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CENTRAL BANK INDEPENDENCE AND THE PERFORMANCE OF THE ECONOMY - TABLES' HANDOUT*

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Abstract

Making the central bank (CB) an agency with the mandate and reputation for maintaining price stability is a means by which government can choose the strength of its commitment to price stability. Economists and policymakers generally feel that the degree of autonomy of the central banks from political authorities is an important determinant of policy choices and of economic performance. Precise empirical verification of these presumptions is not easy because the autonomy of central banks depends on a number of attributes, some of which are not easily quantifiable.

This handout provides background tables which underly a survey lecture on available measures of central bank independence (CBI) and on the empirical evidence about the effects of CBI on economic performance. Among the measures of independence discussed and documented are: legal independence, the actual (as opposed to the legally mandated) term of office of the CB governor, and a behavioral measure of the political vulnerability of the CB governor. Most of those measures exist for a sample of over sixty countries. A first group of tables presents those indices.

*The tables in this handout grew out of a lecture presented at the 12th Latin American Meeting of the Econometric Society in Tucuman, Argentina in August 1993. They have been expanded in January 2002 to incorporate new data and evidence on independence and inflation following central bank reform in the transition economies.

A second group of tables present evidence on the effects of CB autonomy on inflation and its variability, economic growth, investment and interest rates. Some of the tables also explore the interconnections between political instability and the type of political regime, on one hand, and the extent of political influence on the CB on the other.

Latter tables in the handout contain recently created data and evidence on legal autonomy in the new central banks of the transition economies.

The tables in the handout are taken from the following sources

A. Cukierman, *Central Bank Strategy, Credibility and Independence: Theory and Evidence*, 1992, The MIT Press, Cambridge, MA.

A. Cukierman, S. Webb and B. Neyapti, "Measuring the Independence of Central Banks and Its Effect on Policy Outcomes", *World Bank Economic Review*, 6, September 1992, 353-398.

A. Cukierman and S. Webb "Political Influence on the Central Bank-International Evidence", *The World Bank Economic Review*, 9, September 1995, 397-423.

A. Cukierman, P. Kalaitzidakis, L. Summers and S. Webb "Central Bank Independence, Growth, Investment and Real Rates", *Carnegie-Rochester Conference on Public Policy*, Autumn 1993.

A. Cukierman, G.P. Miller and B. Neyapti, *Central Bank Reform, Liberalization and Inflation in Transition Economies - An International Perspective*, Forthcoming: *Journal of Monetary Economics*, March 2002.

2. PROXIES FOR CENTRAL BANK INDEPENDENCE (CBI)

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A. LEGAL PROXIES

Table 19.1
Legal variables and their codings

Group	Definition of variable	Variable	Levels of independence and their meanings	Numerical codings
CEO	Term of office of CEO in years	<i>too</i>	1. $too \geq 8$	1
			2. $8 > too \geq 6$	0.75
			3. $too = 5$	0.50
			4. $too = 4$	0.25
			5. $too < 4$	0
	Who appoints the CEO?	<i>app</i>	1. CEO appointed by CB board	1
			2. CEO appointed by council composed of members from executive and legislative branches as well as from CB board	0.75
			3. CEO appointed by legislative branch (Congress, king)	0.50
			4. CEO appointed by executive branch (council of ministers)	0.25
			5. CEO appointed through decision of one or two members of executive branch (e.g., prime minister or minister of finance)	0
	Provisions for dismissal of CEO	<i>diss</i>	1. No provision for dismissal	1
			2. Dismissal possible only for nonpolicy reasons (e.g., incapability or violation of law)	0.83
3. Dismissal possible and at discretion of CB board			0.67	
4. Dismissal for policy reasons at legislative branch's discretion			0.50	
5. Unconditional dismissal possible at legislative branch's discretion			0.33	
6. Dismissal for policy reasons at executive branch's discretion			0.17	
7. Unconditional dismissal possible at executive branch's discretion			0	
Is CEO allowed to hold another office?	<i>off</i>	1. CEO prohibited by law from holding any other office in government	1	
		2. CEO not allowed to hold any other office in government unless authorized by executive branch	0.5	
		3. Law does not prohibit CEO from holding another office	0	
Policy formulations	Who formulates monetary policy?	<i>monpol</i>	1. CB alone has authority to formulate monetary policy	1
			2. CB participates in formulation of monetary policy together with government	0.66
			3. CB participates in formulation of monetary policy in an advisory capacity	0.33
			4. Government alone formulates monetary policy	0
	Government directives and resolution of conflict	<i>conf</i>	1. CB given final authority over issues clearly defined in the law as CB objectives	1
			2. Government has final authority only over policy issues that have not been clearly defined as CB goals or in case of conflict within CB	0.8
			3. In case of conflict final decision up to a council whose members are from CB, legislative branch, and executive branch	0.6
			4. Legislative branch has final authority on policy issues	0.4
			5. Executive branch has final authority on policy issues, but subject to due process and possible protest by CB	0.2
			6. Executive branch has unconditional authority over policy	0
	Is CB given an active role in the formulation of government's budget?	<i>adv</i>	1. Yes	1
			2. No	0
CB objectives		<i>obj</i>	1. Price stability mentioned as the only or major goal, and in case of conflict with government CB has final authority to pursue policies aimed at achieving this goal	1
			2. Price stability mentioned as the only goal	0.8
			3. Price stability mentioned along with other objectives that do not seem to conflict with price stability (e.g., stable banking)	0.6
			4. Price stability mentioned with a number of potentially conflicting goals (e.g., full employment)	0.4
			5. CB charter does not contain any objectives for CB	0.2
			6. Some goals appear in the charter, but price stability not one of them	0

Table 19.1 (continued)

Group	Definition of variable	Variable	Levels of independence and their meanings	Numerical codings	
Limitations on lending	Limitations on advances	<i>lla</i>	1. Advances to government prohibited	1	
			2. Advances permitted but subject to limits in terms of absolute cash amounts or to other types of relatively strict limits (e.g., up to 15% of government revenues)	0.66	
			3. Advances subject to relatively accommodative limits (e.g., advances can exceed 15% of government revenues or are specified as fractions of government expenditures)	0.33	
			4. No legal limits on advances; their quantity subject to periodic negotiations between government and CB	0	
	Limitations on securitized lending	<i>lls</i>	Specification of levels identical to those for advances		
	Who decides control of terms of lending? ^a	<i>ldc</i>	1. CB controls terms and conditions of government borrowing from it	1	
			2. Terms of CB lending specified in the law, or CB given legal authority to set these terms	0.66	
			3. Law leaves the decision about the terms of CB lending to government to negotiations between CB and executive branch	0.33	
			4. Executive branch alone decides the terms of CB lending to government and imposes them on CB	0	
	How wide is the circle of potential borrowers from CB?	<i>lwd</i>	1. Only central government can borrow from CB	1	
			2. Central and state governments as well as all political subdivisions can borrow from CB	0.66	
3. In addition to the institutions mentioned under 2 public enterprises can borrow from CB			0.33		
4. CB can lend to all of the above as well as to the private sector			0		
Type of limit when such limit exists	<i>lty</i>	1. Limit specified as an absolute cash amount	1		
		2. Limit specified as a percentage of CB capital or other liabilities	0.66		
		3. Limit specified as a percentage of government revenues	0.33		
		4. Limit specified as a percentage of government expenditures	0		
Maturity of loans	<i>lmt</i>	1. Maturity of CB loans limited to a maximum of 6 months	1		
		2. Maturity of CB loans limited to a maximum of one year	0.66		
		3. Maturity of CB loans limited to a maximum of more than one year	0.33		
		4. No legal upper bounds on the maturity of CB loans	0		
Restrictions on interest rates ^b	<i>lnt</i>	1. Interest rate on CB loans must be at market rate	1		
		2. Interest rate on CB loans to government cannot be lower than a certain floor	0.75		
		3. Interest rate on CB loans cannot exceed a certain ceiling	0.50		
		4. No explicit legal provisions regarding the interest rate on CB loans	0.25		
		5. Law stipulates no interest rate charge on government's borrowing from the CB	0		
Prohibition on lending in primary market	<i>lpm</i>	1. CB prohibited from buying government securities in primary market	1		
		2. CB not prohibited from buying government securities in primary market	0		

Sources: (1) Computerized legal data files on CB charters from the Central Banking Department at the IMF, (2) Aufricht (1961, 1967), (3) Eight European central banks (1963), and (4) Effros (1982). These sources were supplemented by updates of various laws from the IMF legal library files.

a. Terms of lending concern maturity, interest, and amount of loans subject to the relevant legal limits.
 b. The rationale for the classification of this variable is that minimum rates are likely to have been devised in order to discourage borrowing at the CB while maximum rates are probably meant to facilitate borrowing at the CB. But the requirement of a minimum rate is classified below "market rates," since minimum rates, when they exist, are usually lower than market rates.

AGGREGATE LEGAL INDEPENDENCE

Table 19.4
Ranking of central banks by average legal independence (as measured by LVAU) during the 1980s in developed countries

Country	LVAU ^a	Average yearly inflation ^b
Switzerland	0.68	3
West Germany	0.66	3
Austria	0.58	4
United States	0.51	5
Denmark	0.47	7
Canada	0.46	6
Netherlands	0.42	3
Ireland	0.39	9
Luxembourg	0.37	5
Iceland	0.36	38
Britain	0.31	7
Australia	0.31	8
France	0.28	7
Sweden	0.27	8
Finland	0.27	7
New Zealand	0.27	12
Italy	0.22	11
Spain	0.21	10
Belgium	0.19	5
Japan	0.16	3
Norway	0.14	8

a. The range of LVAU is from zero (minimal independence) to one (maximum independence).
b. Inflation is measured as the yearly geometric average during the 1980s and is rounded to the nearest full percentage.

