occur within six months of a political transition. t statistics are in parentheses under the coefficients.

^a Botswana, Brazil, and Korea, are excluded.

* designates significance at the 0.10 level

** designates significance at the 0.05 level.

*** designates significance at the 0.01 level.

proxy for general economic and political instability, both of which deter growth possibly by slowing down investment and innovation. There is some evidence that in developing countries, higher CB vulnerability is associated with lower levels of investment (Cukierman, Kalaitzidakis, Summers and Webb, 1993). Sorting out the channels through which political vulnerability affects growth clearly deserves further work.

Real deposit interest rates. Previous evidence (Alesina and Summers (1993) and Cukierman, Kalaitzidakis, Summers and Webb (1993)) suggests there is a negative relation between the variability of ex-post real interest rates and CB independence. In this work CB independence is proxied by legal independence for developed countries and CB governors' turnover for developing countries. We now reexamine this finding with CB vulnerability and non-political turnover as proxies for lack of CB independence. The second column of Table 9 presents the result. It appears that both CB vulnerability and non-political turnover significantly increase the variability of ex-post real deposit rates. This further supports and amplifies the conclusion that the variability of ex-post real deposit rates is lower in countries with more independent central banks. Although it has the expected negative sign, the coefficient on legal independence is not significant.

The first column in Table 9 relates the average level of the ex-post real deposit rate to measures of CB independence. The higher the political vulnerability of the CB the lower the average real deposit rate, which corroborates a similar finding in Cukierman, Kalaitzidakis, Summers and Webb (1993). It probably reflects the higher implicit taxation of financial savings in countries with more politically dependent central banks.

TABLE 9: THE EX-POST REAL DEPOSIT RATE
AND ALTERNATIVE MEASURES OF CENTRAL BANK AUTONOMY

Explanatory Variable	<u>Dependent Variable</u>	
	Real Ex-Post Deposit Rate (R)	Standard Deviation of R
Constant	1.98 (0.64)	1.04 (0.3)
Vulnerability (lag 0-6 months)	-5.56 (-1.89)*	8.68 (2.1)**
Non Political turnover (lag over 6 months)	-1.98 (-.15)	36.24 (3.0)***
Legal CB independence	-3.26 (-.48)	-5.60 (-0.7)
Number of observations	34	34
R ² adjusted	0.05	0.52

T-Statistics are in parentheses under the coefficients.

* means significant at 10 percent level

** means significant at 5 percent level

*** means significant at the 1 percent level.

The ex-post real deposit rate is from Easterly, Rodriguez and Schmidt-Hebbel (1992). Details on the construction of legal independence appear in Cukierman, Webb and Neyapti (1992) and in chapter 19 of Cukierman (1992).

VI. THE MEAN AND THE STANDARD DEVIATION OF INFLATION AND THEIR COMMON ASSOCIATION TO VULNERABILITY AND NON POLITICAL TURNOVER

The strong cross country association between the mean and the variability of inflation is a well-known empirical regularity. Using legal independence and (total) CB governors' turnover as proxies for CB independence, up to a quarter of this association is accounted for by their common association with CB independence (Cukierman 1992, chapters 18 and 22). For this paper, the same experiment was repeated with CB vulnerability and non political turnover as (complementary) indices of CB autonomy. In addition, legal independence was added as a regressor in industrial countries.²⁰ To calculate the fraction of the correlation between the mean and the standard deviation of inflation that is due to their common association with central bank independence we proceeded as follows. First the cross sectional covariance between D (the rate of depreciation in the real value of money) and its standard deviation was calculated. Second, both D and its standard deviation were regressed on CB vulnerability, non-political turnover and (for industrial countries) legal independence, and the predicted values of D and of its standard deviation were calculated. Third, the covariance between those predicted values was calculated and compared to the overall covariance between D and its standard deviation.

The experiment was done for the entire 1950-89 period and for the subperiods 1950-71 and 1972-89. The fractions of the covariability between D and its standard deviation due to

²⁰ For details on the construction of the index of legal independence see Cukierman (1992) chapter 19 or Cukierman, Webb and Neyapti (1992).

their mutual link to CB independence are: 0.30 for the whole period and 0.40 and 0.31 for the two sub-periods. Thus, with the more refined measures of CB autonomy presented in this paper, about one third of the association between inflation and its variability is due to their common association with CB independence.

