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THE WORLD BANK ECONOMIC REVIEW, VOL. 6, NO. 3: 353-398

Measuring the Independence of Central Banks and Its Effect on Policy Outcomes

Alex Cukierman, Steven B. Webb, and Bilin Neyapti

Making the central bank an agency with the mandate and reputation for maintaining price stability is a means by which a government can choose the strength of its commitment to price stability. This article develops four measures of central bank independence and explores their relation with inflation outcomes. An aggregate legal index is developed for four decades in 72 countries. Three indicators of actual independence are developed: the rate of turnover of central bank governors, an index based on a questionnaire answered by specialists in 23 countries, and an aggregation of the legal index and the rate of turnover.

Legal independence is inversely related to inflation in industrial, but not in developing, countries. In developing countries the actual frequency of change of the chief executive officer of the bank is a better proxy for central bank independence. An inflation-based index of overall central bank independence contributes significantly to explaining cross-country variations in the rate of inflation.

"Willpower is trying hard not *to do something that you really want to do," said Frog.*

"You mean like trying not *to eat all these cookies," asked Toad.*

"Right," said Frog. He put the cookies in a box. "There, now we will not eat any more cookies."

"But we can open the box," said Toad.

"That is true," said Frog. He tied some string around the box. He got a ladder and put the box up on a high shelf. "There, now we will not eat any more cookies."

"But we can climb the ladder . . . ." (Lobel 1972)

Institutions cannot absolutely prevent an undesirable outcome, nor ensure a desirable one, but the way that they allocate decisionmaking authority within the public sector makes some policy outcomes more probable and others less likely. An important example of this principle concerns the balance of authority between the central bank and the executive and legislative branches of government. Economists and practitioners in the area of monetary policy generally

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believe that the degree of independence of the central bank from other parts of government affects the rates of expansion of money and credit and, through them, important macroeconomic variables, such as inflation and the size of the budget deficit.

Ultimately, the central bank's authority and scope of action depends on the government. But governments often pass laws and follow customs that grant their central banks authority and autonomy to pursue price stability, even when it conflicts with other government objectives. Making the central bank an agency with the mandate and reputation for maintaining price stability benefits the economy and the government itself in various ways. Central bank independence is one of the means by which a government can choose the strength of its commitment to price stability (Cukierman 1992a, chap. 23, and 1992b; Lohmann 1992). A vast literature discusses the costs of inflation (see Fischer [1986] for a survey); the central bank's pursuit of price stability can help reduce these costs. Price stability is also necessary, although far from sufficient, for developing a local capital market where both government and businesses can borrow more conveniently and cheaply in the long run. International financing, such as for the countries recovering from hyperinflation in the 1920s, has often been conditional on the central bank's mandate and authority to pursue the stability of prices and exchange rates.

Pursuing price stability necessarily competes at least some of the time with other tasks that central banks can and often do perform—such as managing the government's financial transactions, financing the government's deficits with money issue, financing development projects, and bailing out insolvent businesses, including banks and publicly owned enterprises. Although most governments recognize the long-run benefit of price stability, other goals often loom larger in the short run. Assuring price stability, therefore, usually requires ensuring that the central bank is not forced to perform these functions, at least not when they would cause inflation. Sometimes the government or the treasury takes direct responsibility for limiting the demands on a subservient central bank. Even in these cases, but especially in the more typical case where the government has strong tendencies to focus on issues other than price stability, central bank independence and an explicit mandate to pursue price stability are generally regarded as important institutional devices for ensuring price stability.

This belief has eluded comprehensive verification in the past because of the difficulties in measuring the autonomy of central banks independently from

Many individuals helped assemble the data for this study. Particular thanks are due to Walter Wasserfallen, Herman-Josef Dudler, John Flemming, D. Hiss, Wolfgang Schill, Marc-Olivier Strauss-Kahn, Ann Johannessen, and those who answered the questionnaire. The authors also received useful comments from James Alt, Tomas Balino, Edgardo Barandiaran, Paul Beckerman, Mario Blejer, Michael Bruno, Gerald Caprio, Max Corden, Andrew Crockett, Jose de Gregorio, Patrick Downes, Robert Effros, Valeriano Garcia, Sergio Pereiro Leite, Alfredo Leone, Klaus Richel, Lawrence Summers, V. Sundararajan, Mark Swinburne, Richard Webb, Eduardo Wiesner, and participants at the November 1991 NBER Conference on Political Economics.

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observation of the inflation outcomes. Actual, as opposed to formal, central bank independence depends not only on the law, but also on many other less-structured factors, such as informal arrangements between the bank and other parts of government, the quality of the bank's research department, and the personality of key individuals in the bank and the (rest of the) government. Because of the difficulty in quantifying such features in an impartial manner, previous studies developed indexes of central bank independence based mostly on legal independence—and only for the industrial countries at that. The multi-country studies that attempt to rank independence for a cross-section of countries include Bade and Parkin (1980), Skanland (1984), Parkin (1987), Alesina (1988), Masciandaro and Tabellini (1988), Bodart (1990), Swinburne and Castello-Branco (1991), and Grilli, Masciandaro, and Tabellini (1991), plus Leone's (1991) study of limits on lending in several industrial and developing countries. There is also a large literature of single- or multicountry case studies, which includes Mittra (1977), Schokker (1980), Eizenga (1983), Kearney (1984), Dotsey (1986), Epstein and Schor (1986), Bordes and Strauss-Kahn (1987), Bordo and Redish (1987), Eizenga (1987), Keenan and Mayes (1987), Suzuki (1987), Goodhart (1988), Holtfrerich (1988), Willett (1988), Fazio (1991), Cargill and Hutchison (1990), Mayer (1990), Meltzer (1991), Maxfield (1992), and Volcker, Mancera, and Godeaux (1991).

Indicators based only on the law have two problems. First, the laws are incomplete in that they cannot specify explicitly the limits of authority between the central bank and the political authorities under all contingencies. These voids are filled by tradition at best and by power politics at worst. Second, even when the law is quite explicit, actual practice may deviate from it.

This article develops unified and broadly based measures of central bank independence, uses them to rank central banks by their degree of independence, and explores the relation between their independence and inflation outcomes. The study goes beyond previous work in three dimensions. First, the set of countries is wider, including up to 72 countries (21 industrial countries and 51 developing countries). The wider sample makes it possible to examine whether there are systematic differences in central bank independence between industrial and developing countries. Second, the coverage in time goes back to the 1950s, if the bank existed then. Third, the study uses a wider range of information on central bank independence. The spirit of the law and its application in practice are generally more important than the letter of the law. In addition to coding characteristics of the central bank law, the study looks at the actual frequency of turnover of central bank governors and at the questionnaire responses from specialists on monetary policy in a subsample of 23 countries. The questionnaire was designed to identify divergences between the central bank's charter and actual practice. We use several different indicators of independence because, in addition to the noise that they contain, each indicator captures a somewhat different aspect of independence.

Examining the relation of inflation to alternate indicators for independence

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reveals that legal independence is an important determinant of inflation in the industrial countries. In developing countries, by contrast, governors' turnover is strongly and positively associated with inflation. This finding suggests that there are larger divergences between actual practice and the law in developing than in industrial countries (see, for example, Bodart 1990 and Leone 1991).

I. Measures of the Legal Independence of Central Banks

Legal independence is, of course, an essential component of actual independence, but it is also of interest for several other reasons. First, it indicates what is the degree of independence that legislators meant to confer on the central bank. Second, practically all existing attempts at systematically characterizing central bank independence rely solely on legal aspects of independence (Bade and Parkin 1980; Banaian, Laney, and Willett 1983; Skanland 1984; Parkin 1987; Alesina 1988; Masciandaro and Tabellini 1988; Grilli, Masciandaro, and Tabellini 1991). Establishing comparability with previous studies requires an index of legal independence for our sample of countries.

The laws of central banks differ in their focus, scope, and degree of detail. Many provisions in central bank charters have no direct bearing on the issue of central bank independence. Ranking central bank charters by their degree of legal independence is therefore difficult and inevitably requires subjective judgment.

Coding Legal Independence

Our coding of the legal central bank independence followed two principles. First, we coded only a few narrow but relatively precise legal characteristics. Second, we used only the written information from the charters. Additional information on how the law is applied was deliberately left out, since it is reflected by separate indexes that are discussed in section II. These principles make it possible to rank central banks by their degree of independence in various legal dimensions with relatively few subjective judgments and to focus on concrete details of the law rather than on a broader but more impressionistic view of it.

The legal characteristics of the central bank as stated in its charter are grouped into four clusters of issues:

- The appointment, dismissal, and term of office of the chief executive officer of the bank—usually the governor
- The policy formulation cluster, which concerns the resolution of conflicts between the executive branch and the central bank over monetary policy and the participation of the central bank in the budget process
- The objectives of the central bank
- Limitations on the ability of the central bank to lend to the public sector; such restrictions limit the volume, maturity, interest rates, and conditions

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for direct advances and securitized lending from the central bank to the public sector.

The clusters were built up from 16 different legal variables, each coded on a scale of 0 (lowest level of independence) to 1 (highest level of independence). The detailed classification and codings appear in table 1. The codes are set so that a higher number indicates what we expected would lead to a stronger mandate and greater autonomy for the central bank to pursue price stability.

In coding various central banks by the degree of independence within each group of characteristics, the following criteria were used. Central banks in which the legal term of office of the chief executive officer (CEO) is longer and in which the executive branch has little legal authority in appointing or dismissing the governor are classified as more independent in the CEO dimension. By the same logic, central banks with wider authority to formulate monetary policy and to resist the executive branch in cases of conflict are classified as more independent in the policy formulation dimension.

For the objective of the central bank, there are six possible ratings, according to the prominence given to price stability compared with other stated objectives that might conflict with price stability. For instance, when the charter specifies price stability as the main or only goal, the bank is classified as being more independent in this dimension than a central bank with objectives in addition to, but not inconsistent with, price stability, such as stable banking. These banks are, in turn, classified as more independent than banks whose objectives include things like full employment, which might conflict with price stability. The objectives variable is designed to capture the legal mandate of the bank to single-mindedly pursue the objective of price stability. Only the central banks in the Federal Republic of Germany and the Philippines have unequivocal legal mandates for price stability. The objectives variable does not, therefore, reflect the general level of independence from government, in contrast to the CEO and policy formulation variables. In Rogoff's (1985) terminology, the objectives variable measures the strength of the "conservative bias" of the bank's charter.

Similarly, we classify a central bank with tighter limits on its lending to the public sector as more independent to pursue the objective of price stability. These limitations encompass a number of more detailed variables, such as separate limitations on advances and securitized lending and restrictions on maturities and on interest rates. The stricter the limitation, the higher the independence coding given to the bank in that dimension. The comparability of various types of limitations is complicated because the limitations are specified in different ways in different countries. In a few countries limitations on lending are specified in absolute cash amounts and in others as a percentage of central bank liabilities. The limitation is formulated in most cases as a percentage of government's revenues from taxes but in a minority of cases as a percentage of government's expenditures. The "bite" of these limitations obviously depends on the magnitudes of the reference variables. Other things being equal, however, abso-

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Table 1. *Variables for Legal Central Bank Independence*

Variable number	*Description of variable*	*Weight*	*Numerical coding*
1	Chief executive officer (CEO)	0.20	
	a. Term of office		
	Over 8 years		1.00
	6 to 8 years		0.75
	5 years		0.50
	4 years		0.25
	Under 4 years or at the discretion of appointer		0.00
	b. Who appoints CEO?		
	Board of central bank		1.00
	A council of the central bank board, executive branch, and legislative branch		0.75
	Legislature		0.50
	Executive collectively (e.g. council of ministers)		0.25
	One or two members of the executive branch		0.00
	c. Dismissal		
	No provision for dismissal		1.00
	Only for reasons not related to policy		0.83
	At the discretion of central bank board		0.67
	At legislature's discretion		0.50
	Unconditional dismissal possible by legislature		0.33
	At executive's discretion		0.17
	Unconditional dismissal possible by executive		0.00
	d. May CEO hold other offices in government?		
	No		1.00
	Only with permission of the executive branch		0.50
	No rule against CEO holding another office		0.00
2	Policy formulation	0.15	
	a. Who formulates monetary policy?		
	Bank alone		1.00
	Bank participates, but has little influence		0.67
	Bank only advises government		0.33
	Bank has no say		0.00
	b. Who has final word in resolution of conflict?[a]		
	The bank, on issues clearly defined in the law as its objectives		1.00
	Government, on policy issues not clearly defined as the bank's goals or in case of conflict within the bank		0.80
	A council of the central bank, executive branch, and legislative branch		0.60
	The legislature, on policy issues		0.40
	The executive branch on policy issues, subject to due process and possible protest by the bank		0.20
	The executive branch has unconditional priority		0.00
	c. Role in the government's budgetary process		
	Central bank active		1.00
	Central bank has no influence		0.00
3	Objectives	0.15	
	Price stability is the major or only objective in the charter, and the central bank has the final word in case of conflict with other government objectives		1.00
	Price stability is the only objective		0.80
	Price stability is one goal, with other compatible objectives, such as a stable banking system		0.60
	Price stability is one goal, with potentially conflicting objectives, such as full employment		0.40

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Table 1. *(continued)*

Variable number	*Description of variable*	*Weight*	*Numerical coding*
	No objectives stated in the bank charter		0.20
	Stated objectives do not include price stability		0.00
4	Limitations on lending to the government		
	a. Advances (limitation on nonsecuritized lending)	0.15	
	No advances permitted		1.00
	Advances permitted, but with strict limits (e.g., up to 15 percent of government revenue)		0.67
	Advances permitted, and the limits are loose (e.g., over 15 percent of government revenue)		0.33
	No legal limits on lending		0.00
	b. Securitized lending	0.10	
	Not permitted		1.00
	Permitted, but with strict limits (e.g., up to 15 percent of government revenue)		0.67
	Permitted, and the limits are loose (e.g., over 15 percent of government revenue)		0.33
	No legal limits on lending		0.00
	c. Terms of lending (maturity, interest, amount)	0.10	
	Controlled by the bank		1.00
	Specified by the bank charter		0.67
	Agreed between the central bank and executive		0.33
	Decided by the executive branch alone		0.00
	d. Potential borrowers from the bank	0.05	
	Only the central government		1.00
	All levels of government (state as well as central)		0.67
	Those mentioned above and public enterprises		0.33
	Public and private sector		0.00
	e. Limits on central bank lending defined in	0.025	
	Currency amounts		1.00
	Shares of central bank demand liabilities or capital		0.67
	Shares of government revenue		0.33
	Shares of government expenditures		0.00
	f. Maturity of loans	0.025	
	Within 6 months		1.00
	Within 1 year		0.67
	More than 1 year		0.33
	No mention of maturity in the law		0.00
	g. Interest rates on loans must be	0.025	
	Above minimum rates		1.00
	At market rates		0.75
	Below maximum rates		0.50
	Interest rate is not mentioned		0.25
	No interest on government borrowing from the central bank		0.00
	h. Central bank prohibited from buying or selling government securities in the primary market?	0.025	
	Yes		1.00
	No		0.00

Note: The ranking under each criteria indicates the degree of independence of central banks—the higher the code, the more independent the central bank.

a. Often the law does not contain a separate provision on the resolution of conflict. In those cases, the variable was coded on the basis of the impression from reading the law in its entirety. If the law gives the impression that the government formulates policy guidelines that the bank simply follows, then the ranking is low.