Table 19.3
Ranking of central banks by overall legal independence (as measured by LVAU) during the 1980s

Country	LVAU ^a	Average yearly inflation ^b	Country	LVAU ^a	Average yearly inflation ^b
Switzerland	0.68	3	India	0.33	9
West Germany	0.66	3	Indonesia	0.32	10
Austria	0.58	4	Britain	0.31	7
Egypt	0.53	17	Zambia	0.31	28
Greece	0.51	19	Australia	0.31	8
United States	0.51	5	South Africa	0.30	15
Chile	0.49	21	China	0.29	8
Tanzania	0.48	31	Romania	0.29	4
Ethiopia	0.47	4	Ghana	0.28	44
Denmark	0.47	7	France	0.28	7
Canada	0.46	6	Western Samoa	0.28	8
Bahamas	0.45	6	Sweden	0.27	8
Malta	0.45	3	Singapore	0.27	3
Kenya	0.44	11	Finland	0.27	7
Argentina	0.44	319	New Zealand	0.27	12
Turkey	0.44	50	Thailand	0.26	6
Peru	0.43	194	Brazil	0.26	230
Israel	0.42	105	Nepal	0.25	11
Costa Rica	0.42	25	Bolivia	0.25	230
Netherlands	0.42	3	Hungary	0.24	9
Philippines	0.42	14	Zimbabwe	0.23	13
Nicaragua	0.42	258	South Korea	0.23	8
Honduras	0.41	7	Italy	0.22	11
Zaire	0.41	58	Uruguay	0.22	56
Barbados	0.40	7	Spain	0.21	10
Ireland	0.39	9	Pakistan	0.19	7
Venezuela	0.37	21	Belgium	0.19	5
Uganda	0.37	105	Qatar	0.18	4
Luxembourg	0.37	5	Morocco	0.16	8
Botswana	0.36	11	Japan	0.16	3
Iceland	0.36	38	Panama	0.16	3
Mexico	0.36	65	Norway	0.14	8
Malaysia	0.34	4	Yugoslavia	0.13	108
Nigeria	0.33	19	Poland	0.10	43

a. The range of LVAU is from zero (minimal independence) to one (maximum independence).
b. Inflation is measured as the yearly geometric average during the 1980s and is rounded to the nearest full percentage.

B. THE TURNOVER RATE OF CENTRAL BANK GOVERNORS (TOR)

Table 3. Turnover Rates of the Central Bank Governor, 1950-89
(average number of changes a year)

Economy	1950-89	1950-59	1960-71	1972-79	1980-89
<i>Industrial economy</i>					
Iceland	0.03	—	0.09	0.00	0.00
Netherlands	0.05	0.00	0.08	0.00	0.10
Denmark	0.05	0.10	0.08	0.00	0.00
Luxembourg	0.08	0.10	0.08	0.13	0.00
Norway	0.08	0.10	0.08	0.00	0.10
Italy	0.08	0.00	0.08	0.25	0.00
United Kingdom	0.10	0.00	0.17	0.13	0.10
Canada	0.10	0.10	0.08	0.13	0.10
Germany, Fed. Rep. of	0.10	0.10	0.08	0.13	0.10
Australia	0.10	0.00	0.08	0.13	0.20
Finland	0.13	0.20	0.08	0.00	0.20
Switzerland	0.13	0.10	0.08	0.13	0.20
Belgium	0.13	0.10	0.08	0.13	0.20
United States	0.13	0.10	0.08	0.25	0.10
Ireland	0.15	0.10	0.17	0.13	0.20
France	0.15	0.00	0.17	0.25	0.20
Sweden	0.15	0.20	0.00	0.38	0.10
New Zealand	0.15	0.00	0.17	0.13	0.30
Austria	0.15	0.10	0.17	0.25	0.10
Japan	0.20	0.20	0.17	0.13	0.30
Spain	0.20	0.20	0.25	0.25	0.10
<i>Developing economy</i>					
Qatar	0.06	—	—	0.14	0.00
South Africa	0.10	0.00	0.17	0.00	0.20
Barbados	0.11	—	—	0.13	0.10
Taiwan	0.13	0.10	0.17	0.00	0.20
Philippines	0.13	0.00	0.25	0.00	0.20
Honduras	0.13	0.11	0.00	0.38	0.10
Tanzania	0.13	—	0.18	0.13	0.10
Malaysia	0.13	—	0.08	0.00	0.20
Israel	0.14	0.20	0.08	0.13	0.20
Zimbabwe	0.15	0.27	0.17	0.13	0.10
Mexico	0.15	0.10	0.08	0.13	0.30
Kenya	0.17	—	0.36	0.00	0.20
Greece	0.18	0.10	0.08	0.38	0.20
Hungary	0.18	0.38	0.17	0.13	0.10
Lebanon	0.19	—	0.24	0.25	0.10

Table 3. (continued)

Economy	1950-89	1950-59	1960-71	1972-79	1980-89
<i>Developing economy (continued)</i>					
Nigeria	0.19	—	0.17	0.25	0.10
Bahamas, The	0.19	—	—	0.18	0.20
Morocco	0.20	—	0.25	0.00	0.20
Ethiopia	0.20	—	0.00	0.50	0.10
Colombia	0.20	0.20	0.25	0.13	0.20
Romania	0.20	0.40	0.08	0.13	0.20
Portugal	0.20	0.20	0.08	0.25	0.30
Thailand	0.20	0.40	0.08	0.25	0.10
Yugoslavia	0.23	0.30	0.17	0.25	0.20
Indonesia	0.23	0.20	0.33	0.13	0.20
Zaire	0.23	—	0.26	0.25	0.20
Nepal	0.24	0.27	0.33	0.25	0.10
Panama	0.24	—	0.56	0.00	0.20
Pakistan	0.25	0.10	0.33	0.25	0.30
Poland	0.28	0.20	0.25	0.13	0.50
Malta	0.28	—	0.27	0.38	0.20
Ghana	0.28	—	0.33	0.25	0.20
Venezuela	0.30	0.20	0.25	0.25	0.50
Egypt	0.31	0.46	0.33	0.13	0.30
India	0.33	0.20	0.33	0.50	0.30
Peru	0.33	0.30	0.33	0.38	0.30
China	0.34	—	—	—	0.30
Uganda	0.34	—	0.36	0.50	0.20
Nicaragua	0.35	—	0.29	0.38	0.40
Singapore	0.37	—	—	0.00	0.60
Zambia	0.38	—	0.38	0.25	0.50
Turkey	0.40	0.30	0.50	0.38	0.40
Botswana	0.41	—	—	0.44	0.40
Korea, Republic of	0.43	0.31	0.67	0.13	0.50
Chile	0.45	0.20	0.33	0.50	0.80
Uruguay	0.48	—	1.03	0.38	0.30
Western Samoa	0.56	—	—	—	0.56
Costa Rica	0.58	0.20	0.83	0.88	0.40
Brazil	0.68	1.01	0.50	0.38	0.80
Argentina	0.93	0.71	1.08	0.88	1.00

— Not available.

Note: Turnover rates were calculated if at least three years of data were available for the decade.

Source: Correspondence with central banks.

C. ANSWERS TO A QUESTIONNAIRE ON CBI

3. INFLATION AND CBI IN INDUSTRIAL COUNTRIES AND IN LDC-S

Table 20.2
Depreciation in the real value of money versus a weighted average of legal variables, compliance, and turnover (dependent variable: rate of depreciation in the real value of money *d*)

Explanatory variable	All countries	Developed countries	Less developed countries	Developed countries	Less developed countries
Intercept	0.22 (6.2)	0.81 (6.4)	0.24 (4.0)	0.08 (6.5)	0.11 (2.1)
<i>LVAW</i>	-0.02 (-0.3)	-0.05 (-2.0)	0.02 (0.2)		
<i>comp</i>	-0.04 (-2.7)	-0.00 (-0.3)	-0.04 (-1.7)	0.01 (-0.5)	0.02 (0.6)
<i>tor</i>				-0.12 (-2.0)	0.26 (3.6)
Dummy, 50-59	-0.11 (-3.6)	-0.03 (-2.1)	-0.14 (-2.5)	-0.03 (-2.6)	-0.13 (-2.9)
Dummy, 60-71	-0.09 (-3.9)	-0.02 (-1.7)	-0.12 (-3.4)	-0.02 (-2.1)	-0.14 (-4.0)
Dummy, 72-79	-0.03 (-1.2)	0.03 (2.4)	-0.05 (-1.4)	0.03 (2.5)	-0.04 (1.3)
\bar{R}^2	0.13	0.28	0.10	0.29	0.20
Number of observations	188	69	116	73	122

Note: *t* statistics are in parentheses under the coefficients. The coefficients are rounded to the nearest second digit after the decimal point.

