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Contract-Intensive Money: Contract Enforcement, Property Rights, and Economic Performance

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We introduce a new, easily accessed and objective measure of the enforceability of contracts and the security of property rights. This measure, called "contract-intensive money" or CIM, is based on citizens' decisions regarding the form in which they choose to hold their financial assets. Country case studies show that CIM varies over time in response to political events in ways predicted by our arguments. We also show that CIM is positively related to investment and growth rates, and to the relative size of contract-dependent sectors of the economy.

Keywords: contract enforcement, property rights, governance, economic growth

JEL classification: O00, O10

1. Introduction

Markets are commonplace in all types of societies, including the poorest, and they exist even in remarkably unfavorable conditions. Herodotus, for example, describes Phoenician merchants who traded even with distant tribes with whom they shared no government or language. A long-standing literature on "silent trade" among those who cannot communicate directly includes accounts of tribes that traded when at war (Grierson, 1904). Long experience with black markets in many countries confirms that markets persist even when they are prohibited. Nevertheless, some markets that are essential for economic development are less common and more easily repressed. These are markets in which economic actors make exchanges requiring significant and irreversible commitments in the present, whether in the form of goods manufactured and shipped

or fixed investments made, in the expectation of payment or a stream of returns in the future.

These markets are less likely to exist when institutions for the protection of property rights and contract enforcement are absent. The importance of these institutions is now widely acknowledged and emphasized in the work of North (1990), Rosenberg and Birdzell (1986), and others. Recent studies of growth have employed subjective indicators of contract enforcement and the security of property rights (e.g., Knack and Keefer, 1995; Borner, Brunetti, and Weder, 1995) to provide significant empirical support for the proposition that the absence of these institutions is a severe impediment to growth. This article makes two contributions to the literature. First, it introduces a new, easily accessed and objective measure of the enforceability of contracts and the security of property rights. Second, it uses this measure to provide additional and more direct evidence about the importance of secure property and contract rights for economic growth and investment. In the analysis below, we briefly review the arguments that link the quality of third-party contract enforcement to growth and investment. We then show how the new measure, which we call *contract-intensive money* or *CIM*, relates to the subjective measures employed in the literature. We test empirically the proposition that this variable, as a measure of the security of contract and property rights, is positively related to income, growth, and investment.

2. Why Does Government Enforcement of Contracts Matter?

The markets that are most likely to persist even in unfriendly environments are those in which exchange is simultaneous and self-enforcing. These markets are common, either because many exchanges simply meet the conditions for self-enforcement or because they are so lucrative that the absence of self-enforcement makes even risky exchanges worthwhile. However, many transactions require a different kind of market, one more likely to need third-party enforcement. These are nonsimultaneous transactions, in which the *quid* is needed at one time or place and the *quo* at another. When there is lending and borrowing, capital is lent in expectation of a later return. When a demander and a supplier are some distance apart, one must be at risk for the value of the goods in transit. When there is insurance, some parties must make payments now in hope of indemnification if specified contingencies occur. In all of these cases, the gains from trade cannot be realized unless the parties expect that the contracts they make will be carried out.

For example, we do not often see sophisticated capital markets where there is no third-party enforcement of loan contracts or of rules protecting agreements between shareholders and management, or between minority and majority shareholders (see La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998). Firms in societies without third-party enforcement are usually restricted to capital that can be obtained through saving or family connections. Gains from either capital-intensive or large-scale production are accordingly lost in these societies. The absence of these exchanges hinders investment and growth. Since investment is usually required for innovation and the purchase of new technologies as well as capital deepening, contract enforcement also affects the rate of growth.

The contract-intensive money indicator of property-rights enforcement that we introduce below indicates the countries and periods in which nonsimultaneous transactions are more

difficult to enforce. Inadequacies in government-provided third-party enforcement are likely to be a principal reason for these difficulties.[1] It is true, even in societies with the best legal systems, most disagreements are resolved without being taken to court (Williamson, 1983, 1985). One reason, as David Hume (also Hayek, 1948, and many others since) noted long ago, is that a reputation for honoring commitments is valuable. Other agreements are made self-enforcing by allowing valuables to be held hostage (as, most simply, in a pawn shop loan). It is not even the case that third-party resolution of disputes is solely the province of government, since arbitration and dispute settlement services are also available in the private sector. Moreover, countries are likely to vary in their capacity to support reputation and other self-enforcement mechanisms.[2]

Nevertheless, the market has clear limits in enforcing contracts. Reputation is of more limited utility for transactions in which the actors involved deal with each other infrequently. Neither reputation nor socially acceptable hostages are useful when transactions are exceptionally large or performance can be verified only over a long period of time. Private institutions that disseminate information on contract violations are less useful when the reasons for breach of contract cannot be conveyed; when firms that receive the information fail to impose the appropriate punishment strategy; when firms that breach contracts are able to mask their identities; and when the contractual arrangements that undergird the existence of the organization that collects and disseminates information about breaches of contract are themselves unenforceable.