VII. CONCLUDING REMARKS

Stability and other characteristics of government institutions have always been recognized in economic history and in country studies as crucial determinants of macroeconomic stability. Recently this recognition has spread to theoretical work on macroeconomics and has been the focus of some cross-country statistical analysis (Fischer (1991), Edwards and Tabellini (1991), Cukierman, Edwards, and Tabellini (1992), Alesina, Ozler, Roubini, and Swagel (1991), Haggard and Kaufman and Webb (1992). A survey appears in Alesina and Perotti (1993)). As one would expect, political instability is positively related to inflation and negatively related to growth. There are various theories for how political instability causes macroeconomic instability, most of them not mutually exclusive. One contender is that political instability shortens time horizons of policy makers and that it decreases the ability of the political system to efficiently resolve disputes over real incomes.

This paper has demonstrated that political instability causes instability at the CB as well. But the spillover from political instability to instability at the CB varies across country groups and types of political transitions. It is particularly large when the regime changes from democratic to authoritarian or vice versa. This supports the view that when political change is deep enough to involve fundamental rules of the game and in other circumstances where

political change would probably mean the party in power would not be back soon, if ever, then the expected effect of greater political instability would be shortened time horizons, as discussed above, and therefore less autonomy and stability for the central bank. Each new government would want to use the central bank to try to stay in power as long as possible, and would have little concern for the associated detrimental longer run effects. Greater frequency of low- and medium-level political change, however, -- just changing the head of government or the party -- does not on average lead to reduced central bank autonomy as proxied by its political vulnerability.²¹

An important issue for future work is the possibility of reverse causality between the performance of the economy and our measures of gross political influence on the CB. The largely cross-sectional nature of our data precludes the use of Granger-Sims and other methods to test the exogeneity of our measures of political instability with respect to the performance of the economy. Hence, strictly speaking, it is possible that some of the significant relationships between these two groups of variables are due to causality running from the economy to political influence.²²

The measure of CB vulnerability, however, is more likely to be exogenous with respect

²¹ Actually in democratic governments where the party changes frequently, the ruling party might typically lack the strength to impose its will unilaterally and might thus agree to a compromise that would endure changes of party. This was explicit in the set-up of the reformed Chilean central bank in 1989 (Arriagada and Graham (1993)). An analysis of the effect of political instability on CB independence in countries with democratic and stable rules of the political process appears in Cukierman (1994).

²² This is probably less likely to be the case for real interest rates than for real growth. There is evidence that real growth is affected by political instability (Barro (1991), Alesina, Ozler, Roubini and Swagel (1991)) which may, in turn, cause instability at the CB.

to the economy than other behavioral indices of political influence on the CB. Even if political instability responds to the performance of the economy, vulnerability as defined here focuses on the ratio between instability at the CB and political instability. This ratio, which depends on, slowly changing institutions and socio-political norms, may be largely exogenous to the economic performance.

Since the main novelty of this paper is in the extraction of empirical regularities by matching two new data sets, our approach has been inductive rather than deductive. We deliberately avoided committing to and testing a particular model since we believe that at this early stage the broad regularities in the data can be uncovered more efficiently without positing a particular model. Our hope is that the regularities uncovered here will encourage the construction of more precise models and further empirical testing of hypotheses.

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APPENDIX TABLE A1
Political Vulnerability of Central Banks for Individual
Countries by Subgroups, 1950-1989 (*)

Country	Vulnerability (within 6 months)
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INDUSTRIAL-DEMOCRATIC

Sweden	0.400
Japan	0.214
Germany	0.200
Ireland	0.167
Australia	0.167
New Zealand	0.111
Finland	0.111
Switzerland	0.110
Netherlands	0.100
Denmark	0.091
Belgium	0.067
Iceland	0.000
Austria	0.000

Norway	0.000
United Kingdom	0.000
Canada	0.000
United States	0.000

INDUSTRIAL-MIXED

Spain	0.167
France	0.100

DEVELOPING-AUTHORITARIAN

Indonesia	1.000
China	0.500
Mexico	0.429
Ethiopia	0.400
Hungary	0.333
Taiwan	0.286
Egypt	0.250
South Africa	0.167
Morocco	0.100
Yugoslavia	0.100
Tanzania	0.000
Uganda	0.000
Kenya	0.000
Romania	0.000
Zaire	0.000
Qatar	NA

DEVELOPING-DEMOCRATIC

Botswana	1.000
Costa Rica	0.556
Western Samoa	0.333
Malta	0.333
Barbados	0.000
Israel	0.000
The Bahamas	NA
Singapore	NA

DEVELOPING-MIXED

Argentina	1.375
Chile	0.800

Uruguay	0.714
Brazil	0.692
Korea	0.667
India	0.500
Poland	0.429
Panama	0.400
Turkey	0.375
Portugal	0.357
Colombia	0.300
Honduras	0.300
Venezuela	0.300
Nepal	0.182
Thailand	0.154
Nigeria	0.143
Greece	0.111
Pakistan	0.111
Ghana	0.111
Malaysia	0.000
Philippines	0.000

(*) Within each subgroup central banks are arranged in descending order of political vulnerability.