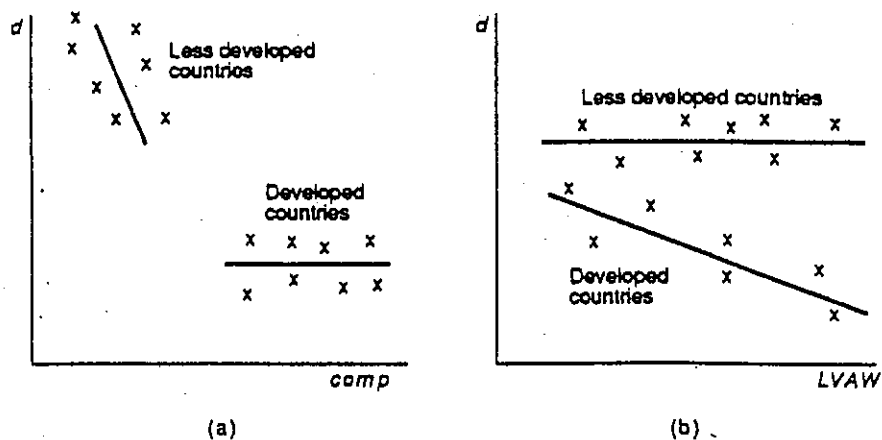


Figure 20.1
Partial relations between *d*, *LVAW*, and *comp* in developed and less developed countries

MAIN CONCLUSION: INFLATION IS NEGATIVELY RELATED TO LEGAL INDEPENDENCE WITHIN INDUSTRIAL COUNTRIES AND POSITIVELY RELATED TO CB GOVERNOR'S TURNOVER (AND NEGATIVELY RELATED TO COMPLIANCE) IN LDC-S

RANKING BY AN OVERALL INDEX OF CBI

Table 21.1
Ranking of central banks by an overall index of CB independence during the 1980s

Country ^a	d^b	d^c	$LYAU^d$	tor^e	Country ^a	d^b	d^c	$LYAU^d$	tor^e
Denmark	0.04	0.05	0.47		Bahamas	0.16	0.05	0.45	0.20
West Germany	0.05	0.02	0.66		India	0.17	0.07	0.33	0.30
United States	0.06	0.04	0.38		Zimbabwe	0.18	0.11	0.23	0.10
Canada	0.06	0.05	0.46		Egypt	0.18	0.13	0.53	0.30
Norway	0.06	0.07	0.14		Israel	0.20	0.47	0.42	0.20
Sweden	0.07	0.06	0.27		Zaire	0.20	0.34	0.41	0.20
Britain	0.07	0.05	0.31		South Africa	0.20	0.12	0.30	0.20
Australia	0.08	0.07	0.31		Indonesia	0.21	0.07	0.32	0.20
France	0.09	0.06	0.28		Costa Rica	0.23	0.19	0.42	0.40
Hungary	0.09	0.07	0.24	0.10	Nicaragua	0.25	0.67	0.42	0.40
Spain	0.10	0.08	0.21		South Korea	0.25	0.05	0.23	0.50
New Zealand	0.10	0.08	0.27		Uruguay	0.26	0.33	0.22	0.30
Iceland	0.11	0.24	0.36		Western Samoa	0.26	0.05	0.28	0.56
Greece	0.11	0.14	0.51	0.20	Zambia	0.26	0.25	0.31	0.50
Thailand	0.11	0.04	0.25	0.10	Ethiopia	0.27	0.04	0.47	0.10
Nigeria	0.12	0.16	0.33	0.10	Peru	0.27	0.64	0.43	0.30
Tanzania	0.13	0.2	0.48	0.10	Mexico	0.28	0.38	0.36	0.30
Malta	0.13	0.02	0.45	0.20	Venezuela	0.28	0.04	0.37	0.50
Kenya	0.13	0.09	0.44	0.20	Turkey	0.29	0.28	0.44	0.40
Philippines	0.14	0.11	0.42	0.20	Botswana	0.30	0.09	0.36	0.40
Barbados	0.14	0.05	0.40	0.10	Chile	0.35	0.15	0.49	0.80
Nepal	0.16	0.08	0.25	0.10	Brazil	0.36	0.68	0.26	0.80
Ghana	0.16	0.28	0.28	0.20	Argentina	0.39	0.74	0.44	1.00

a. The countries in the table are ranked from high to low overall independence by the size of d . Lower values of d indicate higher overall independence.

b. d is the predicted value of d using equation 5 in table 20.1 for LDCs and a version of equation (4) without tor for DC.

c. d is the yearly (geometric) average rate of depreciation in the real value of money during the 1980s.

d. $LYAU$ is reproduced from table 19.3.

e. tor is shown only when it is used to calculate d .

4. MEASURES OF POLITICAL INFLUENCE ON CB

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

Lag interval in months	0-1	2-3	4-6	7-9	10 or more
Frequency	0.142	0.054	0.052	0.028	0.024

TABLE 2: VALUES OF THE TEST STATISTIC FOR THE NULL
 $H_0: P_i = P_{10}$ - FULL SAMPLE

Lag Interval	0-1	2-3	4-6	7-9
	15.2	4.1	4.5	0.6

TABLE 3: FREQUENCIES OF CB GOVERNOR CHANGES AT VARIOUS LAG INTERVALS BY SUBGROUPS OF COUNTRIES^a

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

^a The basic time unit used to measure the frequency is two months.

THE POLITICAL VULNERABILITY - V - OF THE CENTRAL BANK HEAD IS DEFINED AS:

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

TABLE 4: POLITICAL VULNERABILITY OF CENTRAL BANKS BY COUNTRY GROUPS, 1950-1989^a

Country Group	Vulnerability		Frequency of Political change (per annum)
	Within 6 months	Within 1 month	
All	0.236	0.127	0.259
Industrial	0.101	0.053	0.305
LDCs	0.334	0.182	0.233
Industrial--Democratic	0.099	0.045	0.302
Industrial--Mixed	0.115	.115	0.325
LDCs--Authoritarian	0.203	0.159	0.148
LDCs--Democratic	0.276	0.103	0.162
LDCs--Mixed	0.384	0.199	0.309

^a Vulnerability is defined as the fraction of political transitions that are followed within the designated number of months (6 or 1 month) by a replacement of the CB governor.

APPENDIX TABLE A2
Political Vulnerability of Central Banks for Individual
Countries by Subgroups, 1950-1989 (*)

Country	Vulnerability (within 6 months)
<u>INDUSTRIAL-DEMOCRATIC</u>	
Sweden	0.400
Japan	0.214
Germany	0.200
Ireland	0.167
Australia	0.167
New Zealand	0.111
Finland	0.111
Netherlands	0.100
Denmark	0.091
Belgium	0.067
Austria	0.000
Norway	0.000
United Kingdom	0.000
Canada	0.000
United States	0.000
<u>INDUSTRIAL-MIXED</u>	
Spain	0.167
France	0.100
<u>LDCs-AUTHORITARIAN</u>	
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
Saire	0.000
Qatar	NA

LDCs-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

LDCs-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 political vulnerability.
NA - Not available.

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

Explanatory Variable	Dependent Variable = Vulnerability	
	0-1 lag	0-6 lag
Constant	0.087 (1.47)	0.150 (1.97)**
High level Political change	0.963 (1.66)*	1.878 (2.51)***
Authoritarian-2 Transitions	-0.162 (-0.27)	-0.423 (-0.56)
Mid-level Political change	-0.149 (-0.84)	-0.207 (-0.90)
Low level Political change	-0.057 (-0.26)	-0.142 (-0.50)
DUM Authoritarian	-0.010 (-0.13)	-0.083 (-0.89)
DUM LDC	0.110 (1.61)	0.216 (2.45)**
Number of Observations	101	101
R-square Adjusted	0.072	0.183

T-statistics in parentheses

* means significant at 10 percent level

** means significant at 5 percent level

*** means significant at 1 percent level.

MAIN CONCLUSIONS: VULNERABILITY IS HIGHER (CETERIS PARIBUS) IN LDC-S AND IN PERIODS OF CHANGE IN THE STRUCTURE OF THE REGIME (FROM DEMOCRATIC TO AUTHORITARIAN OR VICE VERSA).

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	0.033 1.16	0.013 (1.05)
Vulnerability (lag 0-6 months)	0.088 (2.27)**	0.028 (1.62)
Non-Political Turnover (lag over 6 months)	0.278 (2.64)***	0.160 (3.44)***
High level Political change	0.445 (1.72)*	0.151 (1.31)
Authoritarian-2 Transitions	0.308 (1.25)	0.084 (0.77)
Mid-level Political change	0.054 (0.72)	0.024 (0.72)
Low-level Political change	0.159 (1.75)*	0.070 (1.73)*
DUM Authoritarian	0.030 (0.94)	0.026 (1.83)*
DUM 1950-71	-0.076 (-3.55)***	00.21 (-2.29)**
DUM LDC	-0.010 (-0.31)	0.004 (0.29)
Number of obs.	97	97
R-square Adjusted.	0.336	0.336

T-statistics in parentheses

* means significant at 10 percent level or lower

** means significant at 5 percent level

*** means significant at 1 percent level.

MAIN CONCLUSION: THE HIGHER THE VULNERABILITY OF CB AND THE HIGHER NON POLITICAL TURNOVER THE HIGHER INFLATION. THE ONLY TYPE OF POLITICAL INSTABILITY THAT HAS A POSITIVE EFFECT ON INFLATION IS A REGIME CHANGE.

5. CBI, GROWTH, INVESTMENT AND INTEREST RATES

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A. GROWTH

Growth and CBI Excluding Outliers

DEPENDENT VARIABLE: Per Capita Growth Rate				
	(1) ^a	(2) ^b	(3) ^b	(4) ^b
	<i>Pooled Cross-Section</i>	<i>Time Series</i>	<i>Time Series</i>	<i>Cross-Section</i>
Constant	1.50 (1.6)	1.08 (1.3)	0.24 (0.2)	1.34* (2.3)
Initial GDP	-0.0002* (-2.3)	-0.0002* (-2.2)	-0.0001* (-1.5)	-0.0005** (-4.1)
Change in Terms of Trade	27.53** (4.9)	28.15** (5.1)	29.12** (4.6)	14.84 (1.9)
Initial Primary Education Enrollment Ratio	0.86 (0.9)	0.99 (1.1)	0.78 (0.7)	2.56** (3.4)
Initial Secondary Education Enrollment Ratio	2.09 (1.6)	2.11 (1.7)	2.40 (1.8)	3.23* (2.7)
Legal Independence			-0.81 (-0.5)	
Central Bank Governors Turnover Rate	-4.74** (-3.2)	-3.51** (-3.3)	-2.52* (-1.5)	(-2.2)
Dummy for the '60s	1.82** (3.4)	1.92** (3.6)	2.35** (4.1)	
Dummy for the '70s	1.33** (2.7)	1.39** (2.9)	1.62** (3.1)	
\bar{R}^2	0.29	0.29	0.21	0.46
$P(\rho)$	0.54	0.52	0.52	
No. of Observations	130	133	131	49

t-statistics are in parentheses under the coefficients.