Source: Various central bank laws, Aufricht (1961, 1967); Bank for International Settlements (1963); Effros (1982); and the IMF's computerized files on central bank laws.

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lute cash limits are more binding than limits in terms of central bank liabilities, which, in turn, are more binding than limits in terms of government's revenues. The most accommodative limits are those which are specified in terms of government's expenditures. These considerations were embodied in a "type-of-limit" variable and also influenced the classification of the variables for limitations on lending via advances and for limitations on lending via securities. Table 1 shows the details of the several variables for limitations on lending.

Limitations on lending are also classified as stricter the nearer are the rates paid by government to market rates and the shorter are the maturities of the loans from the central bank to the public sector. They are also stricter the narrower the circle of institutions that is allowed to borrow from the central bank and the smaller the discretion of the executive branch to decide to whom and how much the central bank will lend. In addition, central bank laws that prohibit the central bank from buying government securities on the primary market are considered, all things being equal, stricter than laws that do not contain such a prohibition.

The period considered covers the four decades from 1950 to 1989. It is divided into four subperiods: 1950–59, 1960–71, 1972–79, and 1980–89, which we refer to according to the decades in which they are centered. They correspond, respectively, to the gold-dollar standard period before most currencies had convertibility, the period of convertibility with the dollar, the period of the two oil shocks after the end of the Bretton Woods currency system, and the period of disinflation and the debt crisis. Legal variables were coded separately for each decade. Since central bank legislation changes relatively slowly, the codes are, in many cases, identical across subperiods. Nonetheless this procedure captures important legislative changes for some countries. Only one code per decade was assigned for each country for each legal variable. Whenever a change occurred within a decade, the classification was done in line with the legislation that was in effect during at least half of that decade. When a central bank was founded within a decade, its legal variables were coded only if it existed for at least three years during the decade. The coded variables appear in Table A-1 following the concluding section.

Aggregating the Legal Variables

The individual components of legal independence are aggregated in two steps to yield a hierarchy of indexes. Later in the article we investigate the association of those indexes with other variables, such as other indicators of central bank independence and inflation. The basic data on the 16 legal variables described in table 1 were aggregated into eight legal variables as follows. The four variables concerning the appointment and term of office of the governor of the central bank were aggregated into a single variable labeled CEO, equal to the mean of the four components. The three variables under policy formulation were aggregated into a single variable by computing a weighted mean of the variables in that

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group, with weights of 0.5 for the resolution of conflict, 0.25 for who formulates monetary policy, and 0.25 for active role of the central bank in formulating the government budget. The objectives variable was treated separately. The first four variables for limits on lending were treated separately; the last four variables in the group were averaged with equal weights into a single variable. This aggregation procedure produces one summary legal variable for each of the first three groups in table 1, and five legal variables for the limitations on lending group. When an entry is not available (—) for one or more variables within a subgroup, only the variables with meaningful entries are aggregated. In such cases the weights of the missing variables are allocated proportionally to the remaining variables within the subgroup.

When the legal variables appear at a high level of disaggregation (as in table 1), a missing observation on at least one variable precludes the use of that country or decade. Partial aggregation alleviates this problem by reducing the number of observations with entries that are not available. In addition, multicollinearity among the 16 legal variables reduces the precision of the estimated effect of each of them on inflation. Partial aggregation alleviates this problem, too.

The eight legal variables from the first round of aggregation were aggregated further into a single index for each country and decade, using weights that we considered most plausible. The weights are indicated in table 1. When a component is missing, the weights of those remaining are expanded proportionately to sum to 1.0. For all the observations, the weights of the component variables summed to at least 0.7. The variable for the legal central bank independence aggregated in this way is similar to a variable aggregated with equal weights; the two are highly correlated.

Table 2 ranks industrial and developing countries according to their aggregate variable for legal central bank independence for 1980–89 and also provides their average inflation rates in the 1980s. Countries classified by the World Bank as low- or middle-income, on the basis of 1985 incomes, are classified as developing; the others are referred to as industrial. Observations for each country and decade are given in appendix table A-1. Austria, Germany, and Switzerland—all industrial countries—have the highest legal independence, while Morocco and Poland—both developing countries—have the lowest. Otherwise the two country groups have very similar distributions of aggregate legal independence. The medians are virtually identical—0.33 and 0.34.

II. Informal Indicators of Actual Independence

The legal status of a central bank is only one of several elements that determine its actual independence. Many central bank laws are highly incomplete and leave a lot of room for interpretation. As a result, factors such as tradition or the personalities of the governor and other high officials of the bank at least partially shape the actual level of central bank independence. Even when the law is

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Table 2. *Legal Central Bank Independence and Average Annual Inflation, 1980–89*

Industrial economy			*Developing economy*					
Economy	*Legal central bank independence[a] (index)*	*Average annual rate of inflation[b] (percent)*	*Economy*	*Legal central bank independence[a] (index)*	*Average annual rate of inflation[b] (percent)*	*Economy*	*Legal central bank independence[a] (index)*	*Average annual rate of inflation[b] (percent)*
Germany, Fed. Rep. of	0.69	3	Greece	0.55	18	Botswana	0.33	10
Switzerland	0.64	3	Egypt	0.49	16	Zambia	0.33	25
Austria	0.61	4	Costa Rica	0.47	23	Ghana	0.31	37
Denmark	0.50	7	Chile	0.46	19	Romania	0.30	4
United States	0.48	5	Turkey	0.46	41	Bolivia	0.30	119
Canada	0.45	6	Nicaragua	0.45	128	Western Samoa	0.30	12
Ireland	0.44	9	Malta	0.44	3	China	0.29	8
Netherlands	0.42	3	Tanzania	0.44	27	Singapore	0.29	3
Australia	0.36	8	Kenya	0.44	10	Korea, Republic of	0.27	8
Iceland	0.34	32	Philippines	0.43	13	Indonesia	0.27	9
Luxembourg	0.33	5	Zaire	0.43	45	Colombia	0.27	21
Sweden	0.29	8	Peru	0.43	108	Thailand	0.27	6
Finland	0.28	7	Honduras	0.43	7	South Africa	0.25	14
United Kingdom	0.27	7	Venezuela	0.43	19	Hungary	0.24	9
Italy	0.25	11	Bahamas, The	0.41	6	Uruguay	0.24	45
New Zealand	0.24	12	Portugal	0.41	16	Panama	0.22	3
France	0.24	7	Argentina	0.40	143	Pakistan	0.21	7
Spain	0.23	10	Ethiopia	0.40	4	Brazil	0.21	119
Japan	0.18	3	Lebanon	0.40	—	Taiwan	0.21	5
Norway	0.17	8	Israel	0.39	72	Zimbabwe	0.20	12
Belgium	0.17	5	Barbados	0.38	7	Qatar	0.20	4
			Uganda	0.38	72	Nepal	0.18	10
			Nigeria	0.37	18	Yugoslavia	0.17	73
			Malaysia	0.36	4	Morocco	0.14	7
			Mexico	0.34	50	Poland	0.10	36
			India	0.34	9			

— Not available.

a. The potential range of the index for legal central bank independence is from zero (minimal independence) to one (maximum independence).

b. Inflation is computed in logs.

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quite explicit, reality may be very different. For example, in Argentina the legal term of office of the governor is four years, but there is also a tradition that the governor of the central bank offers to resign whenever the government, or even the finance minister, changes. Argentine governors have invariably adhered to this tradition. As a consequence, the average actual term of office of the governor was about one year from 1950 to 1989. Obviously the actual independence of the Argentine central bank is substantially lower than the legal indicators imply. It is hard to find systematic indicators of actual independence when it diverges from legal independence, and we do not pretend to resolve this measurement issue fully. Here we develop two indicators of actual, as opposed to legal, central bank independence from the actual frequency of change of the governor and from responses to a questionnaire sent to experts on each country.

Turnover of Central Bank Governors

This indicator is based on the presumption that, at least above some threshold, more rapid turnover of central bank governors indicates a lower level of independence. Indeed, more rapid turnover presumably creates dependence. If the political authorities frequently take the opportunity to choose a new governor, they will at least have the opportunity to pick those who will do their will. Frequent turnover may reflect the firing of those who choose to challenge the government. A government would even have some incentive to appoint a governor with a reputation for some independence, thereby gaining a temporary increase in the potential for stimulating output or collecting resources through seigniorage, and then use up his reputation, as happened with Arthur Burns at the Federal Reserve Bank of the United States in the 1970s.

For high turnover rates, the tenure of the central bank governor is shorter than that of the executive branch. This makes the central bank governor susceptible to influence by the executive branch and discourages the governor from trying to implement longer-term policies, especially those that would extend beyond the election cycle. Because in most countries the electoral cycle is at least four years, it is likely that the threshold turnover, above which independence declines seriously, is somewhere between 0.2 and 0.25 changes a year (for an average tenure of four to five years). One would expect that turnovers at the central bank that occur simultaneously with or shortly after changes in the government would indicate lower independence than turnovers that occur at other times. Further work will investigate this issue.

If, however, a governor stays on for several years and perhaps outlasts several heads of government, thus presiding over price stability, the governor's reputation can become strong enough to resist considerable pressure. The government's desire to preserve financial stability can deter it from challenging a well-established central bank governor.

A low turnover does not necessarily imply a high level of central bank independence, however, because a relatively subservient governor may stay in office

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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*
Industrial economy					
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
Developing economy					
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

a long time. This is probably true for countries with exceptionally low turnover rates, such as Iceland, Denmark, Norway, and the United Kingdom.

Table 3 presents the average annual turnover rates in the sample countries for 1950–89 and for each decade within that period. These rates are presented separately for developing and industrial countries. Average turnover rates for 1950–89 range from a minimum of 0.034 (one change in 29 years) in Iceland to a maximum of 0.93 (average tenure of about 13 months) in Argentina. Turnover rates in developing countries extend into a range considerably above the highest rates in the industrial countries. The highest average turnover among the indus-

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Table 3. *(continued)*

Economy	*1950–89*	*1950–59*	*1960–71*	*1972–79*	*1980–89*
Developing economy (continued)					
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.

trial countries for 1950–89 is 0.2 (or an average tenure of five years) for Spain. More than half of the developing countries have turnover rates exceeding this maximum.

Because average turnover rates for all industrial countries for 1950–89 are less than 0.2, these rates probably do not reveal much about the variations of independence within that group. But because turnover rates vary widely among the developing countries, however, they seem more likely to reveal variations in the independence of those governors.

A governor's legal term of office does not seem to have much effect on the

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Table 4. *Questionnarie Variables, Weights, and Numerical Coding*

Variable number	*Variable description*	*Weight*	*Numerical coding*
1	Tenure of central bank CEO overlap with political authorities	0.10	
	Little overlap		1.0
	Some overlap		0.5
	Substantial overlap		0.0
2	Limitations on lending in practice	0.20	
	Tight		1.00
	Moderately tight		0.66
	Moderately loose		0.33
	Loose or nonexistent		0.00
3	Resolution of conflict	0.10	
	Some clear cases of resolution in favor of bank		1.0
	Resolution in favor of government in all cases		0.0
	All other cases		0.5
4	Financial independence	0.10	
	a. Determination of the central bank's budget		
	Mostly central bank		1.0
	Mixture of bank and executive or legislative branches		0.5
	Mostly executive or legislative branches		0.0
	b. Determination of the salaries of high bank officials and the allocation of bank profits		
	Mostly by bank or fixed by law		1.0
	Mixture of bank and executive or legislative branches		0.5
	Mostly executive or legislative branches		0.0
5	Intermediate policy targets	0.15	
	a. Quantitative monetary stock target		
	Such targets exist; good adherence		1.00
	Such targets exist; mixed adherence		0.66
	Such targets exist; poor adherence		0.33
	No stock targets		0.00
	b. Formal or informal interest rate targets		
	No		1
	Yes		0
6	Actual priority given to price stability	0.15	
	First priority		1.00
	First priority assigned to a fixed exchange rate		0.66
	Price or exchange rate stability are among the bank's objectives, but not first priority		0.33
	No mention of price or exchange rate objectives		0.00
7	Function as a development bank, granting credit at subsidy rates?	0.20	
	No		1.00
	To some extent		0.66
	Yes		0.33
	The central bank heavily involved in granting subsidized credits		0.00

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actual turnover. To explore this issue, we regressed actual turnover rates in the four subperiods on the legal terms of office and on decade dummies to control for possible period-specific effects on turnover. The coefficient of the legal term-of-office variable was negative and statistically significant, but the adjusted R^2 was low (0.07), thus indicating that actual turnover is affected by many other factors besides the legal term of office.

Questionnaire on Central Bank Independence

The other group of indicators of central bank independence is based on responses to a questionnaire that was sent to a nonrandom sample of specialists on monetary policy in various central banks. Some questions involve the same issues that underlie the legal variables, but they focus on the practice rather than the law—for example, central bank objectives, their importance in practice, and the strictness of limitations on lending in practice. Some questions refer to additional issues, such as subsidized credits from the bank to the private sector, quantitative targets for the money stock, the determination of the bank budget, and the degree of actual tenure overlap between the governor and high officials in the executive branch. Although the judgments of those responding to the questionnaire are subjective and not entirely uniform, the responses help to identify divergence between actual and legal independence, particularly when the divergence is large.

Answers to the questionnaire sufficed for coding most of the nine questionnaire variables described in table 4 in 23 countries (The codings for each country are given in appendix table A-2). We coded only the parts of the questionnaires that could be translated into clear rankings and for which an adequate share of the questionnaires had responses. Since the questionnaire was worded in the present tense and since policymakers' thinking is dominated by the recent past, the responses are taken to refer to the 1980s.