NA - Not available.

Appendix 2

Tests for the Determination of the Cutoff between Political and Non-political Periods

To test for possible differences between the probability of CB governor change in the ten-or-more lag periods and each of the shorter lag intervals in Table 1, we use the normal approximation to the binomial distribution. More specifically let c_i and c_{10} be the number of CB governor changes in time interval i following a political transition and in the ten or more lag range respectively. As in Table 1, i may assume the interval values $[0,1]$, $[2,3]$, $[4,6]$, $[7,9]$ and 10 or more. We denote each of these lag intervals by its lower bound. Thus i assumes the values 0, 2, 4, 7 and 10. Let n_i be the number of periods within lag interval i in the sample. The frequency of CB governor changes within lag interval i is given by

$$f_i = c_i / n_i \text{ for } i = 0, 2, 4, 7, 10.$$

Let P_i be the true conditional probability of a CB governor change in lag interval i following a political transition. The null hypotheses to be tested are

$$H_0: P_i = P_{10} \text{ for } i = 0, 2, 4, 7$$

against each of the alternative hypotheses that P_i is significantly larger than P_{10} . The specification of the alternative hypotheses accommodates the possibility that the probability of a turnover at the CB is larger at shorter lags following a political transition. Under each of the null hypotheses the values

$$z_i \equiv \frac{f_i - f_{10}}{\sqrt{f_i(1-f_i)\left[\frac{1}{n_i} + \frac{1}{n_{10}}\right]}}, \quad i = 0, 2, 4, 7$$

where

$$\bar{f}_i = \frac{c_i + c_{10}}{n_i + n_{10}}, \quad i = 0, 2, 4, 7$$

have approximately a standard normal distribution, provided both n_i and n_{10} are larger than 30.²³ (See, for example Huntsberger, Croft and Billingsley (1980), p.302). The null hypotheses should be accepted for small values of the z_i 's and rejected for large positive z_i 's. Table A2 displays these statistics. Since a z_i of 3 implies that the null is rejected at the 0.001 level we conclude that the probabilities of a turnover at the CB are significantly larger for the 0-1, 2-3, 4-6 lag periods than for the 10-plus lag periods. However, there is no significant difference in the probability of a CB governor change between the 7-9 lag period and the 10-plus lag period. The evidence in Table A2 therefore supports the conclusion that the cutoff between political and non political periods occurs at a lag of six months following a political transition. Accordingly we define periods of up to six months following a political transition as political and periods which are located seven or more months after the latest political transition as non-political. The respective frequencies are 0.040 and 0.012 respectively. The z statistic testing the significance of the difference between these two estimated probabilities is a huge 12.2.

²³ These conditions are always satisfied for the entire sample of countries. For $i = 0, 2$, n_i and n_{10} are the numbers of two months periods in the appropriate intervals. For $i = 4, 7$ they refer to the number of three monthly periods. This variation in the length of the basic time unit is introduced to make its length identical to the length of the time period within each lag interval (2 months for $i = 0, 2$ and 3 months for $i = 4, 7$). In either case the value of n is sufficiently large to make the normal approximation to the binomial valid.

TABLE A2: VALUES OF THE TEST STATISTIC FOR THE NULL
 $H_0: P_i = p_{10}$ - FULL SAMPLE

Lag Interval (months)	0-1	2-3	4-6	7-9
z_i	15.3	4.1	4.5	0.6

A replication of these tests separately for each of the two economic categories of countries reveals that for developing countries the appropriate cutoff between political and non political periods is still at the upper end of the 4-6 months interval. The z statistics for testing the null hypotheses $P_i = P_{10}$ for $i = 0, 2, 4, 7$ are 15.5, 4.9, 4.4 and 1.4 respectively. The z statistic of the null that the frequency within the entire 0-6 months interval is no different than this frequency in periods that are seven or more months after a political transition is a huge 12.4.

In the industrial countries the probability of a change at the CB in the 0-1 month interval is significantly higher than in the ten-plus interval. Although there is no significant difference between the frequencies in the 2-3 month interval and in the ten-plus interval within the group of industrial countries, the difference in frequencies between the next, 4-6 interval, and the ten plus interval is significant at roughly the 0.03 level. However, there is no significant difference in frequencies between the ten-plus interval and the 7-9 month interval. Thus for industrial economies we could locate the cutoff between political and non political periods either after the 0-1 interval or after the 4-6 interval. In the first case the z statistic is 4.9 and in the second 3.75 (both significant at the 0.001 level).²⁴

²⁴ The results are qualitatively similar when the same tests are repeated for the democratic-only industrial countries and for the 0-1 month time interval.