$P(\rho)$ is the significance level of a first-order autoregressive coefficient from a regression of the residuals of each country in each decade on the residuals of the same country in the previous decade.

* significant at the 0.05 level.

** significant at the 0.01 level.

^a excluding Argentina, Botswana, Brazil, Korea

^b excluding Botswana, Brazil, Korea

Table 3:
Growth and CBI Within Industrial and LDCs - Panel

DEPENDENT VARIABLE: Per Capita Growth Rate	(1)	(2)	(3)
		Industrial	LDCs ^a
Constant	4.10 (1.7)	4.10 (1.7)	1.00 (0.8)
Initial GDP	-0.0003** (-2.8)	-0.0003** (-3.2)	-0.0002 (-0.9)
Change in Terms of Trade	-3.72 (-0.3)	-3.92 (-0.4)	30.45** (4.4)
Initial Primary Education Enrollment Ratio	0.07 (0.0)	0.15 (0.1)	1.13 (0.9)
Initial Secondary Education Enrollment Ratio	0.87 (0.7)	0.89 (0.7)	1.85 (0.8)
Legal Independence	-0.21 (-0.17)		
Central Bank Governors Turnover Rate		-0.80 (-0.4)	-3.58** (-2.7)
Dummy for the '60s	1.00 (1.3)	0.93 (1.2)	1.86* (2.1)
Dummy for the '70s	-0.12 (0.8)	-0.14 (-0.2)	1.58* (2.1)
\bar{R}^2	0.40	0.40	0.26
$P(\rho)$	0.01	0.01	0.77
No. of Observations	48	48	85

t-statistics are in parentheses under the coefficients.

$P(\rho)$ is the significance level of a first-order autoregressive coefficient from a regression of the residuals of each country in each decade on the residuals of the same country in the previous decade.

* significant at the 0.05 level.

** significant at the 0.01 level.

^a excluding Brazil, Botswana, and Korea.

MAIN CONCLUSION: THERE IS NO RELATION BETWEEN LEGAL INDEPENDENCE AND GROWTH. CB GOVERNORS' TURNOVER HAS A NEGATIVE (CETERIS PARIBUS) EFFECT ON GROWTH IN LDC-S.

B. RESOLUTION OF THE (POTENTIAL) SIMULTANEITY ISSUE

Table 4:
Reestimation of Growth Equations with Instrumental Variables and with
Alternative Measures of CBI^a
(Panel with a unified sample)

	(1)	(2) ^b	(3)	(4)
Constant	1.18 (1.4)	1.15 (1.3)	0.72 (0.8)	0.39 (0.5)
Initial GDP	-0.0002** (-2.9)	-0.0002** (-2.9)	-0.0002** (-2.9)	-0.0002** (-2.8)
Change in Terms of Trade	28.05** (5.1)	28.12** (5.1)	30.19** (5.3)	30.51** (5.4)
Initial Primary Education Enrollment Ratio	2.16* (2.3)	2.15* (2.3)	2.54* (2.6)	2.57* (2.6)
Initial Secondary Education Enrollment Ratio	1.29 (1.0)	1.30 (1.1)	1.32 (1.0)	1.28 (1.0)
Central Bank Governors Turnover Rate	-3.42** (-3.3)	-3.29* (-2.5)		
Nonpolitical turnover of Central Bank Governors			-2.39 (-0.7)	
Political Vulnerability of Central Bank			-1.41* (-2.2)	-1.49* (-2.3)
Dummy for the '60s	1.26* (2.4)	1.27* (2.4)	1.32* (2.4)	1.35* (2.5)
Dummy for the '70s	1.06* (2.4)	1.06* (2.4)	1.13* (2.4)	1.15* (2.5)
\bar{R}^2	0.31	0.31	0.27	0.27
No. of Observations	119	119	119	119

^a Excluding Botswana, Brazil, and Korea.

^b Instrumental variables estimation. The Central Bank Governors turnover rate is instrumented with nonpolitical turnover, the political vulnerability of the CB and all the remaining regressors.

^c Statistics are in parentheses under the coefficients.

^d * designates significance at the 0.05 level.

^e ** designates significance at the 0.01 level.

Add a discussion of
Fischer type equ.

MAIN CONCLUSION: VULNERABILITY STILL HAS A (CETERIS PARIBUS) NEGATIVE EFFECT ON GROWTH

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C. INVESTMENT AND PRODUCTIVITY GROWTH

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Table 7:
Private Investment, Productivity Growth and CBI in LDCs

	Dependent Variable: Private Investment (% of GDP)				Dependent Variable: (Solow Residuals)	
	(1)	(2)	(3) ^a	(4) ^a	(5) ^b	(6) ^b
Constant	5.23 (1.8)	4.34 (1.3)	5.67* (2.1)	7.17* (2.29)	-0.01 (-1.2)	-0.00 (-0.6)
Initial GDP	0.0008 (0.9)	0.0006 (0.6)	0.0008 (0.9)	0.001 (1.2)	-0.0000 (-0.2)	-0.0000 (-1.0)
Change in Terms of Trade	-4.65 (-0.2)	-3.08 (-0.1)	-16.88 (-0.9)	-23.19 (-1.1)	0.07 (1.3)	0.07 (1.4)
Initial Primary Education Enrollment Ratio	2.36 (0.6)	3.35 (0.8)	3.99 (0.3)	2.50 (0.7)	0.001 (0.1)	0.000 (0.0)
Initial Secondary Education Enrollment Ratio	12.30* (2.4)	12.52* (2.3)	6.09 (0.9)	4.83 (0.7)	0.03* (2.1)	0.03* (2.4)
Central Bank Governors Turnover Rate	-9.22* (-2.5)	-7.27 (-1.5)	-10.15** (-2.9)	-14.20** (-2.9)	-0.01 (-1.5)	-0.01 (-0.6)
Assassinations		-1.27 (-0.6)		2.11 (1.0)		0.00 (0.5)
Revolutions and Coups		0.41 (0.1)		0.10 (0.0)		-0.03* (-2.2)
Dummy for the '60s					0.01 (1.7)	0.01 (1.6)
Dummy for the '70s	2.99 (1.9)	3.28 (1.9)	2.15 (1.3)	1.58 (0.9)	0.01 (1.8)	0.01 (1.9)
\bar{R}^2	0.33	0.29	0.34	0.32	0.08	0.12
No. of Observations	34	34	30	30	77	77

^a Excluding Botswana, Brazil, and Korea.

^b Excluding Japan. (t-statistics are in parentheses under the coefficients.)

* designates significance at the 0.05 level.

** designates significance at the 0.01 level.

c) the Intra Country Variability of growth.

D. INTEREST RATES

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Table 8:
The Variability of Real Rates and CBI - Cross-Section

DEPENDENT VARIABLE: Standard Deviation of the Ex Post Real Deposit Rate					
	(1)	(2)	(3)	(4)	(5)
	All				
	Countries	Industrial	LDCs	Industrial	LDCs
Constant	3.16 (1.0)	-3.92** (4.4)	9.49 (1.5)	4.23** (8.2)	2.60 (0.9)
Legal Independence	-7.88 (-1.0)	-3.97* (-2.8)	-20.18 (-1.2)	-4.13** (-3.1)	
Central Bank Governors Turnover Rate	31.00** (5.55)	1.90 (0.4)	27.92** (3.19) 3		27.27** (3.4)
\bar{R}^2	0.44	0.32	0.32	0.36	0.31
No. of Observations	39	16	23	16	24

t Statistics are in parentheses under the coefficients.

* significant at the 0.05 level.

** significant at the 0.01 level.

Those findings support the conclusion of Alesina and Summers that real-rate variability is higher when CBI is lower. They also support the conclusion that the appropriate measure of CBI is legal independence for industrial countries and Central Bank Governors turnover for LDCs (Cukierman, Webb, and Neyapti (1992) and Chapter 20 of Cukierman (1992)).

Table 9:
The Variability of Nominal Rates and CBI - Cross-Section

DEPENDENT VARIABLE: Standard Deviation of Designated Nominal Rate			
	(1)	(2)	(3)
	Discount Rate	Deposit Rate	Bond Rate
Constant	225.7 (0.5)	12.2 (0.0)	1.75 (1.3)
Legal Independence	-1593.7 (-1.5)	-1518.0 (-1.2)	0.13 (0.0)
Central Bank Governors Turnover Rate	2419.7* (2.5)	3004.5** (3.8)	2.71 (0.7)
\bar{R}^2	0.11	0.20	-0.05
No. of Observations	54	57	33

t Statistics are in parentheses under the coefficients.

* significant at the 0.05 level.