Variable 1 is designed to reflect the extent to which the terms of office of the governor and of the board of directors are likely to be independent from government. The more the turnover at the central bank coincides with turnover in the government, the less independent the bank is likely to be, and vice versa. Variable 2 reflects the actual limitations on lending in practice and is coded by applying criteria similar to those used to classify the legal limitations on lending described earlier. The lowest level of independence is assigned if there are no limitations on lending or if the government can adjust the limits very easily.

Variable 3 reflects the extent to which conflicts between the government and the central bank are resolved in favor of the latter. Variable 4 captures two aspects of the financial independence of the bank: the determination of its budget and the setting of salaries of its top officials. It is calculated as a simple average of the variables 4a and 4b. The two parts of variable 5 reflect the relative importance of targets for the monetary stock or interest rates—these targets being precommitments agreed to by the bank and government. Money

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stock targets would enhance the pursuit of price stability, because the bank could adhere to them in the face of pressure from the government. A target for the nominal interest rate, however, would typically work to limit the ability of the bank to respond to upsurges of inflation. Variable 5 is calculated as a simple average of the variables 5a and 5b. Variable 6 captures more directly the priority assigned to price stability, and variable 7 reflects the extent to which the central bank has the competing objective of providing subsidized credits to encourage development. Further details appear in chapter 19 of Cukierman (1992a).

Aggregating the seven variables gives the results in table 5. The weights used in the aggregation are based on our priors and are shown in table 4; using equal weights gave an almost identical ranking. The indexes are reported only for countries in which the weights of the responses sum up to at least 0.7. Because it is based on subjective evaluations, the questionnaire-based index probably contains more noise than the index of legal central bank independence, but it also probably contains additional pertinent information about actual independence. The main limit of the questionnaire is the small number of countries with responses, but we hope to expand this in the future.

Table 5. *The Questionnaire-based Index of Central Bank Independence and Average Annual Inflation*

Country	*Questionnaire-based index of central bank independence*	*Average annual rate of inflation,[a] 1980–89 (percent)*
Germany, Fed. Rep. of	1.00	3
Costa Rica	0.81	23
Finland	0.78	7
Australia	0.76	8
Italy	0.73	11
Denmark	0.73	7
Bahamas, The	0.71	6
Luxembourg	0.66	5
France	0.65	7
United Kingdom	0.64	7
South Africa	0.64	14
Zaire	0.61	45
Lebanon	0.59	—
Ireland	0.57	9
Barbados	0.54	7
Uganda	0.53	72
Uruguay	0.49	45
Belgium	0.47	5
Turkey	0.44	41
Tanzania	0.38	27
Peru	0.22	108
Yugoslavia	0.17	73
Ethiopia	0.13	4

— Not available.

a. Inflation is computed in logs.

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Table 6. *Rank Correlations between Indexes of Legal Central Bank Independence*

Correlation pair	*Country sample*		
	All	*Industrial*	*Developing*
Legal index and rate of turnover			
1950–89	0.000	0.018	0.011
1980–89	0.000	0.065	0.015
Legal and questionnaire-based indexes[a]	0.041	0.334*	0.056
Questionnaire-based index and rate of turnover[a]	0.068	0.050	0.031

* Significant at 10 percent level.
a. Covers 1980–89.

The questionnaires clearly indicate that central banks in developing countries are less independent than those in industrial countries. Only two industrial countries—Ireland and Belgium—are below the median of 0.60, and only four developing countries—The Bahamas, Costa Rica, South Africa, and Zaire—are above it. This contrasts with the findings for legal independence, where the two country groups do not differ widely, but is similar to the finding for turnover.

Relationships between Indexes of Independence

Table 6 shows the rank correlations between indexes of central bank independence: the legal index, the turnover rate, and the questionnaire-based index. None of the various indexes of central bank independence are closely correlated. Only the correlation between the legal independence index and the questionnaire-based index of independence for the industrial countries is even marginally significant, which suggests that the law is a more important determinant of actual independence in the industrial countries. Since the correlation across these indexes is not high, they can be usefully combined to obtain a better measure of overall central bank independence, which is done toward the end of the article.

III. Inflation and Central Bank Independence

Do countries with more independent central banks have lower rates of inflation? The hypothesis that inflation should be negatively related to the legal and questionnaire variables has two bases. (Recall that for both variables a higher code in the range between 0 and 1 reflects a higher level of independence.) First, there is a presumption that central banks are more concerned about price stability than the political authorities (see Rogoff [1985], for instance). Because actual policy is normally the outcome of a compromise between the central bank and the executive branch, a more independent central bank will have a stronger impact on actual policy, and therefore average inflation will be lower (Alesina and Tabellini 1987; Cukierman 1992a, chap. 18). Second, the legal indepen-

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dence variable is intentionally structured to reflect, among other things, the extent to which the central bank has an explicit mandate to pursue price stability at the expense of other objectives. For a given level of independence from the political authorities, a more focused legal mandate to pursue price stability is expected to result in a lower rate of inflation.

The legal independence of the central bank is neither a necessary nor a sufficient condition for low inflation, although, other things being equal, less legal independence contributes to higher inflation. Some of the countries with the highest average rates of inflation, such as Argentina, Peru, and Nicaragua, have rankings of legal independence above the median. However, countries such as Belgium, Japan, Morocco, and Qatar, with very low rates of inflation, are ranked in the lowest quartile of legal central bank independence.

To investigate systematically the relation between central bank independence and inflation, we regressed inflation on the various indexes of central bank independence. Because a higher numerical code assigned to the legal and questionnaire variables indicates a higher level of independence, the hypothesis implies that the effect of each of these variables on inflation is negative. The effect of the turnover of central bank governors, at least above some threshold, is predicted to be positive.

The inflation variable was transformed in order to reduce heteroskedasticity of the error and thus improve the efficiency of the estimate. Most countries had average inflation rates of 20 percent or less, but a few had three-digit inflation rates in some decades. Using the straight inflation rate would give undue weight to these outlier observations. So we transformed each year's inflation rate into inflation divided by one plus the inflation rate and then took the geometric average for the decade. This variable represents the annual real depreciation of a given amount of money; we call it D:

$$D = \pi/(1 + \pi) \tag{1}$$

where π is the inflation rate and D (hence, the transformed inflation rate) takes a value from 0 to 1.0. When inflation is 100 percent a year, D is 0.5.

Table 7 presents regressions of the transformed inflation rate (D) on disaggregated indexes of legal central bank independence, along with the governor's turnover variable. Each observation pertains to one decade in one country. Not all countries have observations for all four decades, because some countries or central banks start after 1950. Inflation was counted only for years when the central bank existed, if it started late in the decade. The results show the importance of the turnover rate for explaining variations of inflation in the whole sample and among the developing countries. None of the disaggregated legal variables has a significant coefficient (at the 5 percent level), and an F-test reveals that the variables as a group are not quite significant at the 10 percent level even within the group of industrial countries.

To overcome the collinearity among the disaggregated legal variables, we ran the regressions with the aggregate index of legal independence. Table 8 reports

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Table 7. *The Transformed Inflation Rate, Disaggregated Variables of Legal Central Bank Independence, and the Turnover Rate, 1950–89*

Explanatory variable	*All countries*	*Industrial countries*	*Developing countries*
Intercept	0.09**	0.09***	0.09*
	(2.47)	(3.50)	(1.71)
CEO	−0.00	0.02	0.01
	(−0.10)	(0.54)	(0.18)
Policy formulation	0.05	−0.02	0.09
	(0.90)	(−0.54)	(1.08)
Central bank objectives	−0.04	0.01	−0.08
	(−1.29)	(0.42)	(−1.61)
Limitations on lending			
a. Advances	−0.04	−0.02	−0.04
	(−1.11)	(−0.88)	(−0.72)
b. Securitized lending	0.03	−0.01	0.04
	(0.73)	(−0.13)	(0.69)
c. Terms of lending	0.06	0.01	0.08
	(1.27)	(0.42)	(1.15)
d. Potential borrowers	0.02	0.00	0.03
	(1.15)	(0.33)	(0.90)
e. Others	−0.07	−0.06*	−0.05
	(−1.14)	(−1.79)	(−0.57)
Rate of turnover of central bank governor	0.30***	−0.07	0.30***
	(5.99)	(−1.13)	(4.47)
Dummy: 1950–59	−0.08***	−0.03**	−0.10**
	(−2.92)	(−2.05)	(−2.14)
Dummy: 1960–71	−0.09***	−0.02	−0.12***
	(−4.04)	(−1.48)	(−3.57)
Dummy: 1972–79	−0.02	0.03**	−0.03
	(−1.10)	(2.10)	(−1.18)
$\bar{R}^2$	0.29	0.29	0.27
F-statistic for legal variables[a]	1.24	1.62	1.20
	(0.28)	(0.15)	(0.30)
Number of observations	177	60	117

Note: The dependent variable is the transformed inflation rate, *D*. The *t*-statistics are reported in parentheses under estimated coefficients. * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

a. The significance levels are in parentheses.

the results. (We used the index based on our priors for weights. Using the index with equal weights produced similar results.) The key results come out when we split the sample into industrial and developing countries.

For the industrial countries, the aggregate legal variable has a statistically significant coefficient with the predicted negative sign. Laws do make a difference. The turnover rate, always low in any case for this subsample, has a negative sign, contrary to our prediction; the *t*-statistic indicates marginal statistical significance. The most anomalous case is Iceland, with the highest inflation rate and lowest turnover among industrial countries. Dropping Iceland from the industrial country subsample makes the estimated coefficient on the turnover rate slightly positive and totally insignificant. The coefficient on the aggregate index of legal central bank independence becomes more significant (the *t*-statis-

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Table 8. *The Transformed Inflation Rate, Aggregate Index of Legal Central Bank Independence, and the Turnover Rate, 1950–89*

Explanatory variable	*All countries*	*Industrial countries*	*Developing countries*	*All countries with decomposed turnover variable*
Intercept	0.09***	0.09***	0.11**	0.10***
	(3.55)	(7.17)	(2.51)	(3.54)
Legal central bank independence (aggregate index)	−0.02	−0.06**	0.01	−0.03
	(−0.39)	(−2.54)	(0.11)	(−0.45)
Rate of turnover of central bank governor	0.28***	−0.08*	0.28***	
	(6.64)	(−1.81)	(4.80)	
Decomposed turnover[a]				
High turnover range				0.27***
				(6.27)
Low turnover range				0.20*
				(1.86)
Dummy: 1950–59	−0.08***	−0.03***	−0.11***	−0.08***
	(−3.31)	(−2.94)	(−2.62)	(−3.33)
Dummy: 1960–71	−0.09***	−0.02**	−0.13***	−0.09***
	(−4.45)	(−2.11)	(−4.14)	(−4.47)
Dummy: 1972–79	−0.02	0.03***	−0.04	−0.02
	(−0.88)	(2.90)	(−1.28)	(−0.86)
R^2	0.26	0.34	0.23	0.25
Number of observations	214	79	135	214

Note: The dependent variable is the transformed inflation rate, *D*. The *t*-statistics are reported in parentheses under estimated coefficients. * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

a. The rate of turnover is in the high range if there are 0.25 or more turnovers per year; it is in the low range if there are fewer than 0.25.

tic is −4.32), and the adjusted R^2 increases to 0.61. Italy also has low turnover rates but high inflation, while Japan has high turnover compared with other industrial countries but low inflation. In Japan, the Ministry of Finance has an unusually strong anti-inflation attitude, as well as strong influence over the central bank.

To explore further the composition of the legal variable, we made an index—the lending-limit index—from only the five components pertaining to limits on lending. These components drive the result for the industrial countries. The *t*-statistic for the lending-limit index is about the same as for the whole composite legal variable. The other components of the legal independence variable—CEO, policy formation, and objectives—do not make any significant contribution to explaining inflation. The lending-limit index is not significant for the developing countries.

For the developing countries, the turnover rate is highly significant with the predicted positive coefficient. But the aggregate legal variable remains insignificant. This is not to deny that the legal charter has helped ensure the central

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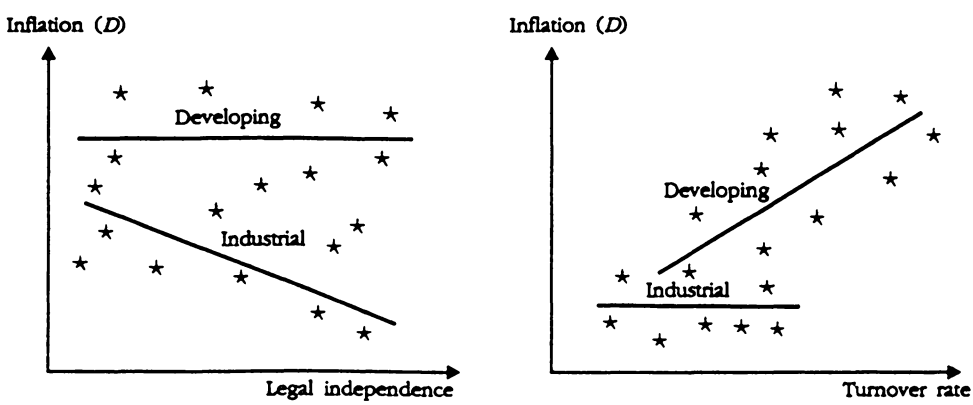
bank's independence and commitment to price stability in some developing countries. But statistical evidence for developing countries does not reveal that the central bank laws contribute to explaining the variation of inflation across periods and between countries.

What is the relation between the results for the whole sample and the results for the two subsamples (industrial and developing countries)? In particular, why does the result of the importance of the legal variable for the industrial countries not show up in the whole sample, while the result of the importance of the turnover variable for the developing countries does show up for the entire sample? Figure 1 illustrates these relations.

The left panel in figure 1 shows the partial relation of the aggregate index of legal central bank independence with the transformed inflation rate (D). The downward-sloping line shows the significance of the aggregate index of legal central bank independence for industrial countries. The horizontal line shows that the index does not on average affect inflation (D) in developing countries. Combining the two samples masks the effect of legal central bank independence on inflation in industrial countries, because including the developing countries raises the average inflation rate (D) across the whole range of values for the aggregate index of legal central bank independence.

The right panel shows the partial relation between the rate of turnover of the central bank governor and inflation (D). The upward-sloping line shows that the increasing rate of turnover leads to increased inflation in developing countries. The short and low horizontal line shows that the rate of turnover and inflation are both generally lower in the industrial countries. The overall regressions on the rate of turnover reveal a stronger effect of turnover on real depreciation of money in the entire sample than in the developing-country subsample, because

Figure 1. *Partial Relation of Inflation to the Legal Independence and to the Turnover Rate of Governors of Central Banks in Industrial and Developing Countries*



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the overall regression also reflects differences between industrial and developing countries in the general levels of D and of turnover rates.