Even after accounting for the effects of self-enforcement, then, the government still has four crucial roles to play in contract enforcement and the protection of property rights. First, it provides third-party enforcement when no self-enforcing mechanism exists. Second, it may itself constitute the entity that communicates breaches of contract. Third, it may enforce the arrangements that private actors use to constitute themselves as a formal group (such as a trade association). Fourth, and most elementally, the government ensures peace: if there is a Hobbesian anarchy, a reputation for effective violence is worth more than one for honoring commercial contracts. But whatever authority has the power to maintain peace also has the power to enforce or to abrogate contracts. It follows that even if private agents could, without recourse to governments or other third parties, engage in every profitable investment or exchange by relying on self-enforcement, they would still confront the possibility that the government could expropriate them. Differences in the behavior of governments therefore make for cross-country differences in property rights, contract enforcement, and levels of productivity and growth.

3. Testing the Theory: Contract-Intensive Money

In testing our argument that secure property and contract rights are crucial for productivity and growth, we take advantage of a fortuitous circumstance that enforcement problems underlying the use of different forms of money and credit mirror enforcement problems underlying trade in goods and services in much the way a negative resembles a print. Though the gains from issuing money ensure that it is available everywhere, the types of money that are most widely used vary greatly from country to country. In some countries, currency is the only money that is widely used. In others, individuals and firms are more likely to

use the types of money that are held in banks or invested in other financial institutions or instruments. Characteristics of third-party contract enforcement in countries are likely to explain much of the difference in firm and individual preferences governing the choice of money to use. This, and the fact that data on both types of money usages are regularly reported and widely available, make a monetary measure of the security of property and contract rights an attractive one to investigate.

There are several reasons why the same governmental deficiencies that require self-enforcement of transactions also lead economic actors to prefer currency. If contracts are generally unreliable, there can be no assurance that the money lent to financial institutions is safe. Moreover, when financial institutions cannot rely on third-party-enforcement of loan contracts—and when property rights are not clear, so that lenders do not have secure rights to mortgaged assets in the event of borrowers' defaults—then they cannot earn as much with the depositors' money. This means in turn that there will be less financial intermediation and higher charges for banking services. Finally, where governments choose to prohibit many transactions, creating black markets in which contracts are inherently insecure, the discretion afforded by currency is likely to make it a favored medium of exchange.

In societies where contract and property rights are secure and well defined, on the other hand, even transactions that are heavily reliant on outside enforcement can be advantageous, and currency is normally used only for small transactions. In such environments, it is also profitable to provide extensive banking and financial intermediation services. Individuals and firms are increasingly able to invest their currency in bank deposits or financial instruments and are likely to prefer these to currency for several reasons. They are normally safer and more convenient than currency. These instruments are also more lucrative, since interest is generally paid on such deposits, unlike currency holdings. As is evident from the work of Townsend (1983), when more sophisticated forms of money and trade credit are available, individuals and firms not only can trade without a double coincidence of wants but are also spared much of the opportunity cost of significant intervals between the receipt and the spending of money. A final advantage of using monies in financial institutions is that this provides records that enhance the legal rights of the parties and thereby reduce their risks.

Thus the extent to which societies can capture not only the gains from self-enforcing transactions but also those potential trades that are intensive in contract enforcement and property rights can be approximated by the *relative* use of *currency* in comparison with contract-intensive money. We define *contract-intensive money* (CIM) as the ratio of non-currency money to the total money supply, or $(M_2 - C)/M_2$, where M_2 is a broad definition of the money supply and C is currency held outside banks. Fortunately, there are data on the quantities of both currency and M_2 for almost all countries.[3] Each firm and individual can decide, after taking account of the type of governance in that society, in what form it wants to hold its assets. Where citizens believe that there is sufficient third-party enforcement, they are more likely to allow other parties to hold their money in exchange for some compensation, and CIM is correspondingly higher.

The discussion suggests the following set of hypotheses.

1. If CIM is a good proxy for contractual enforcement more generally, then the higher a country's CIM ratio, the larger the share of GDP that should be generated by industries

that are especially dependent on third-party enforcement, such as those involved with insurance and capital markets.

2. The higher CIM, the more gains from economies of scale and specialization a country should reap and thus the higher its capital stock, productivity, and per capita income.

3. The higher CIM, the greater the ability of firms to raise capital, the higher the rate of investment and (other things, like the opportunity for catch-up growth, equal) the faster the rate of economic growth. However, secure individual rights to contract enforcement and to property will help most in obtaining those gains from trade and specialization that can be completed only over a long period of time, such as those involving long-term loans. Therefore, CIM should be more closely associated with the gains from trade in the capital market than with the gains from trade in the economy as a whole and thus better correlated with investment than with growth.