** significant at the 0.01 level.

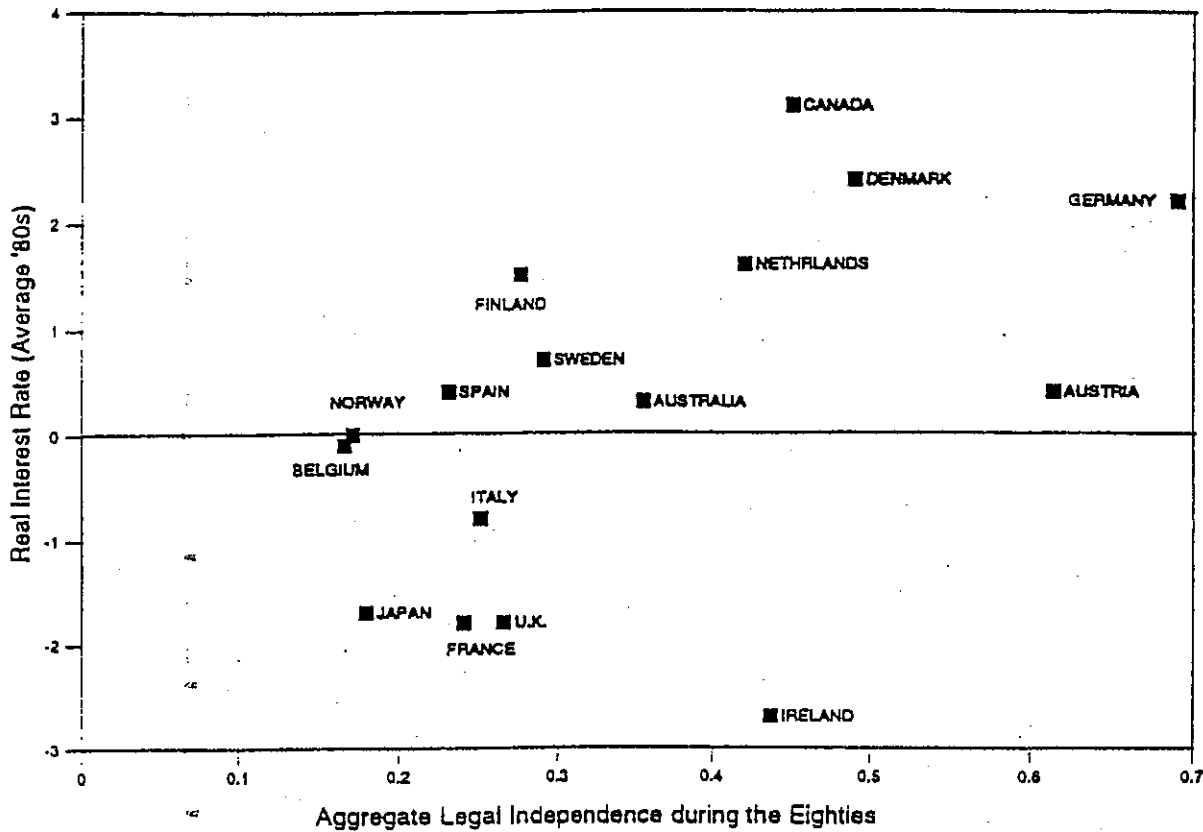


Figure 4

Average real ex post deposit rates and legal independence during the Eighties in Industrial Countries

Table 11: Real Rate Levels and CBI - Cross-Section

Dependent Variable: Mean ex post real deposit rate	Industrial	Industrial	LDCs
		(excl. Ireland)	
Constant	-1.26 (-1.3)	-1.32 [†] (-1.7)	0.84 (0.3)
Legal Independence	4.27 (1.7)	5.07** (2.4)	
Central Bank Governors Turnover Rate			-13.48* (-2.0)
\bar{R}^2	0.12	0.26	0.11
No. of Observations	16	15	24

t statistics are in parentheses under the coefficients.

* significant at the 0.07 level

** significant at the 0.03 level.

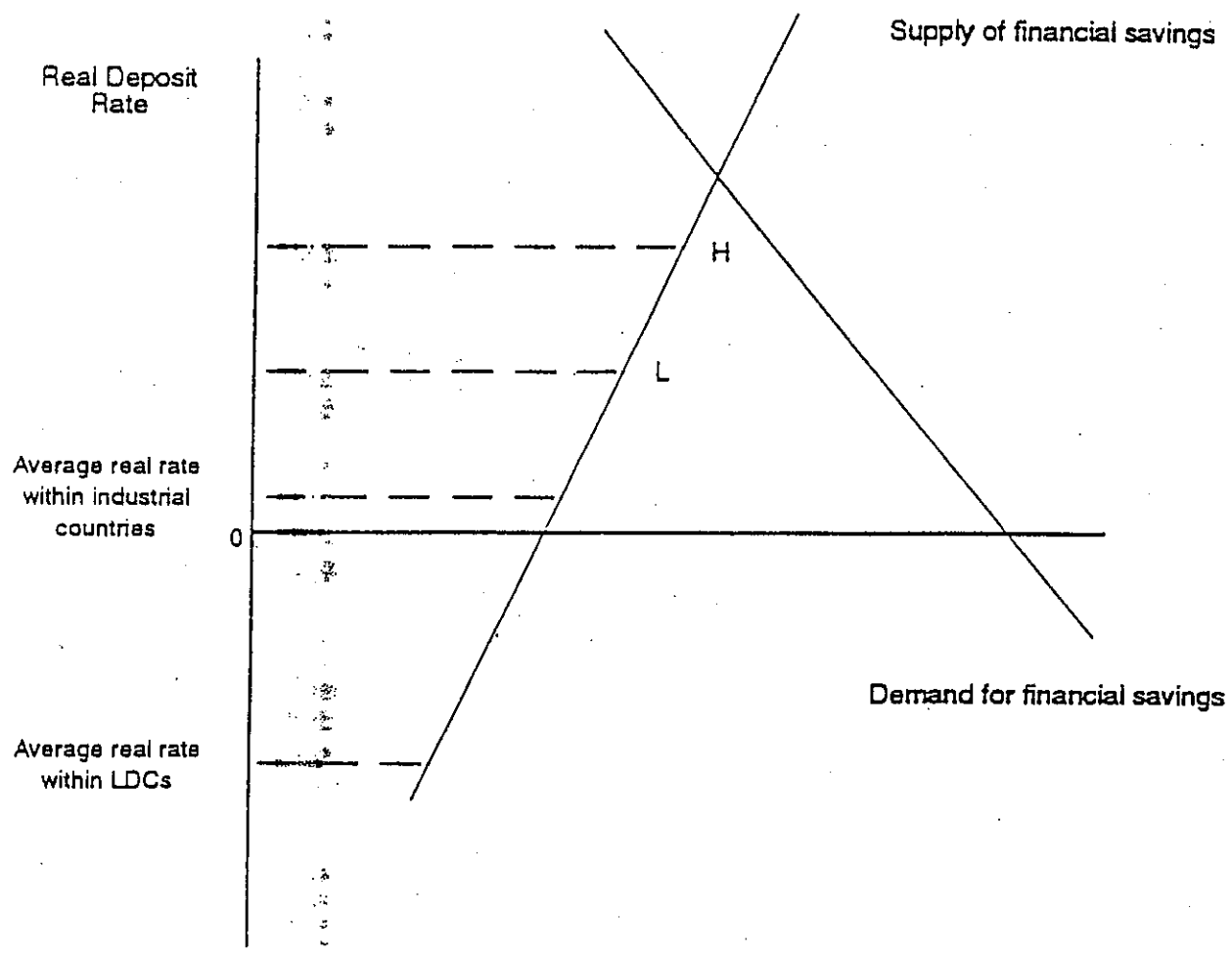


Figure 5

Central bank independence and real rates.

Central Bank Reform, Liberalization and Inflation in Transition Economies - An International Perspective

Table 1 : Aggregate Legal Independence in Transition Economies after CB Reform and Year of Introduction of a National Currency

Country	enactment year	year of introduction of national currency ^a	LVAW	LVES	LVESX
Albania	92		0.51	0.47	0.49
Armenia	93	93	0.30	0.60	0.34
Armenia	96		0.85	1.00	0.90
Azerbaijan	92	94	0.22	NA	0.42
Azerbaijan	96		0.24	NA	0.37
Belarus	92	94	0.73	0.75	0.67
Bulgaria	91		0.55	NA	0.65
Croatia	92		0.44	0.60	0.49
Czech Republic	91		0.73	0.96	0.73
Estonia	93	92	0.78	0.96	0.58
Georgia	95	93	0.73	0.68	0.62
Hungary	91		0.67	0.79	0.61
Kazakhstan	93	93	0.32	0.63	0.56
Kazakhstan	95		0.44	0.92	0.79
Kyrgyz Republic	92	93	0.52	0.55	0.55

Latvia	92	93	0.49	0.96	0.73
Lithuania	91	93	0.28	0.37	0.25
Lithuania	96		0.78	0.96	0.58
Macedonia	95		0.41	0.68	0.55
Moldova	91	93	0.38	0.84	0.54
Moldova	95	93	0.73	0.96	0.94
Mongolia	91		0.43	0.96	0.61
Mongolia	96		0.55	0.92	0.68
Poland	91		0.46	0.49	0.32
Poland ^b	97		0.89	0.92	0.95
Romania	91		0.34	0.51	
Russia ^c	93		0.43	0.47	0.41
Russia	95		0.49	0.47	0.38
Slovak Republic	92		0.62	0.92	0.73
Slovenia	91		0.63	0.72	0.52
Tajikistan	93	95	0.36	NA	0.29
Turkmenistan	92	93	0.26	0.25	0.19
Ukraine ^d	91 ^e	93	0.42	NA	NA
Uzbekistan	92 ^e	94	0.41	NA	0.71

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Uzbekistan	95	0.56	0.92	0.92
Average		0.51	0.73	0.57

Countries with two CB reforms - averages:

First law	0.36	0.62	0.46
Second law	0.62	0.88	0.72

Notes to Table 1:

^a For obvious reasons this year is shown only for countries that used to be part of the former Soviet Union. The source of the information for this column is: Transition Report, EBRD, various issues.