To explore further the possibility that variations in the rate of turnover of the central bank governor at high rates of turnover might have a stronger effect on inflation than variations at low levels, the regression in the fourth column of table 8 decomposes the turnover variable into high and low turnover ranges. The cutoff of 0.25 turnovers a year or an average tenure of four years seems reasonable, in view of the typical length of electoral cycles. The coefficient on turnover for the high range is very significant, although it is significant for the low range at only the 10 percent level. This result is consistent with the view that turnover is more negatively associated with actual central bank independence in the high range for turnovers.

Although the observations of the questionnaire results (and inflation) were available for a much smaller sample—only 22 countries and one period, the 1980s—than the sample for the turnover and aggregate legal central bank independence variables, we combined it into the regression reported in column 1 of table 8 and obtained the following results:

$$(2) \qquad D = 0.27 + 0.16\ \text{Legal-CBI} + 0.57\ \text{TOR} - 0.46\ \text{Question-CBI}$$
$$(0.62) \qquad (2.22)^{**} \quad (-2.97)^{***}$$

$$\text{adjusted } R^2 = 0.38,\ N = 22$$

where ** and *** indicate significance at the 0.05 and 0.01 levels, respectively, Legal-CBI is the index of aggregate legal central bank independence, TOR is the rate of turnover of the central bank governor, and Question-CBI is the aggregate questionnaire-based index computed with the weights listed in table 4. The questionnaire variable has the predicted sign and is very significant statistically. The turnover variable also remains significant, which suggests that it reveals information about actual central bank independence that is not captured by the questionnaire. (The coefficient on the turnover variable may also reflect some simultaneity with the inflation variable, which is discussed below.)

To test the robustness of our results, we tried several variants of the regressions in table 8. Using regular inflation rates instead of the transformed version (D) as the dependent variable yields qualitatively similar results. Using versions of the legal central bank independence and questionnaire variables that were aggregated using equal weights on the component variables did not substantially change the results. We also tried aggregating legal variables with weights derived from principal components analysis. For the industrial-country subsample, the first principal component gave results very similar to those with equal weights and with the weights we selected. The aggregations with weights from the second and third principal components did not have significant coefficients. For the overall sample and the developing-country subsample, the aggregation with weights from the first principal component was not statistically significant.

The turnover rate also reflects the extent to which the government complies

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with the law's specification of the governor's term of office. To address this issue more directly, we generated a variable (the compliance variable) equal to the ratio of the actual average term in office to the legal term of office in each country and decade. In most countries and decades, actual average terms in office (including reappointments) are shorter than the legal term. Our hypothesis is that the lower the actual tenure compared with the one in the law, the lower the actual independence of the central bank and the higher the inflation rate (D). When the compliance variable is entered instead of the turnover variable, it gives qualitatively similar results to those with the turnover variable—significant coefficients for the overall sample and the developing countries but not in the group of industrial countries. When the compliance and turnover variables are entered together on the right-hand side, however, the compliance variable loses all significance, while the coefficient on the turnover variable remains positive and significant. In other words, it seems to be turnover itself that affects the ability and will to control inflation, rather than the relation of actual to legally stipulated turnover.

We also explored whether the low turnover would identify a subset of developing countries where the degree of legal independence did contribute to explaining inflation. An interaction term of the aggregate index of legal independence times a dummy for low turnover (0.25 or below) was not significant, however, for the whole sample or for the developing countries. Thus low turnover does not seem to be sufficient to reveal or engender a systematic respect for the legal stipulations of independence.

Previous work on inflation and central bank independence is based only on legal data and, in some cases, refers to a subset of the developed countries (Alesina 1988; Grilli, Masciandaro, and Tabellini 1991). These analyses find a significant negative relationship between some of their indexes of central bank independence and average inflation in some periods. Because the indexes of independence used here differ from those used in the previous studies, it is instructive to reexamine their samples with our indexes. We did this with the country subsamples from the earlier studies, and our variables give a better fit with the country subsamples from the previous studies than with the whole industrial-country subsample. The Grilli and others (1991) sample includes Greece and Portugal, which are in our developing-country subsample. (Further details appear in Cukierman [1992a], chap. 20.)

The same degree of central bank independence may be associated with different rates of inflation when there are different economic shocks. It is also possible that the degree of independence affects the response of policy to shocks. A more dependent central bank, for example, may inflate at a higher rate in response to a slowdown in economic activity. The investigation of such interactions is beyond the scope of this article, but it represents an intriguing avenue for future empirical research.

In summary, legal independence is systematically and inversely related to

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inflation in industrial, but not in developing, countries. In the latter group the actual frequency of change of the CEO of the bank is a better proxy for central bank independence. The divergence between the letter of the law and actual practice seems substantially higher in developing than in industrial countries. This may be due to a general norm of more adherence to the law in industrial countries.

Two-Way Causality between Inflation and Central Bank Independence

There may be two-way causality between inflation and the actual degree of central bank independence. As shown above, less independence contributes to higher inflation. However, high inflation is likely to result, at least after a while, in less independence. High inflation encourages processes that make it easier for the government to influence monetary policy even if the bank charter does not change. Most central bank laws are highly incomplete contracts that do not fully delimit the areas of responsibility of the bank and of the executive branch. In times of high inflation it is harder for the bank to closely control the money supply. In addition, high inflation is partly blamed on the bank, which tarnishes its public image and thus reduces its authority in relation to the treasury, even if this contradicts the charter. Argentina is a dramatic example. If inflation affects actual independence, we expect it also affects the rate of turnover of governors. Therefore, at least part of the positive relation found between inflation and turnover may reflect the effect of inflation on the independence of central banks and therefore on the turnover rate of their CEOs. The legal charters change infrequently and do not seem likely to be simultaneously determined with inflation outcomes.

To examine the possibility that the results for the turnover variable in tables 7 and 8 result from a simultaneity bias, we reestimated the regressions using two-stage least squares and introduced an instrumental variable for the rate of turnover of the central bank governor. The instruments used are transformed inflation (D) and the turnover variable in the previous decade, legal central bank independence, the legal term of office, and the decade dummies. Because periods are about a decade each, the previous observation is about 10 years away from the center of the current one—enough to be predetermined. The use of lagged values of D and turnover as instruments cuts the number of observations used in the equation by about a quarter, to 142. The coefficient of turnover remains positive, actually increases, and remains highly significant (its t-statistic is 6.98). Qualitatively similar results were also obtained with the developing-country subsample.

To investigate further the causality between inflation and the turnover of central bank governors, we did a simple Granger causality test by estimating the bivariate autoregressive processes for inflation and turnover. The periods are the four approximate decades used throughout the article. The long periods seem appropriate for slow-moving processes such as the erosion or the buildup of central bank independence and its interaction with inflation. The estimated

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processes for transformed inflation (D) and turnover (TOR) are given in equations 3 and 4 with t-statistics in parentheses under the coefficients.

$$D = 0.02 + 0.79\,D_{-1} + 0.17\,\text{TOR}_{-1} \tag{3}$$
$$(7.54)^{***} \quad (3.53)^{***}$$

$$\text{TOR} = 0.09 + 0.54\,D_{-1} + 0.43\,\text{TOR}_{-1}. \tag{4}$$
$$(3.41)^{***} \quad (5.93)^{***}$$

The coefficient of lagged turnover in the inflation equation is highly significant, as is the coefficient of lagged inflation in the turnover equation. A similar picture emerges when the straight inflation rate is substituted for D. The pattern also holds up for the developing-country subsample, but not for the industrial-country subsample, as the earlier results would lead one to expect.

These results imply that there is a vicious circle between inflation and low levels of central bank independence. When sufficiently sustained, inflation erodes central bank independence. Then low independence contributes to higher inflation. Although central bank independence and price stability reinforce each other, the significant coefficients for the turnover variable reported in tables 7 and 8 do seem to reflect a true effect of central bank independence on inflation, and not just simultaneity.

Central Bank Independence and the Variability of Inflation

Variability of inflation imposes economic costs. Indeed, many of the costs of high inflation arise because it is usually more variable and uncertain when the average is high (Cukierman 1984, chap. 3–6). Furthermore, theory implies that inflation will be more variable when the central bank is less independent (Cukierman 1992a, chap. 18). Thus it is important to investigate whether our proxies for central bank independence actually affect the variability of inflation. As a measure of inflation variability, we take the standard deviation of D.

The proxies for central bank independence explain inflation variability to about the same extent that they explain inflation levels (table 9). Turnover contributes significantly to explaining the variance of D in the overall sample and in the developing countries, but the variable for legal independence does not. For the industrial-country sample, the legal variable is significant at the 10 percent level. Again, with Iceland removed from the industrial subsample, the coefficient on turnover is much smaller and more insignificant, and the coefficient for legal central bank independence is significant at the 5 percent level.

The conceptual framework in chapter 18 of Cukierman (1992a) implies that the mean level of inflation and its standard deviation are both negatively related to the degree of independence of central banks across countries. As a consequence the mean level of inflation and its standard deviation are positively related to each other. There is empirical evidence that the variation in the independence of central banks explains some of the correlation between the average level of inflation rates and their variance (Cukierman 1992a, chap. 22).

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Table 9. *The Standard Deviation of Transformed Inflation, Aggregate Index of Legal Central Bank Independence, and the Turnover Rate, 1950–89*

Explanatory variable	*All countries*	*Industrial countries*	*Developing countries*	*All countries with decomposed turnover variable*
Intercept	0.04***	0.04***	0.05***	0.04***
	(4.16)	(7.42)	(2.88)	(3.96)
Legal central bank independence (aggregate index)	−0.00	−0.02*	0.02	−0.01
	(−0.20)	(−1.77)	(0.40)	(−0.23)
Rate of turnover of central bank governor	0.10***	−0.02	0.09***	
	(6.23)	(−1.28)	(4.05)	
Decomposed turnover[a]				
High turnover range				0.10***
				(5.92)
Low turnover range				0.08**
				(1.95)
Dummy: 1950–59	−0.01	0.00	−0.03	−0.01
	(−1.46)	(0.80)	(−1.52)	(−1.48)
Dummy: 1960–71	−0.03***	−0.01***	−0.04***	−0.03***
	(−3.87)	(−3.14)	(−3.22)	(−3.88)
Dummy: 1972–79	−0.01	−0.00	−0.01	−0.01
	(−1.29)	(−0.77)	(−1.13)	(−1.27)
R^2	0.19	0.18	0.15	0.19
Number of observations	215	79	136	215

Note: The dependent variable is the standard deviation of transformed inflation (D). The t-statistics are reported in parentheses under estimated coefficients. * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

a. The rate of turnover is in the high range if there are 0.25 or more turnovers per year; it is in the low range if there are fewer than 0.25.

Central Bank Independence and the Growth of Credit to the Government

Providing credit to the government would seem to be the most important channel through which the lack of central bank independence leads to inflation because the issue of how to finance its budget deficit is immediately relevant to the government. Providing credit to private and publicly owned business also contributes to inflation, however, as do problems with managing exchange rates. Political authorities are very concerned with these issues as they affect unemployment, bankruptcy rates, export incentives, and the domestic currency cost of imports. Although a systematic evaluation of these considerations lies beyond the scope of this article, we can at least examine the relation between central bank independence and its extension of credit to the government.

Regressing the rate of growth of credit from the bank to the public sector on the two main indicators of central bank independence—the legal independence of the central bank and turnover variables—reveals a pattern similar to, but generally less strong than, what was found with the regressions for the transformed inflation rate (table 10). The aggregate index of legal variables was not significant at all, even in the industrial-country subsample. Turnover of the central bank governor contributes significantly to explaining credit growth to the public sector, although variation of turnover at low rates does not matter much. Within the subsamples of country groups, the coefficients are not statis-

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tically significant. Yet they are consistent with the following two hypotheses. The first is that among industrial countries more legal independence limits credit expansion to the public sector, whereas the turnover rate is too low to matter much. The second is that among developing countries higher turnover reflects lower independence, which contributes to faster credit expansion, but the law does not matter much.

That the results for the growth of central bank credit are weaker than the results for inflation suggests that issues other than deficit financing are more important than we had originally thought.

An Overall Index of Inflation-Based Central Bank Independence

Legal independence and turnover capture different dimensions of central bank independence, and each seems to be important for a different subset of countries. This section combines the indicators with a weighting scheme in order to obtain an overall measure of central bank independence. Such weighting is perforce arbitrary, but we reduce the arbitrariness by setting the weights equal to the coefficients from the regressions in which they are used to explain the variation in the transformed inflation variable (D). In this sense, the resulting index of overall independence is based on inflation.

Different regressions for the industrial and developing countries generate the measures of overall central bank independence for members of each group. For

Table 10. *The Rate of Growth of Central Bank Credit to the Public Sector, 1950–89*

Explanatory variable	*All countries*	*Industrial countries*	*Developing countries*	*All countries with decomposed turnover variable*
Intercept	0.22***	0.14**	0.27**	0.22***
	(3.06)	(2.15)	(2.34)	(2.71)
Legal central bank independence (aggregate index)	−0.05	−0.13	0.20	−0.05
	(−0.33)	(−1.21)	(0.67)	(−0.33)
Rate of turnover of central bank governor	0.46***	−0.06	0.27	
	(3.48)	(−0.27)	(1.52)	
Decomposed turnover[a]				
High turnover range				0.46***
				(3.38)
Low turnover range				0.45
				(1.46)
Dummy: 1950–59	−0.19***	−0.09*	−0.20*	−0.19***
	(−2.80)	(−1.67)	(−1.79)	(−2.79)
Dummy: 1960–71	−0.15***	−0.01	−0.22***	−0.15***
	(−2.73)	(−0.28)	(−2.66)	(−2.71)
Dummy: 1972–79	−0.01	0.10**	−0.06	−0.01
	(−0.16)	(2.12)	(−0.83)	(−0.16)
R^2	0.13	0.14	0.06	0.12
Number of observations	175	68	107	175

Note: The dependent variable is the rate of growth of central bank credit to the public sector. The t-statistics are reported in parentheses under estimated coefficients. * indicates significance at the 10 percent level, ** at the 5 percent level, and *** at the 1 percent level.

a. The rate of turnover is in the high range if there are 0.25 or more turnovers per year; it is in the low range if there are fewer than 0.25.