^b All the limitation on lending variables underlying the 1997 aggregate index for the Bank of Poland are set to 1.00 because the 1997 Polish constitution prohibits government from borrowing at the CB. Further details and discussion appear in the second footnote to table A1 in the appendix, in Wojtyna (1997) and in Huterski et. al. (1999).

^c The first Russian central bank law was passed on December 90 but apparently was applied only at the end of 92 and was amended in 93. In view of this, and since a new currency was introduced in July of 93 we picked 93 as the year in which the first Russian central bank law became effective. See also note number 4 in table A1 of the Appendix.

^d The narrower indices of legal independence for Ukraine are not shown in line with our rule not to display an aggregate index when the sum of weights of the constituent legal variables for which there is a meaningful entry is less than 0.7. As can be seen from Appendix table A1 data on some of the legal variables in Ukraine is available. Had we calculated narrow aggregate indices from this small set of legal variables we would have obtained indices showing a non negligible level of legal independence.

^e Tentative date.

Table 2 : A Comparison of the New Legal Independence in Transition Economies and in Developed Economies During the Eighties

A. Ranked by LVAW^a

Country	LVAW	Country	LVAW	Country	LVAW
Poland	0.89	Bulgaria	0.55	Iceland	0.34
Armenia	0.85	Kyrgyz Republic	0.52	Romania	0.34
Estonia	0.78	Albania	0.51	Luxembourg	0.33
Lithuania	0.78	Denmark	0.50	Sweden	0.29
Georgia	0.73	Latvia	0.49	Finland	0.28
Moldova	0.73	Russia	0.49	UK	0.27
Belarus	0.73	USA	0.48	Turkmenistan	0.26
Czech Republic	0.73	Canada	0.45	Azerbaijan	0.25
Germany	0.69	Croatia	0.44	Italy	0.25
Hungary	0.67	Ireland	0.44	France	0.24
Switzerland	0.64	Kazakhstan	0.44	New - Zealand	0.24
Slovenia	0.63	Netherlands	0.42	Spain	0.23
Slovak Republic	0.62	Ukraine	0.42	Japan	0.18
Austria	0.61	Macedonia	0.41	Belgium	0.17
Uzbekistan	0.56	Australia	0.36	Norway	0.17
Mongolia	0.55	Tajikistan	0.36		

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Table 2 : Continued

B. Ranked by LVES^a

Country	LVES	Country	LVES	Country	LVES
Armenia	1.00	Macedonia	0.68	Turkmenistan	0.25
Estonia	0.96	Croatia	0.60	Norway	0.21
Latvia	0.96	Kyrgyz Republic	0.55	Finland	0.16
Lithuania	0.96	Denmark	0.52	Ireland	0.16
Moldova	0.96	Romania	0.51	USA	0.16
Czech Republic	0.96	France	0.51	Belgium	0.08
Poland	0.92	Russia	0.47	New -Zealand	0.08
Kazakhstan	0.92	Albania	0.47	Italy	0.04
Mongolia	0.92	Switzerland	0.40	Sweden	0.04
Slovak Republic	0.92	Netherlands	0.37	UK	0.04
Germany	0.87	Australia	0.29	Azerbaijan	NA
Hungary	0.79	Iceland	0.29	Tajikistan	NA
Austria	0.76	Japan	0.27	Ukraine	NA
Belarus	0.75	Canada	0.25	Uzbekistan	NA
Slovenia	0.72	Luxembourg	0.25	Bulgaria	NA
Georgia	0.68	Spain	0.25		

^a In countries with two CB reforms the latest of the two laws is used.

NA means that there is not enough information to calculate the index. We followed the rule of not reporting an aggregate index whenever information on more than 30 percent of the (weighted) constituent components was missing.

Table 3 : Inflation, CBI, liberalization, wars, decontrols of domestic prices and currency boards without and with a zero constraint on the effect of CBI on inflation for CLI < 3.0^a

Dependent variable : D

Regressors :

	Without a zero constraint			With a zero constraint		
CLI	-0.13 (0.00)	-0.12 (0.00)	-0.12 (0.00)	-0.05 (0.16)	-0.03 (0.28)	-0.05 (0.11)
I	0.36 (0.01)	0.43 (0.01)	0.42 (0.01)	0.31 (0.02)	0.32 (0.01)	0.32 (0.01)
WD	0.15 (0.01)	0.15 (0.01)	0.14 (0.02)	0.12 (0.03)	0.13 (0.02)	0.12 (0.03)
LVAW	0.19 (0.27)			-0.47 (0.00)		
LVES		0.00 (0.97)			-0.45 (0.00)	
LVESX			-0.00 (0.98)			-0.41 (0.00)
DCB	-0.06 (0.67)	-0.02 (0.90)	-0.03 (0.83)	0.06 (0.66)	0.07 (0.57)	-0.05 (0.67)
Intercept	0.39 (0.00)	0.38 (0.00)	0.37 (0.00)	0.39 (0.00)	0.37 (0.00)	0.39 (0.00)
Adj. R- sq	0.41	0.43	0.40	0.50	0.57	0.50
Number of observations	56	56	60	56	56	60

^aNumbers in parenthesis under the coefficients are levels of significance.

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APPENDIX

Table A1: Codings of the components of aggregate indices of legal central bank independence

Country	Year of Enactment of Central Bank Law	CEO			Policy Formulation		Objectives		Limitations on lending					Primary market			
		Term of office	Who appointed	Dis-missal	Other offices	Who formulated	Final authority	Role in budget	Advances	Securitized lending	Terms of lending	Potential borrowers	Type of limit		Maturity of loans	Interest rates	
Albania	1992	0.75	0.75	0.83	0.50	0.67	0.20	NA	0.60	0.33	0.67	0.33	NA	0.33	1.00	0.75	0.00
Armenia	1993	0.75	0.50	0.00	1.00	1.00	0.20	0.00	0.60	0.00	0.33	0.00	0.00	0.33	0.00	0.25	0.00
Azerbaijan	1996	0.75	0.50	0.83	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	0.33	0.67	1.00	1.00
	1992	NA	0.50	0.33	0.00	0.33	NA	0.00	0.60	0.00	0.00	0.00	NA	NA	1.00	0.25	0.00
	1996	0.50	0.00	0.17	1.00	0.67	NA	0.00	0.40	0.00	0.00	0.33	0.33	NA	0.00	0.25	0.00
Belarus	1992	0.75	0.50	1.00	1.00	0.67	0.80	1.00	0.80	1.00	0.33	0.67	0.33	0.00	1.00	0.25	1.00
Bulgaria	1991	0.50	0.50	0.83	1.00	0.67	NA	NA	0.60	0.67	0.00	0.33	NA	0.33	1.00	0.25	1.00
Croatia	1992	0.75	0.50	0.33	0.00	1.00	0.20	0.00	0.60	0.67	0.00	0.67	NA	0.33	0.67	0.25	0.00
Czech Republic	1991	0.75	0.50	0.83	1.00	1.00	1.00	NA	0.80	0.67	0.67	0.67	NA	0.33	1.00	0.25	0.00
Estonia	1993	0.50	0.50	0.63	1.00	1.00	1.00	1.00	0.80	1.00	1.00	1.00	NA	NA	NA	NA	0.00
Georgia	1995	0.75	0.50	0.83	1.00	1.00	0.40	1.00	0.60	1.00	0.67	0.67	1.00	0.33	1.00	0.75	0.00
Hungary	1991	0.75	0.50	0.83	1.00	0.67	1.00	1.00	0.60	0.67	NA	0.33	1.00	0.33	0.33	0.75	0.00
Kazakhstan	1993	0.75	0.50	0.33	0.00	0.67	0.60	0.00	0.60	0.00	0.00	0.33	0.00	NA	0.67	0.75	0.00
	1995	0.75	0.50	0.33	1.00	1.00	1.00	0.00	0.60	0.00	0.00	0.33	0.33	NA	0.00	0.75	1.00
Kyrgyz Republic	1992	0.50	0.50	0.83	1.00	0.67	0.40	1.00	0.60	0.33	0.00	0.67	NA	0.00	1.00	0.25	1.00
Latvia	1992	0.75	0.50	0.33	1.00	1.00	1.00	0.00	0.80	0.00	0.00	0.67	NA	0.33	1.00	0.25	0.00
Lithuania	1991	NA	0.50	1.00	0.00	0.33	0.40	0.00	0.40	0.00	0.33	0.00	0.67	0.00	0.00	0.25	0.00
Macedonia	1996	0.50	0.50	0.83	1.00	1.00	1.00	1.00	0.80	1.00	1.00	1.00	NA	NA	NA	NA	0.00
Moldova	1995	0.75	0.50	0.83	0.00	1.00	0.40	0.00	0.60	0.00	0.00	0.33	0.67	0.00	0.67	0.75	0.00
	1991	0.75	0.50	0.83	1.00	1.00	0.80	0.00	0.60	0.00	0.00	0.33	0.00	NA	0.00	0.25	0.00
	1995	0.75	0.50	0.63	1.00	1.00	1.00	1.00	0.80	1.00	0.00	0.33	0.67	NA	1.00	0.75	1.00
Mongolia	1991	0.50	0.50	1.00	0.00	1.00	1.00	0.00	0.80	0.00	0.00	0.67	NA	NA	0.00	0.25	0.00
	1996	0.75	0.50	0.50	1.00	1.00	1.00	0.00	0.60	0.67	0.00	0.67	0.33	0.33	0.67	0.25	0.00
Poland	1991	0.75	0.50	0.83	1.00	0.33	0.60	1.00	0.60	0.00	0.67	0.33	0.33	0.00	0.00	0.25	0.00
	1997	0.75	0.50	0.83	1.00	1.00	1.00	1.00	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Romania	1991	0.00	0.50	0.33	1.00	0.67	0.40	0.00	0.40	0.33	0.00	0.33	NA	0.00	0.00	0.25	0.00
Russia	1993	0.50	0.50	0.33	0.00	0.67	0.20	0.00	0.60	1.00	0.00	0.33	NA	0.00	1.00	0.25	0.00
	1995	0.25	0.50	0.83	1.00	0.67	0.20	1.00	0.60	1.00	0.00	0.00	0.33	NA	0.00	0.75	0.00
Slovak Republic	1992	0.75	0.50	0.67	1.00	1.00	1.00	0.00	0.60	0.67	0.67	0.67	0.00	0.33	1.00	NA	0.00
Slovenia	1991	0.75	0.50	1.00	1.00	1.00	0.40	NA	0.80	0.67	0.67	1.00	NA	0.00	0.67	0.25	0.00
Tajikistan	1993	NA	0.50	0.50	0.00	0.67	NA	1.00	0.60	0.00	0.00	0.33	0.67	NA	0.00	0.25	0.00
Turkmenistan	1992	NA	0.50	1.00	0.50	0.33	0.00	0.00	0.60	0.00	0.00	0.00	0.33	NA	0.00	0.25	0.00
Ukraine	1991	NA	0.50	NA	NA	0.67	NA	1.00	0.60	0.00	0.00	NA	NA	NA	NA	NA	NA
	1992	0.25	0.50	0.50	1.00	0.67	NA	1.00	0.60	0.00	0.67	0.00	0.33	0.33	1.00	0.75	1.00
Uzbekistan	1995	0.25	0.50	0.83	0.00	1.00	1.00	1.00	0.60	1.00	0.00	0.00	0.00	NA	1.00	0.75	1.00

Notes:

1. A detailed description of the 16 legal variables in the table appears in Table 1 of Cukierman, Webb and Neyapti, (1992, pp. 358-9) or Table 19.1 of Cukierman (1992, pp. 373-6).
2. Although the 1997 charter of the Bank of Poland does not contain any reference to limitations on lending to government we assigned the maximum value of 1.00 to all the limitations on lending variables for Poland in 1997. The reason is that article 220-2 in the chapter on Public Finances (Chapter X) of the April, 2, 1997 constitution of the Republic of Poland states that: "The budget shall not provide for covering a budget deficit by way of contracting credit obligations to the State's central bank".
3. The dates of enactment of the CB law in Ukraine and of the first law in Uzbekistan are tentative.
4. The first Russian CB law was passed in December 1990, apparently came into force only at the end of 1992, was followed by the introduction of a new currency in mid 1993 and by the collapse of the Ruble zone at the end of 1993. In view of those gyrations we settled on 1993 as the year of enactment of the first Russian CB law. Unlike other CB charters the first Russian CB law was not translated into English by the IMF. The codings of this charter rely on a translation of relevant parts of this law from Russian by Daniel Treisman.

Table A2: Yearly Inflation Rates and Rates of Depreciation in the Real Value of Money (D), 1989-98

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	Inflation -- period averages in percentages (100F)										D										
Albania	0	0	36	226	85	23	7.8	12.7	32.1	20.6	0.00	0.00	0.26	0.69	0.46	0.19	0.07	0.11	0.24	0.17	0.10
Armenia	0	10.3	100	1346	3500	5273	176.7	18.7	14	6.7	0.00	0.09	0.50	0.93	0.97	0.98	0.64	0.16	0.12	0.06	0.06
Azerbaijan	0	7.8	107	912	1129	1664	411.7	19.7	8.4	-0.8	0.00	0.07	0.52	0.90	0.92	0.94	0.80	0.16	0.08	-0.01	0.08
Belarus	1.7	4.5	83.5	971	1187	2200	709.3	53	63.9	77	0.02	0.04	0.46	0.91	0.92	0.96	0.88	0.35	0.39	0.44	0.35
Bulgaria	6	22	333.5	82	73	96.3	62.1	123	1082	22	0.06	0.18	0.77	0.45	0.42	0.49	0.38	0.55	0.92	0.18	0.05
Croatia	2520.5	135.6	123	665.5	1517.5	97.6	2	3.5	3.6	5.7	0.96	0.58	0.55	0.87	0.94	0.49	0.02	0.03	0.03	0.03	0.05
Czech Rep.	2.3	10.8	56.6	11.1	20.8	10	9.1	8.8	8.5	10.7	0.02	0.10	0.36	0.10	0.17	0.09	0.08	0.08	0.08	0.10	0.10
Estonia	6.1	23	210.5	1076	89.8	48	29	23	11	10.6	0.06	0.19	0.68	0.91	0.47	0.32	0.22	0.19	0.10	0.10	0.10
Georgia	0	3.3	79	887	3125	15607	162.7	39.4	7.3	3.7	0.00	0.03	0.44	0.90	0.97	0.99	0.62	0.28	0.07	0.04	0.04
Hungary	17	28.9	35	23	22.5	18.8	28.2	23.6	18.3	14.3	0.15	0.22	0.26	0.19	0.18	0.16	0.22	0.19	0.15	0.13	0.13
Kazakhstan	0	4.2	79	1381	1662	1892	176	39.1	17.4	7.3	0.00	0.04	0.44	0.93	0.94	0.95	0.64	0.28	0.15	0.07	0.07
Kyrgyz Rep.	0	3	85	855	772	229	52.5	30.4	25.5	13	0.00	0.03	0.46	0.90	0.89	0.70	0.34	0.23	0.20	0.12	0.12
Latvia	4.7	10.5	172	951	108	36	25	17.6	8.4	4.7	0.04	0.10	0.63	0.90	0.52	0.26	0.20	0.15	0.08	0.04	0.04
Lithuania	2.1	8.4	224.7	1020.5	410.4	72.1	39.5	24.7	8.9	5.1	0.02	0.08	0.69	0.91	0.80	0.42	0.28	0.20	0.08	0.05	0.05
Macedonia	1246	120.5	229.7	1664.4	338.4	126.5	16.4	2.5	1.8	0.6	0.93	0.55	0.70	0.94	0.77	0.56	0.14	0.02	0.02	0.01	0.01
Moldova	0	4.2	98	1276.4	788.5	330	30	23.5	11.8	8	0.00	0.04	0.49	0.93	0.89	0.77	0.23	0.19	0.11	0.07	0.07
Mongolia	0	0	208.6	321	183	145	56.8	NA	NA	NA	0.00	0.00	0.68	0.76	0.65	0.59	0.36	NA	NA	NA	NA
Poland	251	585.8	70.3	43	35.3	32.2	27.8	19.9	14.9	11.8	0.72	0.85	0.41	0.30	0.26	0.24	0.22	0.17	0.13	0.11	0.11
Romania	1.1	5.1	161	210.4	256	136.7	32.3	38.8	154.8	59.2	0.01	0.05	0.62	0.68	0.72	0.58	0.24	0.28	0.61	0.37	0.37
Russia	2.2	5.6	93	1526	875	311.4	197.7	47.7	14.7	27.8	0.02	0.05	0.48	0.94	0.90	0.76	0.66	0.32	0.13	0.22	0.22
Slovak Rep.	0	10.8	61.2	10.1	23.2	13.4	9.9	5.8	6.1	6.7	0.00	0.10	0.38	0.09	0.19	0.12	0.09	0.05	0.06	0.06	0.06
Slovenia	1306	550	117.7	207.3	32.9	21	13.5	9.9	8.4	8	0.93	0.85	0.54	0.67	0.25	0.17	0.12	0.09	0.08	0.07	0.07
Tajikistan	0	4	112	1157	2195	350	609	418	87.8	43.1	0.00	0.04	0.53	0.92	0.96	0.78	0.86	0.81	0.47	0.30	0.30
Turkmenistan	2.1	4.6	103	492.9	3102	1748	1005	992	83.7	17	0.02	0.04	0.51	0.83	0.97	0.95	0.91	0.91	0.46	0.15	0.15
Ukraine	2	4	91	1210	4735	891	377	80	16	11	0.02	0.04	0.48	0.92	0.98	0.90	0.79	0.44	0.14	0.10	0.10
Uzbekistan	0.7	3.1	82.2	645	534	1568	305	54	72	34	0.01	0.03	0.45	0.87	0.84	0.94	0.75	0.35	0.42	0.25	0.25

SOURCES: 1. EBRD, Transition Report Update 1999.

2. de Melo et al. (1996).

D is the rate of depreciation in the real value of money. It is calculated from the relation $D=F/(1+F)$ where F is the yearly average rate of inflation in decimals.

The inflation data from 1992 and on is from the 1999 EBRD Transition Report Update (the figures for 1998 are estimates as of July 1999).

The data for 1989 and 1990 are from de Melo et al. Except for Armenia, Belarus and FYR Macedonia, whose data are from de Melo et al., the data for 1991 are from the EBRD (1999).

Data for Mongolia for all years are from de Melo et al.