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the industrial countries, the equation has only the aggregate index of legal independence, because the coefficient on turnover in tables 7 and 8 had a sign contrary to the prediction and because virtually all the observations from the industrial countries had turnover rates below the relevant threshold. For developing countries, the equation has both turnover and the index of legal independence. The two equations have the same left-side variable, D, and so the predicted values of D offer an inflation-based indicator or index of central bank independence that is comparable across the two subsamples. We estimated the equations across all periods. Table 11 shows the countries ranked by their

Table 11. *Ranking of Central Banks by an Overall Index of Independence during the 1980s*

Economy	Transformed inflation rate (D)		Legal central bank independence (aggregate index)	Rate of turnover of central bank governor
	Fitted	Actual		
Germany, Fed. Rep. of	0.04	0.02	0.69	n.a.
Switzerland	0.05	0.03	0.64	n.a.
Austria	0.05	0.03	0.61	n.a.
Denmark	0.05	0.05	0.50	n.a.
United States	0.05	0.04	0.48	n.a.
Canada	0.06	0.05	0.45	n.a.
Ireland	0.06	0.07	0.44	n.a.
Netherlands	0.06	0.02	0.42	n.a.
Australia	0.06	0.07	0.36	n.a.
Iceland	0.06	0.24	0.34	n.a.
Luxembourg	0.06	0.04	0.33	n.a.
Sweden	0.06	0.06	0.29	n.a.
Finland	0.07	0.06	0.28	n.a.
United Kingdom	0.07	0.05	0.27	n.a.
Italy	0.07	0.08	0.25	n.a.
New Zealand	0.07	0.09	0.24	n.a.
France	0.07	0.06	0.24	n.a.
Spain	0.07	0.08	0.23	n.a.
Japan	0.07	0.02	0.18	n.a.
Norway	0.07	0.07	0.17	n.a.
Belgium	0.07	0.04	0.17	n.a.
Qatar	0.11	0.03	0.20	0.00
Nepal	0.14	0.08	0.18	0.10
Zimbabwe	0.14	0.11	0.20	0.10
Hungary	0.14	0.07	0.24	0.10
Thailand	0.14	0.04	0.27	0.10
Nigeria	0.14	0.16	0.37	0.10
Barbados	0.14	0.05	0.38	0.10
Lebanon	0.14	—	0.40	0.10
Ethiopia	0.14	0.04	0.40	0.10
Honduras	0.14	0.05	0.43	0.10
Tanzania	0.14	0.21	0.44	0.10
Morocco	0.16	0.06	0.14	0.20
Yugoslavia	0.17	0.51	0.17	0.20
Taiwan	0.17	0.03	0.21	0.20

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indexes of central bank independence during the 1980s. The actual values of D in the 1980s are presented too, for comparison, along with the legal independence variable for all countries and the turnover variable for the developing countries.

The overall index usually classifies extreme cases in the expected ranges. Thus Germany and the United States are classified near the top and Argentina, Brazil, and Venezuela toward the bottom. For 24 out of the 71 countries (with inflation data) in table 11, the distance between the actual and the predicted transformed inflation rate (D) is less than or equal to 0.03.

Table 11. *(continued)*

Economy	*Transformed inflation rate (D)*		*Legal central bank independence (aggregate index)*	*Rate of turnover of central bank governor*
	Fitted	*Actual*		
Panama	0.17	0.02	0.22	0.20
South Africa	0.17	0.12	0.25	0.20
Colombia	0.17	0.17	0.27	0.20
Indonesia	0.17	0.07	0.27	0.20
Romania	0.17	—	0.30	0.20
Ghana	0.17	0.28	0.31	0.20
Malaysia	0.17	0.03	0.36	0.20
Uganda	0.17	0.47	0.38	0.20
Israel	0.17	0.47	0.39	0.20
Bahamas, The	0.17	0.05	0.41	0.20
Zaire	0.17	0.34	0.43	0.20
Philippines	0.17	0.11	0.43	0.20
Kenya	0.17	0.09	0.44	0.20
Malta	0.17	0.02	0.44	0.20
Greece	0.17	0.14	0.55	0.20
Pakistan	0.19	0.06	0.21	0.30
Uruguay	0.19	0.33	0.24	0.30
China	0.19	0.07	0.29	0.30
India	0.19	0.07	0.34	0.30
Mexico	0.19	0.38	0.34	0.30
Portugal	0.20	0.14	0.41	0.30
Peru	0.20	0.64	0.43	0.30
Egypt	0.20	0.13	0.49	0.30
Botswana	0.22	0.09	0.33	0.40
Nicaragua	0.22	0.67	0.45	0.40
Turkey	0.22	0.28	0.46	0.40
Costa Rica	0.22	0.19	0.47	0.40
Poland	0.25	0.29	0.10	0.50
Korea, Republic of	0.25	0.05	0.27	0.50
Zambia	0.25	0.25	0.33	0.50
Venezuela	0.25	0.16	0.43	0.50
Western Samoa	0.27	0.05	0.30	0.56
Singapore	0.28	0.02	0.29	0.60
Brazil	0.33	0.68	0.21	0.80
Chile	0.33	0.15	0.46	0.80
Argentina	0.39	0.74	0.40	1.00

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The coefficient of rank correlation between the actual and predicted real depreciation of money is 0.25 for the countries in table 11, which indicates that the combination of variables for turnover and legal central bank independence can predict a reasonable amount of the cross-country variation in inflation in the 1980s. Using only the legal variable (and country group dummies), the coefficient of rank correlation is merely 0.19. The inclusion of turnover in the construction of an index of central bank independence improves the ability of this index to predict cross-country variations in inflation. Argentina and Brazil would have been ranked as 55th and 29th from the top in legal independence alone, instead of 71st and 69th in the overall index of independence. The large change of rankings reflects the effect of the turnover variable, which is very high for Argentina and Brazil. In most other cases, where including the turnover variable substantially improved the prediction of a country's inflation, low turnover brought the prediction down closer to the actual.

All the industrial countries are above the median of overall independence (D predicted 0.17), and most of the developing countries are below it. Among the countries with overall independence above the median—D estimated below the median—only two (Iceland and Tanzania) have actual D values above 0.17. This indicates that a reasonably high overall independence is highly likely to prevent high inflation. All of the countries with inflation above 50 percent (D 0.33) have less than median central bank independence. For 11 countries, however, the actual D is less than 0.17, even though they have lower-than-median overall central bank independence (estimated D above 0.17). In other words, lower-than-median levels of overall central bank independence do not necessarily lead to high inflation.

These findings are consistent with the view that below-median independence by itself does not necessarily result in high inflation. When there are adverse shocks, however, countries with independence levels within the low range are more likely to develop high and even exceptionally high rates of inflation.

Austria, The Bahamas, Belgium, Luxembourg, Netherlands, and Panama have lower inflation in the 1980s than their central bank independence would indicate, because their monetary policy is dominated by a policy rule fixing their exchange rate to a relatively stable currency. Korea and Japan have lower inflation than their indicators of central bank independence predict, probably because the governments, to which their central banks are subservient, have their own commitment to price stability. These examples demonstrate that high central bank independence is not necessary for price stability.

IV. Conclusions

The notion of central bank independence underlying this study is not unconditional independence from government, but rather the independence to pursue the objective of price stability, even at the cost of other objectives that may be more important to the political authorities. Thus, our measures of independence

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include indexes of institutional independence such as appointment procedures, as well as measures of the relative importance attached to price stability in the central bank law and in practice.

Unavoidably, there were subjective or arbitrary decisions in coding, classifying, and weighing legal information and responses to questionnaires. Results of sensitivity analysis offer some reassurance that the main results are robust, but questions about various details may remain. This study aims to contribute to the systematization of future work by committing to a systematic and documented way of characterizing central bank independence.

The study produces four different rankings of independence of central banks. The first is by legal independence, and the second is by governors' turnover rates. The third ranking utilizes responses of specialists to a questionnaire on central bank independence. The fourth ranking is based on an aggregation of the first two.

Legal independence is an important and statistically significant determinant of price stability among industrial countries, but not among developing countries. Within the latter group, some countries have elaborately locked cookie boxes, to borrow a metaphor from the beginning of the article, but some of them either break or undo the lock when they are hungry. An important step in creating an independent central bank, therefore, must involve establishing respect for the central bank charter and management, even when they are not ideal. The rate of turnover of the governors contributes significantly to explaining inflation, and it is even more important in explaining variations in inflation across the overall sample of countries. An inflation-based index of overall central bank independence—combining legal and turnover information—contributes significantly to explaining cross-country variations in the rate of inflation. These results seem robust to possible biases due to reverse causality. The results imply that the discrepancies between actual and legal independence are wider on average in developing countries than in the industrial countries. The turnover rate was not significant in explaining variations of inflation within the industrial group.

Preliminary evidence from the 1980s suggests that when questionnaire variables are used to explain variations in inflation, there is some additional information in the rate of governors' turnover but not in the legal variables.

There seems to be a vicious circle between inflation and the lack of central bank independence, which deserves fuller investigation. Preliminary results here indicate a two-way (positive in both directions) causality between inflation and turnover of central bank governors, a proxy for lack of independence. Lower independence induces higher future inflation, which, in turn, reduces the subsequent actual level of central bank independence, and so on. Success in controlling inflation, however, seems to enhance the independence of central banks.

Finally, central bank independence is only one of several institutional devices for ensuring price stability. Some of the structural and political determinants of central bank independence are discussed in Cukierman (1992a, chap. 23, and 1992b).

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Table A-1. *Disaggregated and Aggregated Legal Central Bank Independence Variables, by Country and Decade*

	Disaggregated legal variables																
	CEO variables				*Policy formulation variables*			*Central bank*	*Limitations on lending variables*								*Aggregate legal*
Economy and decade	*Term of office (1a)*	*Who appoints (1b)*	*Dismissal (1c)*	*Other offices (1d)*	*Who formulates (2a)*	*Final authority (2b)*	*Role in budget (2c)*	*objectives variable (3)*	*Advances (4a)*	*Securitized lending (4b)*	*Terms of lending (4c)*	*Potential borrowers (4d)*	*Type of limit (4e)*	*Maturity of loans (4f)*	*Interest rates (4g)*	*Primary market (4h)*	*central bank independence variable*
Argentina																	
1972–79	0.25	0.25	0.83	1.00	0.33	0.00	0.00	0.40	0.33	0.33	0.33	1.00	0.33	1.00	0.50	0.00	0.40
1980–89	0.25	0.25	0.83	1.00	0.33	0.00	0.00	0.40	0.33	0.33	0.33	1.00	0.33	1.00	0.50	0.00	0.40
Australia																	
1960–71	0.75	0.00	0.83	1.00	0.33	0.20	0.00	0.40	0.33	0.00	0.33	0.00	—	0.67	1.00	0.00	0.36
1972–79	0.75	0.00	0.83	1.00	0.33	0.20	0.00	0.40	0.33	0.00	0.33	0.00	—	0.67	1.00	0.00	0.36
1980–89	0.75	0.00	0.83	1.00	0.33	0.20	0.00	0.40	0.33	0.00	0.33	0.00	—	0.67	1.00	0.00	0.36
Austria																	
1950–59	0.50	0.00	0.83	1.00	0.67	0.60	0.00	0.60	1.00	0.67	0.33	1.00	1.00	1.00	1.00	0.00	0.65
1960–71	0.50	0.00	0.83	1.00	0.67	0.60	0.00	0.60	1.00	0.67	0.33	1.00	1.00	1.00	1.00	0.00	0.65
1972–79	0.50	0.00	0.83	1.00	1.00	0.60	0.00	0.60	1.00	0.67	0.33	0.33	0.33	1.00	1.00	0.00	0.61
1980–89	0.50	0.00	0.83	1.00	1.00	0.60	0.00	0.60	1.00	0.67	0.33	0.33	0.33	1.00	1.00	0.00	0.61
Bahamas, The																	
1972–79	0.50	0.00	0.83	0.50	0.33	—	0.00	0.60	0.33	0.33	0.33	1.00	0.33	1.00	0.25	0.00	0.41
1980–89	0.50	0.00	0.83	0.50	0.33	—	0.00	0.60	0.33	0.33	0.33	1.00	0.33	1.00	0.25	0.00	0.41
Barbados																	
1972–79	0.50	0.00	0.83	0.00	0.33	0.20	0.00	0.80	0.33	0.33	0.33	0.67	—	0.33	0.25	0.00	0.38
1980–89	0.50	0.00	0.83	0.00	0.33	0.20	0.00	0.80	0.33	0.33	0.33	0.67	—	0.33	0.25	0.00	0.38
Belgium																	
1950–59	0.50	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	—	1.00	0.50	0.00	0.15
1960–71	0.50	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.33	—	1.00	0.50	0.00	0.15
1972–79	0.50	0.00	0.00	0.50	0.00	0.20	0.00	0.00	0.00	0.00	0.33	0.33	—	1.00	0.50	0.00	0.17
1980–89	0.50	0.00	0.00	0.50	0.00	0.20	0.00	0.00	0.00	0.00	0.33	0.33	—	1.00	0.50	0.00	0.17
Bolivia																	
1950–59	0.00	0.00	0.83	1.00	0.67	0.20	0.00	0.60	0.33	0.00	0.00	0.00	0.00	1.00	0.25	0.00	0.30
1960–71	0.00	0.00	0.83	1.00	0.67	0.20	0.00	0.60	0.33	0.00	0.00	0.00	0.00	1.00	0.25	0.00	0.30
1972–79	0.00	0.00	0.83	1.00	0.67	0.20	0.00	0.60	0.33	0.00	0.00	0.00	0.00	1.00	0.25	0.00	0.30
1980–89	0.00	0.00	0.83	1.00	0.67	0.20	0.00	0.60	0.33	0.00	0.00	0.00	0.00	1.00	0.25	0.00	0.30

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Botswana																	
1972–79	0.50	0.00	0.83	0.50	—	0.00	0.00	0.20	0.33	0.67	0.33	0.67	0.33	0.33	0.25	0.00	0.33
1980–89	0.50	0.00	0.83	0.50	—	0.00	0.00	0.20	0.33	0.67	0.33	0.67	0.33	0.33	0.25	0.00	0.33
Brazil																	
1960–71	0.00	0.50	0.00	0.00	0.33	—	0.00	0.00	0.67	0.00	0.00	1.00	—	0.00	0.25	0.00	0.21
1972–79	0.00	0.50	0.00	0.00	0.33	—	0.00	0.00	0.67	0.00	0.00	1.00	—	0.00	0.25	0.00	0.21
1980–89	0.00	0.50	0.00	0.00	0.33	—	0.00	0.00	0.67	0.00	0.00	1.00	—	0.00	0.25	0.00	0.21
Canada																	
1950–59	0.75	0.75	0.83	1.00	0.33	0.20	0.00	0.20	0.33	0.67	0.44	0.67	0.33	0.67	0.75	0.00	0.45
1960–71	0.75	0.75	0.83	1.00	0.33	0.20	0.00	0.20	0.33	0.33	0.67	0.67	0.33	0.67	0.75	0.00	0.45
1972–79	0.75	0.75	0.83	1.00	0.33	0.20	0.00	0.20	0.33	0.33	0.67	0.67	0.33	0.67	0.75	0.00	0.45
1980–89	0.75	0.75	0.83	1.00	0.33	0.20	0.00	0.20	0.33	0.33	0.67	0.67	0.33	0.67	0.75	0.00	0.45
Chile																	
1950–59	0.00	1.00	1.00	0.50	0.67	0.00	0.00	0.20	0.00	0.00	0.67	0.00	—	0.00	0.25	0.00	0.26
1960–71	0.00	1.00	1.00	0.50	0.67	0.00	0.00	0.20	0.00	0.00	0.67	0.00	—	0.00	0.25	0.00	0.26
1972–79	0.50	0.00	0.83	0.50	0.67	0.20	0.00	0.80	0.33	0.33	0.67	1.00	—	0.00	0.25	0.00	0.46
1980–89	0.50	0.00	0.83	0.50	0.67	0.20	0.00	0.80	0.33	0.33	0.67	1.00	—	0.00	0.25	0.00	0.46
China																	
1950–59	0.50	—	—	0.00	—	0.80	0.00	0.20	—	0.33	0.00	—	—	0.00	0.25	1.00	0.29
1960–71	0.50	—	—	0.00	—	0.80	0.00	0.20	—	0.33	0.00	—	—	0.00	0.25	1.00	0.29
1972–79	0.50	—	—	0.00	—	0.80	0.00	0.20	—	0.33	0.00	—	—	0.00	0.25	1.00	0.29
1980–89	0.50	—	—	0.00	—	0.80	0.00	0.20	—	0.33	0.00	—	—	0.00	0.25	1.00	0.29
Colombia																	
1960–71	0.00	0.75	0.83	0.00	0.00	0.20	0.00	0.00	0.67	0.00	0.33	0.00	0.67	0.67	0.25	0.00	0.27
1972–79	0.00	0.75	0.83	0.00	0.00	0.20	0.00	0.00	0.67	0.00	0.33	0.00	0.67	0.67	0.25	0.00	0.27
1980–89	0.00	0.75	0.83	0.00	0.00	0.20	0.00	0.00	0.67	0.00	0.33	0.00	0.67	0.67	0.25	0.00	0.27
Costa Rica																	
1960–71	—	1.00	0.67	1.00	—	—	0.00	0.60	0.67	0.33	0.33	0.33	0.00	0.67	0.25	0.00	0.47
1972–79	—	1.00	0.67	1.00	—	—	0.00	0.60	0.67	0.33	0.33	0.33	0.00	0.67	0.25	0.00	0.47
1980–89	—	1.00	0.67	1.00	—	—	0.00	0.60	0.67	0.33	0.33	0.33	0.00	0.67	0.25	0.00	0.47
Denmark																	
1950–59	0.00	0.00	0.33	0.00	—	1.00	0.00	0.60	1.00	0.33	0.67	0.00	—	1.00	0.25	0.00	0.50
1960–71	0.00	0.00	0.33	0.00	—	1.00	0.00	0.60	1.00	0.33	0.67	0.00	—	1.00	0.25	0.00	0.50
1972–79	0.00	0.00	0.33	0.00	—	1.00	0.00	0.60	1.00	0.33	0.67	0.00	—	1.00	0.25	0.00	0.50
1980–89	0.00	0.00	0.33	0.00	—	1.00	0.00	0.60	1.00	0.33	0.67	0.00	—	1.00	0.25	0.00	0.50

(*Table continues on the following page.*)

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Table A-1. *(continued)*

	Disaggregated legal variables																
	CEO variables				Policy formulation variables			Central bank	Limitations on lending variables								Aggregate legal central bank independence variable
Economy and decade	Term of office (1a)	Who appoints (1b)	Dismissal (1c)	Other offices (1d)	Who formulates (2a)	Final authority (2b)	Role in budget (2c)	objectives variable (3)	Advances (4a)	Securitized lending (4b)	Terms of lending (4c)	Potential borrowers (4d)	Type of limit (4e)	Maturity of loans (4f)	Interest rates (4g)	Primary market (4h)	
Egypt																	
1950–59	0.50	0.50	1.00	1.00	0.33	0.00	0.00	0.60	0.67	0.67	0.33	1.00	0.33	0.00	0.25	0.00	0.52
1960–71	0.50	0.50	1.00	1.00	0.33	0.00	0.00	0.60	0.67	0.67	0.33	1.00	0.33	0.00	0.25	0.00	0.52
1972–79	0.50	0.50	1.00	0.00	0.33	0.00	0.00	0.60	0.67	0.67	0.33	1.00	0.67	0.67	0.25	0.00	0.49
1980–89	0.50	0.50	1.00	0.00	0.33	0.00	0.00	0.60	0.67	0.67	0.33	1.00	0.67	0.67	0.25	0.00	0.49
Ethiopia																	
1960–71	0.50	0.25	0.00	0.00	—	—	—	0.60	—	—	—	—	—	0.00	0.25	0.00	—
1972–79	0.00	0.25	0.00	0.00	—	1.00	1.00	0.00	0.33	0.33	0.67	1.00	0.33	0.67	0.50	0.00	0.40
1980–89	0.00	0.25	0.00	0.00	—	1.00	1.00	0.00	0.33	0.33	0.67	1.00	0.33	0.67	0.50	0.00	0.40
Finland																	
1950–59	1.00	0.00	—	0.00	—	0.00	0.00	0.80	0.00	0.00	0.67	—	—	0.00	0.25	0.00	0.28
1960–71	1.00	0.00	—	0.00	—	0.00	0.00	0.80	0.00	0.00	0.67	—	—	0.00	0.25	0.00	0.28
1972–79	1.00	0.00	—	0.00	—	0.00	0.00	0.80	0.00	0.00	0.67	—	—	0.00	0.25	0.00	0.28
1980–89	1.00	0.00	—	0.00	—	0.00	0.00	0.80	0.00	0.00	0.67	—	—	0.00	0.25	0.00	0.28
France																	
1950–59	0.00	0.25	1.00	0.50	0.33	0.60	0.00	0.20	0.33	0.00	0.33	0.00	1.00	0.00	0.00	0.00	0.28
1960–71	0.00	0.25	1.00	0.50	0.33	0.60	0.00	0.20	0.33	0.00	0.33	1.00	1.00	1.00	0.00	0.00	0.36
1972–79	0.00	0.25	1.00	0.50	0.67	0.60	0.00	0.00	0.00	0.00	0.33	1.00	—	—	—	0.00	0.24
1980–89	0.00	0.25	1.00	0.50	0.67	0.60	0.00	0.00	0.00	0.00	0.33	1.00	—	—	—	0.00	0.24
Germany, Fed. Rep. of																	
1950–59	1.00	0.75	1.00	0.00	0.67	1.00	0.00	1.00	0.67	0.67	0.67	0.33	1.00	1.00	0.25	0.00	0.69
1960–71	1.00	0.75	1.00	0.00	0.67	1.00	0.00	1.00	0.67	0.67	0.67	0.33	1.00	1.00	0.25	0.00	0.69
1972–79	1.00	0.75	1.00	0.00	0.67	1.00	0.00	1.00	0.67	0.67	0.67	0.33	1.00	1.00	0.25	0.00	0.69
1980–89	1.00	0.75	1.00	0.00	0.67	1.00	0.00	1.00	0.67	0.67	0.67	0.33	1.00	1.00	0.25	0.00	0.69

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Ghana																	
1950–59	0.50	0.00	0.83	0.50	0.33	0.00	0.00	0.60	0.67	0.67	0.33	1.00	0.33	0.67	0.75	0.00	0.49
1960–71	0.50	0.00	0.83	0.50	0.33	0.00	0.00	0.60	0.00	0.33	0.33	0.00	0.33	1.00	0.50	0.00	0.31
1972–79	0.50	0.00	0.83	0.50	0.33	0.00	0.00	0.60	0.00	0.33	0.33	0.00	0.33	1.00	0.50	0.00	0.31
1980–89	0.50	0.00	0.83	0.50	0.33	0.00	0.00	0.60	0.00	0.33	0.33	0.00	0.33	1.00	0.50	0.00	0.31
Greece																	
1950–59	0.25	0.75	0.67	0.50	0.33	0.60	0.00	0.80	0.67	0.67	0.33	0.33	1.00	0.67	0.75	0.00	0.56
1960–71	0.25	0.75	0.67	0.50	0.33	0.60	0.00	0.80	0.33	0.67	0.33	0.33	1.00	0.67	0.75	0.00	0.51
1972–79	0.25	0.75	0.67	0.50	0.33	0.60	0.00	0.80	0.67	0.67	0.33	0.00	1.00	1.00	0.75	0.00	0.55
1980–89	0.25	0.75	0.67	0.50	0.33	0.60	0.00	0.80	0.67	0.67	0.33	0.00	1.00	1.00	0.75	0.00	0.55
Honduras																	
1950–59	0.75	0.00	0.83	1.00	0.33	1.00	0.00	0.00	—	0.33	0.67	0.33	0.33	0.67	0.25	0.00	0.43
1960–71	0.75	0.00	0.83	1.00	0.33	1.00	0.00	0.00	—	0.33	0.67	0.33	0.33	0.67	0.25	0.00	0.43
1972–79	0.75	0.00	0.83	1.00	0.33	1.00	0.00	0.00	—	0.33	0.67	0.33	0.33	0.67	0.25	0.00	0.43
1980–89	0.75	0.00	0.83	1.00	0.33	1.00	0.00	0.00	—	0.33	0.67	0.33	0.33	0.67	0.25	0.00	0.43
Hungary																	
1950–59	0.50	0.25	1.00	0.00	0.33	0.00	0.00	0.40	0.00	0.00	0.00	0.33	1.00	0.67	1.00	0.00	0.24
1960–71	0.50	0.25	1.00	0.00	0.33	0.00	0.00	0.40	0.00	0.00	0.00	0.33	1.00	0.67	1.00	0.00	0.24
1972–79	0.50	0.25	1.00	0.00	0.33	0.00	0.00	0.40	0.00	0.00	0.00	0.33	1.00	0.67	1.00	0.00	0.24
1980–89	0.50	0.25	1.00	0.00	0.33	0.00	0.00	0.40	0.00	0.00	0.00	0.33	1.00	0.67	1.00	0.00	0.24
Iceland																	
1950–59	1.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1960–71	1.00	0.75	0.83	0.50	0.33	0.20	0.00	0.40	0.00	0.00	0.33	1.00	—	0.33	0.25	0.00	0.34
1972–79	1.00	0.75	0.83	0.50	0.33	0.20	0.00	0.40	0.00	0.00	0.33	1.00	—	0.33	0.25	0.00	0.34
1980–89	1.00	0.75	0.83	0.50	0.33	0.20	0.00	0.40	0.00	0.00	0.33	1.00	—	0.33	0.25	0.00	0.34
India																	
1950–59	0.50	0.25	0.83	0.50	—	0.00	0.00	0.40	0.00	0.00	0.33	0.33	1.00	0.33	0.25	0.00	0.25
1960–71	0.50	0.25	0.83	0.50	—	0.00	0.00	0.40	0.33	0.00	0.67	0.33	1.00	0.33	0.25	0.00	0.34
1972–79	0.50	0.25	0.83	0.50	—	0.00	0.00	0.40	0.33	0.00	0.67	0.33	1.00	0.33	0.25	0.00	0.34
1980–89	0.50	0.25	0.83	0.50	—	0.00	0.00	0.40	0.33	0.00	0.67	0.33	1.00	0.33	0.25	0.00	0.34
Indonesia																	
1950–59	0.50	0.25	0.00	0.50	0.67	0.00	0.00	0.00	0.33	0.33	0.00	1.00	0.33	0.00	0.25	0.00	0.24
1960–71	0.50	0.25	0.00	0.50	0.67	0.00	0.00	0.40	0.33	0.33	0.00	1.00	0.33	0.00	0.25	0.00	0.30
1972–79	0.50	0.25	0.00	0.50	0.67	0.20	0.00	0.40	0.00	0.00	0.33	1.00	0.33	0.33	0.25	0.00	0.27
1980–89	0.50	0.25	0.00	0.50	0.67	0.20	0.00	0.40	0.00	0.00	0.33	1.00	0.33	0.33	0.25	0.00	0.27