Table A3: Cumulative Liberalization Index, CLI (*)

Country	1989	1990	1991	1992	1993	1994	1995	1996	1997
Albania	0	0	0.24	0.9	1.6	2.3	3.04	3.78	4.56
Armenia	0.04	0.08	0.21	0.6	1.02	1.44	1.93	2.65	3.37
Azerbaijan	0.04	0.08	0.12	0.37	0.68	1.03	1.47	2.02	2.64
Belarus	0.04	0.08	0.18	0.38	0.71	1.07	1.55	2.03	2.54
Bulgaria	0.13	0.32	0.94	1.6	2.26	2.9	3.48	4.13	4.92
Croatia	0.41	1.03	1.65	2.37	3.16	3.98	4.83	5.68	6.53
Czech Republic	0	0.16	0.95	1.84	2.74	3.64	4.57	5.5	6.43
Estonia	0.07	0.27	0.59	1.23	2.04	2.93	3.86	4.79	5.72
Georgia	0.04	0.08	0.3	0.62	0.97	1.36	1.85	2.54	3.26
Hungary	0.34	0.91	1.65	2.43	3.25	4.11	5.01	5.91	6.84
Kazakistan	0.04	0.08	0.22	0.57	0.92	1.31	1.92	2.64	3.39
Kyrgyz Republic	0.04	0.08	0.12	0.45	1.05	1.81	2.63	3.49	4.35
Latvia	0.04	0.17	0.46	0.97	1.64	2.45	3.26	4.11	5
Lithuania	0.04	0.17	0.5	1.05	1.83	2.72	3.61	4.5	5.39
Macedonia	0.41	1.03	1.68	2.36	3.14	3.92	4.7	5.52	6.34
Moldova	0.04	0.08	0.18	0.56	1.07	1.62	2.3	3.05	3.8
Mongolia	0	0	0.44	0.99	1.6	2.27	2.94	3.61	4.44
Poland	0.24	0.92	1.64	2.46	3.28	4.14	5.03	5.92	6.81
Romania	0	0.22	0.58	1.03	1.61	2.29	3	3.72	4.47
Russia	0.04	0.08	0.18	0.67	1.26	1.92	2.69	3.49	4.32
Slovak Republic	0	0.16	0.95	1.81	2.64	3.47	4.33	5.19	6.05
Slovenia	0.41	1.03	1.74	2.52	3.34	4.16	5.01	5.88	6.77
Tajikistan	0.04	0.08	0.19	0.39	0.65	0.95	1.34	1.76	2.21
Turkmenistan	0.04	0.08	0.12	0.25	0.41	0.63	0.85	1.17	1.53
Ukraine	0.04	0.08	0.18	0.41	0.54	0.8	1.31	1.9	2.55
Uzbekistan	0.04	0.08	0.12	0.38	0.68	1.11	1.69	2.26	2.83

(*) CLI is composed of the cumulative degrees of liberalization in internal and external markets and private sector entry, with weights of 0.3, 0.3 and 0.4, respectively.

Sources: Till 1995: de Melo et al.(1996); 1996-97: update provided by Cevdet Denizer, World Bank, in July 1999.

Table A4: Panel Data for 3 Subperiods

Country	PERIOD	D	LVAW	LVES	LVESX	CLI	WD	I
Albania	1	0.24	0.00	0.00	0.00	0.12	0.00	0.10
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.21	0.51	0.47	0.49	3.41	0.00	0.90
Armenia	1	0.50	0.00	0.00	0.00	0.21	1.00	0.20
	2	0.59	0.30	0.60	0.34	1.93	1.00	0.70
	3	0.09	0.85	1.00	0.90	3.37	0.00	0.80
Azerbaijan	1	0.48	0.00	0.00	0.00	0.12	1.00	0.00
	2	0.94	0.43	0.47	0.41	1.03	1.00	0.70
	3	0.26	0.24	NA	0.37	2.33	0.00	0.75
Belarus	1	0.47	0.00	0.00	0.00	0.18	0.00	0.1
	2	0.96	0.43	0.47	0.41	1.07	0.00	0.4
	3	0.51	0.73	0.75	0.67	2.285	0.00	0.75
Bulgaria	1	0.34	0.00	0.00	0.00	0.32	0.00	0.00
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.48	0.55	NA	0.65	3.48	0.00	0.60
Croatia	1	0.74	0.15	0.16	0.13	1.34	1.00	0.70
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.26	0.44	0.60	0.49	5.26	1.00	0.90
Czech Republic	1	0.16	0.00	0.00	0.00	0.16	0.00	0.00
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.10	0.73	0.96	0.73	4.57	0.00	0.90
Estonia	1	0.46	0.00	0.00	0.00	0.59	0.00	0.50
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.19	0.78	0.96	0.58	4.79	0.00	0.90
Georgia	1	0.47	0.00	0.00	0.00	0.3	1.00	0.3
	2	0.81	0.00	0.00	0.00	1.605	NA	0.65
	3	0.13	0.73	0.68	0.62	3.26	0.00	0.8
Hungary	1	0.21	0.24	0.21	0.39	0.91	0.00	0.80
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.17	0.67	0.79	0.61	5.01	0.00	0.90
Kazakstan	1	0.47	0.00	0.00	0.00	0.22	0.00	0.10
	2	0.79	0.32	0.63	0.56	1.62	0.00	0.65
	3	0.17	0.44	0.92	0.79	3.39	0.00	0.80
Kyrgyz Republic	1	0.45	0.00	0.00	0.00	0.12	0.00	0.00
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.32	0.52	0.55	0.55	3.49	0.00	0.80
Latvia	1	0.44	0.00	0.00	0.00	0.46	0.00	0.50
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.15	0.49	0.96	0.73	4.11	0.00	0.90
Lithuania	1	0.50	0.00	0.00	0.00	0.50	0.00	0.50
	2	0.30	0.28	0.37	0.25	3.61	0.00	0.90
	3	0.07	0.78	0.96	0.58	5.39	0.00	0.90
Macedonia	1	0.65	0.15	0.16	0.13	2.36	0.00	0.80
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.02	0.41	0.68	0.55	6.34	0.00	0.90
Moldova	1	0.47	0.00	0.00	0.00	0.18	1.00	0.10
	2	0.50	0.38	0.84	0.54	1.96	1.00	0.75
	3	0.12	0.73	0.96	0.94	3.80	0.00	0.80
Mongolia	1	0.23	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.59	0.43	0.96	0.61	2.27	0.00	0.70
	3	NA	0.55	0.92	0.68	4.44	0.00	0.80

Country	PERIOD	D	LVAW	LVES	LVESX	CLI	WD	I
Poland	1	0.66	0.10	0.27	0.19	0.92	0.00	0.70
	2	0.22	0.46	0.49	0.32	4.59	0.00	0.90
	3	0.11	0.89	0.92	0.95	NA	0.00	NA
Romania	1	0.23	0.23	0.76	0.76	0.22	0.00	0.50
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.50	0.34	0.51	0.32	3.00	0.00	0.80
Russia	1	0.48	0	0	0	0.18	0.00	0.1
	2	0.71	0.43	0.47	0.41	2.305	0.00	0.7
	3	0.22	0.49	0.47	0.38	4.32	0.00	0.80
Slovak Republic	1	0.14	0.00	0.00	0.00	0.56	0.00	0.45
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.10	0.62	0.92	0.73	4.76	0.00	0.90
Slovenia	1	0.77	0.15	0.16	0.13	1.03	1.00	0.70
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.21	0.63	0.72	0.52	5.01	0.00	0.90
Tajikistan	1	0.49	0	0	0	0.19	1.00	0.1
	2	0.82	0.43	0.47	0.41	1.145	1.00	0.55
	3	0.53	0.36	NA	0.29	2.21	1.00	0.7
Turkmenistan	1	0.47	0.00	0.00	0.00	0.12	0.00	0.00
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.67	0.26	0.25	0.19	1.17	0.00	0.50
Ukraine	1	0.49	0.00	0.00	0.00	0.18	0.00	0.10
	2	NA	NA	NA	NA	NA	NA	NA
	3	0.47	0.42	NA	NA	1.90	0.00	0.70
Uzbekistan	1	0.52	0.07	0.08	0.07	0.25	0.00	0.2
	2	0.75	0.41	NA	0.71	1.69	0.00	0.70
	3	0.34	0.56	0.92	0.92	2.83	0.00	0.6

Notes:

- a. Period 1 starts in 1989. For non-former Soviet Union countries It ends in the year of enactment of the first central bank law. For former Soviet Union countries the last year of period 1 is the latest of the year of enactment of the first central bank law and the year of replacement of the Ruble by a domestic currency.
 Period 2 is the period after the enactment of the first central bank law including the year of enactment of the second central bank law, if there is such a law.
 Period 3 covers all the years following the enactment of the last central bank law, up to and including 1998. A consequence of this classification is that in former Soviet Union countries in which the Ruble continued to circulate after the enactment of the first CB law there may be three periods even if the country had only one CB reform. Even if the country had two reforms, the second period may differ from the period between the two laws.
- b. D is the average rate of depreciation in the real value of money within each subperiod.
- c. CLI is the value of the cumulative liberalization index in the middle of each subperiod.
 If the number of years in a subperiod is odd, CLI is the value at the median year in that subperiod. If the number of years in a subperiod is even, CLI is the average of the values in the two middle years.
 Since the data for 1998 is unavailable, CLI for the third period of countries whose CB enactment year was 1996 (Armenia, Azerbaijan, Lithuania and Mongolia) is the value of CLI in 1997.
- d. WD is a war dummy which assumes a value of one in periods (1, 2 or 3) in which the country was at war for more than half of the period, and zero otherwise.
- e. I is the value of the de Melo et. al. (1996) index of liberalization of internal prices in the median year(s) of each subperiod.
- f. LVAW, LVES and LVESX are alternative proxies for aggregate legal CBI. Details appear at the beginning of section 2.