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Table A-1. *(continued)*

Economy and decade	Disaggregated legal variables																Aggregate legal central bank independence variable
	CEO variables				Policy formulation variables			Central bank objectives variable	Limitations on lending variables								
	Term of office (1a)	Who appoints (1b)	Dismissal (1c)	Other offices (1d)	Who formulates (2a)	Final authority (2b)	Role in budget (2c)	(3)	Advances (4a)	Securitized lending (4b)	Terms of lending (4c)	Potential borrowers (4d)	Type of limit (4e)	Maturity of loans (4f)	Interest rates (4g)	Primary market (4h)	
Ireland																	
1950–59	0.75	0.50	0.83	1.00	—	—	0.00	0.80	—	0.00	0.33	0.33	—	0.67	0.75	0.00	0.44
1960–71	0.75	0.50	0.83	1.00	—	—	0.00	0.80	—	0.00	0.33	0.33	—	0.67	0.75	0.00	0.44
1972–79	0.75	0.50	0.83	1.00	—	—	0.00	0.80	—	0.00	0.33	0.33	—	0.67	0.75	0.00	0.44
1980–89	0.75	0.50	0.83	1.00	—	—	0.00	0.80	—	0.00	0.33	0.33	—	0.67	0.75	0.00	0.44
Israel																	
1950–59	0.50	0.50	0.50	0.50	0.67	0.20	0.00	0.40	0.33	0.00	0.67	1.00	0.00	0.67	0.25	0.00	0.39
1960–71	0.50	0.50	0.50	0.50	0.67	0.20	0.00	0.40	0.33	0.00	0.67	1.00	0.00	0.67	0.25	0.00	0.39
1972–79	0.50	0.50	0.50	0.50	0.67	0.20	0.00	0.40	0.33	0.00	0.67	1.00	0.00	0.67	0.25	0.00	0.39
1980–89	0.50	0.50	0.50	0.50	0.67	0.20	0.00	0.40	0.33	0.00	0.67	1.00	0.00	0.67	0.25	0.00	0.39
Italy																	
1950–59	0.00	0.75	0.67	1.00	—	—	0.00	0.20	0.33	0.00	0.33	—	0.00	0.00	0.25	0.00	0.25
1960–71	0.00	0.75	0.67	1.00	—	—	0.00	0.20	0.33	0.00	0.33	—	0.00	0.00	0.25	0.00	0.25
1972–79	0.00	0.75	0.67	1.00	—	—	0.00	0.20	0.33	0.00	0.33	—	0.00	0.00	0.25	0.00	0.25
1980–89	0.00	0.75	0.67	1.00	—	—	0.00	0.20	0.33	0.00	0.33	—	0.00	0.00	0.25	0.00	0.25
Japan																	
1950–59	0.50	0.25	0.83	0.50	0.67	0.00	0.00	0.00	0.00	0.00	0.33	—	—	0.00	0.25	0.00	0.18
1960–71	0.50	0.25	0.83	0.50	0.67	0.00	0.00	0.00	0.00	0.00	0.33	—	—	0.00	0.25	0.00	0.18
1972–79	0.50	0.25	0.83	0.50	0.67	0.00	0.00	0.00	0.00	0.00	0.33	—	—	0.00	0.25	0.00	0.18
1980–89	0.50	0.25	0.83	0.50	0.67	0.00	0.00	0.00	0.00	0.00	0.33	—	—	0.00	0.25	0.00	0.18
Kenya																	
1960–71	0.25	0.00	0.83	0.50	—	0.20	0.00	0.40	0.67	0.67	0.33	0.33	1.00	0.67	0.75	0.00	0.44
1972–79	0.25	0.00	0.83	0.50	—	0.20	0.00	0.40	0.67	0.67	0.33	0.33	1.00	0.67	0.75	0.00	0.44
1980–89	0.25	0.00	0.83	0.50	—	0.20	0.00	0.40	0.67	0.67	0.33	0.33	1.00	0.67	0.75	0.00	0.44

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Korea, Republic of																	
1950–59	0.25	0.25	0.83	0.00	0.33	—	0.00	0.60	0.33	0.00	0.33	0.00	—	0.67	0.25	0.00	0.30
1960–71	0.25	0.25	0.83	0.00	0.33	—	0.00	0.60	0.33	0.00	0.33	0.00	—	0.67	0.25	0.00	0.30
1972–79	0.25	0.25	0.83	0.50	0.33	—	0.00	0.60	0.33	0.00	0.33	0.00	—	0.67	0.25	0.00	0.32
1980–89	0.25	0.25	0.83	0.50	0.33	—	0.00	0.60	0.00	0.00	0.33	0.00	—	0.67	0.25	0.00	0.27
Lebanon																	
1950–59	0.75	0.25	0.83	1.00	0.67	—	0.00	0.00	0.67	0.00	0.33	0.33	0.33	1.00	1.00	0.00	0.40
1960–71	0.75	0.25	0.83	1.00	0.67	—	0.00	0.00	0.67	0.00	0.33	0.33	0.33	1.00	1.00	0.00	0.40
1972–79	0.75	0.25	0.83	1.00	0.67	—	0.00	0.00	0.67	0.00	0.33	0.33	0.33	1.00	1.00	0.00	0.40
1980–89	0.75	0.25	0.83	1.00	0.67	—	0.00	0.00	0.67	0.00	0.33	0.33	0.33	1.00	1.00	0.00	0.40
Luxembourg																	
1980–89	0.75	0.25	0.83	0.00	0.33	—	0.00	0.60	0.00	0.00	0.33	1.00	—	1.00	0.25	0.00	0.33
Malaysia																	
1960–71	0.50	0.00	0.83	0.00	0.00	0.20	0.00	0.60	0.33	—	0.67	0.00	0.33	0.67	0.25	0.00	0.36
1972–79	0.50	0.00	0.83	0.00	0.00	0.20	0.00	0.60	0.33	—	0.67	0.00	0.33	0.67	0.25	0.00	0.36
1980–89	0.50	0.00	0.83	0.00	0.00	0.20	0.00	0.60	0.33	—	0.67	0.00	0.33	0.67	0.25	0.00	0.36
Malta																	
1960–71	0.50	0.50	0.83	1.00	0.00	0.20	0.00	0.40	0.67	0.00	0.33	1.00	0.33	1.00	0.25	0.00	0.44
1972–79	0.50	0.50	0.83	1.00	0.00	0.20	0.00	0.40	0.67	0.00	0.33	1.00	0.33	1.00	0.25	0.00	0.44
1980–89	0.50	0.50	0.83	1.00	0.00	0.20	0.00	0.40	0.67	0.00	0.33	1.00	0.33	1.00	0.25	0.00	0.44
Mexico																	
1950–59	—	0.00	0.83	1.00	0.00	0.20	0.00	0.00	0.00	0.00	0.33	1.00	—	0.67	0.25	0.00	0.25
1960–71	—	1.00	0.83	1.00	0.67	0.20	0.00	0.00	0.00	0.00	0.33	1.00	—	0.67	0.25	0.00	0.34
1972–79	—	1.00	0.83	1.00	0.67	0.20	0.00	0.00	0.00	0.00	0.33	1.00	—	0.67	0.25	0.00	0.34
1980–89	—	1.00	0.83	1.00	0.67	0.20	0.00	0.00	0.00	0.00	0.33	1.00	—	0.67	0.25	0.00	0.34
Morocco																	
1960–71	—	0.25	0.00	0.00	—	—	0.00	0.20	0.33	0.00	0.00	0.33	0.33	0.67	0.25	0.00	0.14
1972–79	—	0.25	0.00	0.00	—	—	0.00	0.20	0.33	0.00	0.00	0.33	0.33	0.67	0.25	0.00	0.14
1980–89	—	0.25	0.00	0.00	—	—	0.00	0.20	0.33	0.00	0.00	0.33	0.33	0.67	0.25	0.00	0.14
Nepal																	
1950–59	0.50	0.25	0.00	0.00	—	0.00	0.00	0.20	0.00	0.00	0.33	1.00	—	0.67	0.25	0.00	0.18
1960–71	0.50	0.25	0.00	0.00	—	0.00	0.00	0.20	0.00	0.00	0.33	1.00	—	0.67	0.25	0.00	0.18
1972–79	0.50	0.25	0.00	0.00	—	0.00	0.00	0.20	0.00	0.00	0.33	1.00	—	0.67	0.25	0.00	0.18
1980–89	0.50	0.25	0.00	0.00	—	0.00	0.00	0.20	0.00	0.00	0.33	1.00	—	0.67	0.25	0.00	0.18

(*Table continues on the following page.*)

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Table A-1. *(continued)*

	Disaggregated legal variables																
	CEO variables				*Policy formulation variables*			*Central bank*	*Limitations on lending variables*								*Aggregate legal*
Economy and decade	*Term of office (1a)*	*Who appoints (1b)*	*Dismissal (1c)*	*Other offices (1d)*	*Who formulates (2a)*	*Final authority (2b)*	*Role in budget (2c)*	*objectives variable (3)*	*Advances (4a)*	*Securitized lending (4b)*	*Terms of lending (4c)*	*Potential borrowers (4d)*	*Type of limit (4e)*	*Maturity of loans (4f)*	*Interest rates (4g)*	*Primary market (4h)*	*central bank independence variable*
Netherlands																	
1950–59	0.75	0.00	0.17	1.00	0.33	0.20	0.00	0.80	0.67	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.42
1960–71	0.75	0.00	0.17	1.00	0.33	0.20	0.00	0.80	0.67	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.42
1972–79	0.75	0.00	0.17	1.00	0.33	0.20	0.00	0.80	0.67	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.42
1980–89	0.75	0.00	0.17	1.00	0.33	0.20	0.00	0.80	0.67	0.00	0.00	1.00	1.00	0.00	0.00	0.00	0.42
New Zealand																	
1950–59	0.50	0.00	0.83	0.00	0.00	0.00	0.00	0.00	—	—	0.00	0.33	0.33	1.00	0.75	0.00	0.18
1960–71	0.50	0.00	0.83	1.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	1.00	—	0.00	0.50	0.00	0.24
1972–79	0.50	0.00	0.83	1.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	1.00	—	0.00	0.50	0.00	0.24
1980–89	0.50	0.00	0.83	1.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	1.00	—	0.00	0.50	0.00	0.24
Nicaragua																	
1960–71	0.00	0.00	0.83	1.00	1.00	—	0.00	0.00	1.00	0.33	0.67	0.00	0.33	0.67	0.50	0.00	0.45
1972–79	0.00	0.00	0.83	1.00	1.00	—	0.00	0.00	1.00	0.33	0.67	0.00	0.33	0.67	0.50	0.00	0.45
1980–89	0.00	0.00	0.83	1.00	1.00	—	0.00	0.00	1.00	0.33	0.67	0.00	0.33	0.67	0.50	0.00	0.45
Nigeria																	
1960–71	0.50	0.00	0.83	0.50	0.33	0.20	0.00	0.60	0.33	0.33	0.33	0.00	0.33	0.67	0.75	0.00	0.37
1972–79	0.50	0.00	0.83	0.50	0.33	0.20	0.00	0.60	0.33	0.33	0.33	0.00	0.33	0.67	0.75	0.00	0.37
1980–89	0.50	0.00	0.83	0.50	0.33	0.20	0.00	0.60	0.33	0.33	0.33	0.00	0.33	0.67	0.75	0.00	0.37
Norway																	
1950–59	0.75	0.00	0.33	1.00	0.00	0.20	0.00	0.00	—	—	0.00	0.00	—	0.67	0.25	0.00	0.20
1960–71	0.75	0.00	0.33	1.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	—	0.67	0.25	0.00	0.15
1972–79	0.75	0.00	0.33	1.00	0.33	0.20	0.00	0.00	0.00	0.00	0.00	0.00	—	0.67	0.50	0.00	0.17
1980–89	0.75	0.00	0.33	1.00	0.33	0.20	0.00	0.00	0.00	0.00	0.00	0.00	—	0.67	0.50	0.00	0.17
Pakistan																	
1950–59	0.50	0.25	0.83	0.50	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.33	—	0.67	0.25	0.00	0.21
1960–71	0.50	0.25	0.83	0.50	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.33	—	0.67	0.25	0.00	0.21
1972–79	0.50	0.25	0.83	0.50	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.33	—	0.67	0.25	0.00	0.21
1980–89	0.50	0.25	0.83	0.50	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.33	—	0.67	0.25	0.00	0.21

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Panama																	
1950–59	—	0.25	0.83	1.00	0.33	0.00	0.00	0.40	0.00	0.00	0.00	0.33	—	0.00	0.25	0.00	0.24
1960–71	—	0.25	0.83	1.00	0.33	0.00	0.00	0.40	0.00	0.00	0.00	0.33	—	0.00	0.25	0.00	0.24
1972–79	—	0.25	0.83	1.00	0.33	0.00	0.00	0.40	0.00	0.00	0.00	0.00	—	0.00	0.25	0.00	0.22
1980–89	—	0.25	0.83	1.00	0.33	0.00	0.00	0.40	0.00	0.00	0.00	0.00	—	0.00	0.25	0.00	0.22
Peru																	
1960–71	0.00	1.00	0.83	1.00	0.67	0.20	0.00	0.40	0.00	0.67	0.67	0.33	0.33	1.00	0.25	0.00	0.43
1972–79	0.00	1.00	0.83	1.00	0.67	0.20	0.00	0.40	0.00	0.67	0.67	0.33	0.33	1.00	0.25	0.00	0.43
1980–89	0.00	1.00	0.83	1.00	0.67	0.20	0.00	0.40	0.00	0.67	0.67	0.33	0.33	1.00	0.25	0.00	0.43
Philippines																	
1950–59	0.75	0.00	0.83	0.50	0.67	0.20	0.00	1.00	0.33	0.00	0.33	0.67	0.33	0.33	0.25	0.00	0.43
1960–71	0.75	0.00	0.83	0.50	0.67	0.20	0.00	1.00	0.33	0.00	0.33	0.67	0.33	0.33	0.25	0.00	0.43
1972–79	0.75	0.00	0.83	0.50	0.67	0.20	0.00	1.00	0.33	0.00	0.33	0.67	0.33	0.33	0.25	0.00	0.43
1980–89	0.75	0.00	0.83	0.50	0.67	0.20	0.00	1.00	0.33	0.00	0.33	0.67	0.33	0.33	0.25	0.00	0.43
Poland																	
1950–59	0.50	0.25	0.00	0.50	0.33	0.00	0.00	0.00	0.00	0.00	0.33	0.00	—	0.67	0.25	0.00	0.14
1960–71	0.50	0.25	0.00	0.50	0.33	0.00	0.00	0.00	0.00	0.00	0.33	0.00	—	0.67	0.25	0.00	0.14
1972–79	0.50	0.25	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.33	0.00	—	0.00	0.25	0.00	0.10
1980–89	0.50	0.25	0.00	0.00	0.67	0.00	0.00	0.00	0.00	0.00	0.33	0.00	—	0.00	0.25	0.00	0.10
Portugal																	
1972–79	0.50	0.25	1.00	1.00	0.33	0.40	0.00	0.60	0.33	0.33	0.67	0.67	0.00	0.67	0.25	0.00	0.48
1980–89	0.00	0.25	1.00	0.00	0.33	0.60	0.00	0.00	0.67	0.67	0.67	0.00	1.00	1.00	0.25	0.00	0.41
Qatar																	
1972–79	0.50	0.25	0.83	0.50	0.33	0.00	0.00	0.40	0.00	0.00	0.00	0.33	—	0.00	0.25	0.00	0.20
1980–89	0.50	0.25	0.83	0.50	0.33	0.00	0.00	0.40	0.00	0.00	0.00	0.33	—	0.00	0.25	0.00	0.20
Romania																	
1950–59	0.50	0.25	1.00	1.00	0.67	0.60	0.00	0.60	0.67	0.33	0.67	0.00	0.67	0.67	0.00	0.00	0.53
1960–71	0.50	0.25	1.00	1.00	0.67	0.60	0.00	0.60	0.67	0.33	0.67	0.00	0.67	0.67	0.00	0.00	0.53
1972–79	—	0.25	—	0.00	1.00	0.80	0.00	0.20	—	—	0.67	0.00	—	0.00	0.25	0.00	0.30
1980–89	—	0.25	—	0.00	1.00	0.80	0.00	0.20	—	—	0.67	0.00	—	0.00	0.25	0.00	0.30
Singapore																	
1972–79	0.25	0.00	0.83	0.00	—	—	0.00	0.60	—	—	0.33	0.00	—	1.00	0.25	0.00	0.29
1980–89	0.25	0.00	0.83	0.00	—	—	0.00	0.60	—	—	0.33	0.00	—	1.00	0.25	0.00	0.29

(*Table continues on the following page.*)

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Table A-1. *(continued)*

	Disaggregated legal variables																
	CEO variables				Policy formulation variables			Central bank	Limitations on lending variables								Aggregate legal
Economy and decade	Term of office (1a)	Who appoints (1b)	Dismissal (1c)	Other offices (1d)	Who formulates (2a)	Final authority (2b)	Role in budget (2c)	objectives variable (3)	Advances (4a)	Securitized lending (4b)	Terms of lending (4c)	Potential borrowers (4d)	Type of limit (4e)	Maturity of loans (4f)	Interest rates (4g)	Primary market (4h)	central bank independence variable
South Africa																	
1950–59	0.50	0.00	0.83	0.50	—	—	0.00	0.20	0.00	0.00	0.33	1.00	—	1.00	0.25	0.00	0.25
1960–71	0.50	0.00	0.83	0.50	—	—	0.00	0.20	0.00	0.00	0.33	1.00	—	1.00	0.25	0.00	0.25
1972–79	0.50	0.00	0.83	0.50	—	—	0.00	0.20	0.00	0.00	0.33	1.00	—	1.00	0.25	0.00	0.25
1980–89	0.50	0.00	0.83	0.50	—	—	0.00	0.20	0.00	0.00	0.33	1.00	—	1.00	0.25	0.00	0.25
Spain																	
1950–59	0.00	0.25	0.00	0.50	0.33	0.00	0.00	0.00	0.33	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.13
1960–71	0.00	0.25	0.00	0.00	0.33	0.00	0.00	0.00	0.33	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.09
1972–79	0.00	0.25	0.00	0.00	0.33	0.00	0.00	0.00	0.33	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.09
1980–89	0.25	0.00	0.00	1.00	0.33	0.00	0.00	0.60	0.33	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.23
Sweden																	
1950–59	0.00	1.00	—	0.50	—	—	0.00	0.20	0.33	0.00	0.67	0.00	1.00	0.67	0.25	0.00	0.29
1960–71	0.00	1.00	—	0.50	—	—	0.00	0.20	0.33	0.00	0.67	0.00	1.00	0.67	0.25	0.00	0.29
1972–79	0.00	1.00	—	0.50	—	—	0.00	0.20	0.33	0.00	0.67	0.00	1.00	0.67	0.25	0.00	0.29
1980–89	0.00	1.00	—	0.50	—	—	0.00	0.20	0.33	0.00	0.67	0.00	1.00	0.67	0.25	0.00	0.29
Switzerland																	
1950–59	0.75	0.25	—	1.00	—	1.00	0.00	0.00	0.67	0.33	0.67	1.00	—	1.00	0.25	0.00	0.53
1960–71	0.75	0.25	—	1.00	—	1.00	0.00	0.00	0.67	0.33	0.67	1.00	—	1.00	0.25	0.00	0.53
1972–79	0.75	0.25	—	1.00	—	1.00	0.00	0.00	0.67	0.33	0.67	1.00	—	1.00	0.25	0.00	0.53
1980–89	0.75	0.25	—	1.00	—	1.00	0.00	0.00	1.00	—	1.00	1.00	—	1.00	0.25	0.00	0.64
Taiwan																	
1980–89	0.50	0.50	1.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.21
Tanzania																	
1960–71	0.25	0.00	0.83	0.50	0.67	0.20	0.00	0.40	0.67	0.33	0.33	1.00	0.33	0.67	0.75	0.00	0.44
1972–79	0.25	0.00	0.83	0.50	0.67	0.20	0.00	0.40	0.67	0.33	0.33	1.00	0.33	0.67	0.75	0.00	0.44
1980–89	0.25	0.00	0.83	0.50	0.67	0.20	0.00	0.40	0.67	0.33	0.33	1.00	0.33	0.67	0.75	0.00	0.44

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Thailand																	
1950–59	0.25	0.50	0.00	0.00	0.00	0.20	0.00	0.60	0.33	0.00	0.33	0.33	0.00	0.67	0.25	0.00	0.27
1960–71	0.25	0.50	0.00	0.00	0.00	0.20	0.00	0.60	0.33	0.00	0.33	0.33	0.00	0.67	0.25	0.00	0.27
1972–79	0.25	0.50	0.00	0.00	0.00	0.20	0.00	0.60	0.33	0.00	0.33	0.33	0.00	0.67	0.25	0.00	0.27
1980–89	0.25	0.50	0.00	0.00	0.00	0.20	0.00	0.60	0.33	0.00	0.33	0.33	0.00	0.67	0.25	0.00	0.27
Turkey																	
1950–59	0.50	0.75	1.00	1.00	0.67	0.20	0.00	0.40	0.33	0.00	0.33	0.00	0.67	1.00	0.25	0.00	0.39
1960–71	0.50	0.75	1.00	1.00	0.67	0.20	0.00	0.40	0.33	0.00	0.33	0.00	0.67	1.00	0.25	0.00	0.39
1972–79	0.50	0.75	0.83	0.00	0.33	0.80	0.00	0.60	0.33	0.67	0.33	0.33	0.00	0.67	0.25	0.00	0.46
1980–89	0.50	0.75	0.83	0.00	0.33	0.80	0.00	0.60	0.33	0.67	0.33	0.33	0.00	0.67	0.25	0.00	0.46
Uganda																	
1960–71	0.50	0.50	0.83	0.50	0.00	0.20	0.00	0.40	0.33	—	0.33	0.33	0.33	1.00	0.75	0.00	0.38
1972–79	0.50	0.50	0.83	0.50	0.00	0.20	0.00	0.40	0.33	—	0.33	0.33	0.33	1.00	0.75	0.00	0.38
1980–89	0.50	0.50	0.83	0.50	0.00	0.20	0.00	0.40	0.33	—	0.33	0.33	0.33	1.00	0.75	0.00	0.38
United Kingdom																	
1950–59	0.50	0.00	0.83	1.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	1.00	—	0.00	0.25	0.00	0.21
1960–71	0.50	0.00	0.83	1.00	0.00	0.00	0.00	0.20	0.67	0.67	0.00	1.00	1.00	1.00	0.75	0.00	0.43
1972–79	0.50	0.00	0.83	1.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	1.00	1.00	1.00	0.75	0.00	0.27
1980–89	0.50	0.00	0.83	1.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	1.00	1.00	1.00	0.75	0.00	0.27
United States																	
1950–59	0.25	0.50	0.00	1.00	—	0.20	0.00	0.40	1.00	0.33	0.33	1.00	—	1.00	0.25	0.00	0.48
1960–71	0.25	0.50	0.00	1.00	—	0.20	0.00	0.40	1.00	0.33	0.33	1.00	—	1.00	0.25	0.00	0.48
1972–79	0.25	0.50	0.00	1.00	—	0.20	0.00	0.40	1.00	0.33	0.33	1.00	—	1.00	0.25	0.00	0.48
1980–89	0.25	0.50	0.00	1.00	—	0.20	0.00	0.40	1.00	0.33	0.33	1.00	—	1.00	0.25	0.00	0.48
Uruguay																	
1950–59	0.25	0.00	—	0.50	0.67	0.00	0.00	0.20	—	—	0.33	0.33	—	0.00	0.25	0.00	0.22
1960–71	0.25	0.00	—	0.50	0.67	0.00	0.00	0.20	—	—	0.33	0.33	—	0.00	0.25	0.00	0.22
1972–79	0.25	0.25	0.83	0.00	0.67	0.20	0.00	0.40	0.00	0.00	0.67	0.00	—	0.00	0.25	0.00	0.24
1980–89	0.25	0.25	0.83	0.00	0.67	0.20	0.00	0.40	0.00	0.00	0.67	0.00	—	0.00	0.25	0.00	0.24
Venezuela																	
1950–59	0.50	0.00	—	0.00	0.00	—	0.00	0.20	—	—	0.67	1.00	—	0.67	0.25	0.00	0.28
1960–71	0.50	0.00	—	0.00	0.00	—	0.00	0.20	—	—	0.67	1.00	—	0.67	0.25	0.00	0.28
1972–79	0.50	0.00	0.83	0.50	0.33	1.00	0.00	0.40	0.67	0.00	0.67	0.00	0.33	0.00	0.50	0.00	0.43
1980–89	0.50	0.00	0.83	0.50	0.33	1.00	0.00	0.40	0.67	0.00	0.67	0.00	0.33	0.00	0.50	0.00	0.43

(*Table continues on the following page.*)

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Table A-1. *(continued)*

	Disaggregated legal variables																
	CEO variables				*Policy formulation variables*			*Central bank objectives variable*	*Limitations on lending variables*								*Aggregate legal central bank independence variable*
Economy and decade	*Term of office (1a)*	*Who appoints (1b)*	*Dismissal (1c)*	*Other offices (1d)*	*Who formulates (2a)*	*Final authority (2b)*	*Role in budget (2c)*		*Advances (4a)*	*Securitized lending (4b)*	*Terms of lending (4c)*	*Potential borrowers (4d)*	*Type of limit (4e)*	*Maturity of loans (4f)*	*Interest rates (4g)*	*Primary market (4h)*	
Western Samoa																	
1980–89	0.25	0.25	0.83	0.00	0.00	0.20	0.00	0.40	0.33	0.33	0.33	0.00	0.33	1.00	0.25	0.00	0.30
Yugoslavia																	
1960–71	0.25	0.25	0.83	0.00	0.00	0.20	0.00	0.40	0.00	—	0.00	0.00	—	0.00	0.25	0.00	0.17
1972–79	0.25	0.25	0.83	0.00	0.00	0.20	0.00	0.40	0.00	—	0.00	0.00	—	0.00	0.25	0.00	0.17
1980–89	0.25	0.25	0.83	0.00	0.00	0.20	0.00	0.40	0.00	—	0.00	0.00	—	0.00	0.25	0.00	0.17
Zaire																	
1972–79	0.50	0.00	1.00	0.00	0.67	0.20	0.00	0.60	—	0.00	0.33	0.33	0.33	0.67	0.75	0.00	0.35
1980–89	0.50	0.00	1.00	1.00	0.67	0.60	0.00	0.40	0.33	0.33	0.33	0.33	0.33	0.67	0.75	0.00	0.43
Zambia																	
1960–71	0.50	0.25	0.83	1.00	0.00	0.20	0.00	0.80	0.33	0.33	0.00	0.33	0.33	0.33	0.75	0.00	0.40
1972–79	0.50	0.25	0.83	1.00	0.00	0.20	0.00	0.80	0.33	0.33	0.00	0.33	0.33	0.33	0.75	0.00	0.40
1980–89	0.50	0.25	0.83	0.50	0.33	0.20	0.00	0.40	0.33	0.33	0.00	0.33	0.33	0.33	0.75	0.00	0.33
Zimbabwe																	
1950–59	0.75	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.33	0.33	0.00	0.67	0.33	0.33	0.25	0.00	0.23
1960–71	0.75	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.33	0.33	0.00	0.67	0.33	0.33	0.25	0.00	0.20
1972–79	0.75	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.33	0.33	0.00	0.67	0.33	0.33	0.25	0.00	0.20
1980–89	0.75	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.33	0.33	0.00	0.67	0.33	0.33	0.25	0.00	0.20

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Table A-2. *Country Codes for the Questionnaire Variables and the Questionnaire-based Index of Central Bank Independence*

Country	Tenure overlap (1)	Limitations on lending (2)	Resolution of conflict (3)	Financial independence: Budget (4a)	Financial independence: Salaries and profits (4b)	Policy targets: Monetary stock (5a)	Policy targets: Interest rate (5b)	Priority of price stability (6)	Function as development bank (7)	Questionnaire-based index of central bank independence
Australia	1.00	0.67	0.00	1.00	0.50	0.33	1.00	1.00	1.00	0.76
Bahamas, The	0.50	0.67	0.50	1.00	1.00	0.00	1.00	0.67	1.00	0.71
Barbados	0.50	0.67	0.00	1.00	0.50	0.00	0.00	1.00	0.67	0.54
Belgium	1.00	0.00	0.00	1.00	1.00	0.00	1.00	0.67	—	0.47
Costa Rica	0.50	0.67	0.50	1.00	1.00	0.67	1.00	1.00	1.00	0.81
Denmark	1.00	1.00	0.50	0.50	1.00	0.00	0.00	0.67	1.00	0.73
Ethiopia	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.33	0.00	0.13
Finland	1.00	1.00	1.00	0.50	0.00	0.00	—	1.00	1.00	0.78
France	0.50	0.33	0.50	0.50	1.00	0.67	1.00	1.00	0.67	0.65
Ireland	0.50	0.33	0.00	0.50	0.00	0.00	1.00	1.00	1.00	0.57
Italy	1.00	0.00	0.50	1.00	1.00	0.67	1.00	1.00	1.00	0.73
Lebanon	0.50	0.33	0.50	1.00	1.00	0.00	1.00	0.33	1.00	0.59
Luxembourg	0.50	0.33	—	1.00	1.00	0.00	1.00	0.67	1.00	0.66
Peru	0.00	0.00	0.00	1.00	0.50	0.33	0.00	0.33	0.33	0.22
South Africa	0.50	0.33	0.50	1.00	0.00	0.67	1.00	—	1.00	0.64
Tanzania	0.50	0.33	0.50	1.00	0.00	0.33	1.00	0.00	0.33	0.38
Turkey	0.50	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.33	0.44
Uganda	0.50	0.33	0.50	1.00	1.00	0.33	—	1.00	0.33	0.53
Uruguay	0.50	0.33	0.50	1.00	0.50	0.00	—	0.33	1.00	0.49
United Kingdom	0.50	0.33	0.00	0.50	—	0.67	1.00	1.00	1.00	0.64
Germany, Fed. Rep. of	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Yugoslavia	—	0.00	0.00	0.50	0.00	0.33	1.00	—	0.00	0.17
Zaire	0.50	0.33	0.50	1.00	1.00	0.67	1.00	1.00	0.33	0.61

— Not available.

Note: Numbers in parentheses in the column headings correspond to variable numbers in table 4.

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