Note that we are *not* suggesting that the greater use of more sophisticated, noncurrency monies *causes* better economic performance; we are hypothesizing instead that better institutions, especially with respect to contract enforcement, enable a society to obtain a wider array of (real) gains from trade, and, at the same time, facilitate the use of more sophisticated forms of money. Thus CIM is a reflection or measure of the type of governance that improves economic performance rather than a cause of that performance.

Before we turn to the statistical tests of our hypotheses, we examine, in Section 4, some especially instructive country cases. Since the CIM ratio offers not only a precise test of our theory but also a new measure of the quality of governance and institutions, we relate it, in Section 5, to other measures of quality of governance. We then present in Sections 6 to 8 a variety of evidence that stronger economic performance is associated with higher values of CIM. Sections 9 and 10 respond to possible objections to our tests. Section 11 concludes.

4. CIM Case Studies

If CIM is a good measure of the security of contract and property rights, dramatic political events or changes of regime affecting these rights should change the CIM ratio. They do, and in directions that are consistent with our argument. We looked for countries that experienced sharp and sudden political changes and present CIM time-series graphs, along with a brief summary of political events for each of these countries, below. Where data are available from *IFS Yearbooks*, we trace CIM from 1960 forward; for other countries, the beginning date is 1969.

4.1. Iran

The Shah ruled Iran from the 1950s until he was overthrown by a revolution led by Khomeini in 1978. The new regime had no respect for the rights of those who had been allied with the old regime or who did not fully support the new regime and follow its religious doctrine. There was a period of revolutionary turmoil and a dramatic change in the social order. Iraq

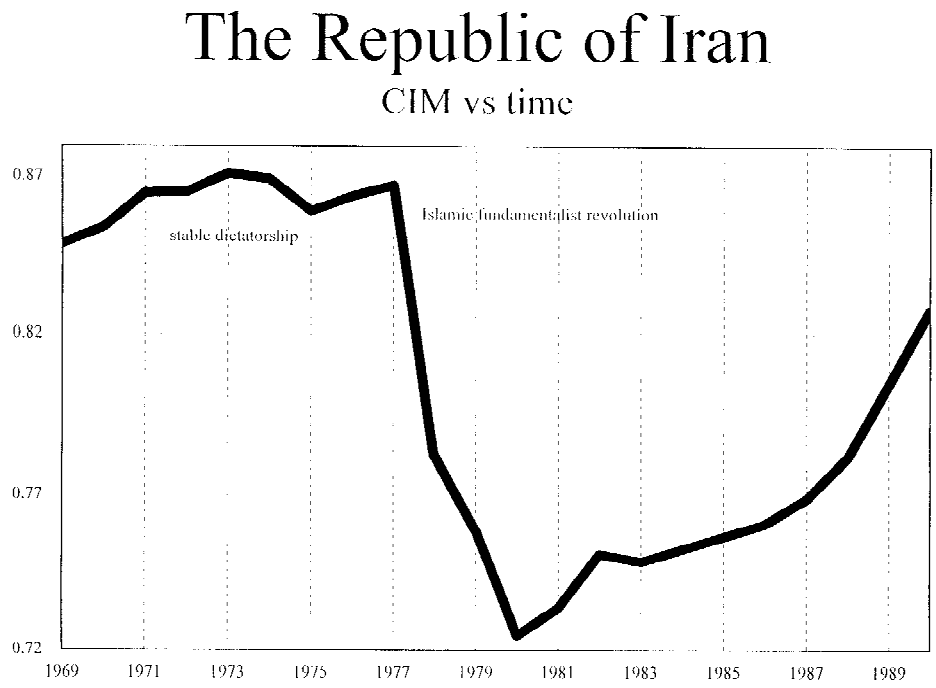

Figure 1. Contract-intensive money, the Republic of Iran, 1969 to 1989.

launched a war against Iran in September 1980 that lasted until 1988. CIM was at relatively high and stable levels under the Shah, then dropped sharply with Khomeini's takeover, the revolutionary turmoil, and the attack by Iraq. As the new regime established a relatively stable order and as the war with Iraq came to an end, the CIM ratio increased and approached its former level (see Figure 1).

4.2. The Gambia

Sir Dawda Jawara led Gambia from 1962 through 1992, winning reelection in several meaningful elections. In October of 1980, however, the Gambian government had, out of fear of a coup by its own military, requested that Senegal station troops in the Gambia. In 1981, while Sir Dawda was out of the country, left-wing rebels staged a coup that was suppressed only with the help of Senegalese troops. The data indicate a substantial upward trend in the contract-intensive money ratio from 1969 to 1990 (consistent with the general stability of the regime) that is interrupted in the 1978 to 1982 period (see Figure 2).

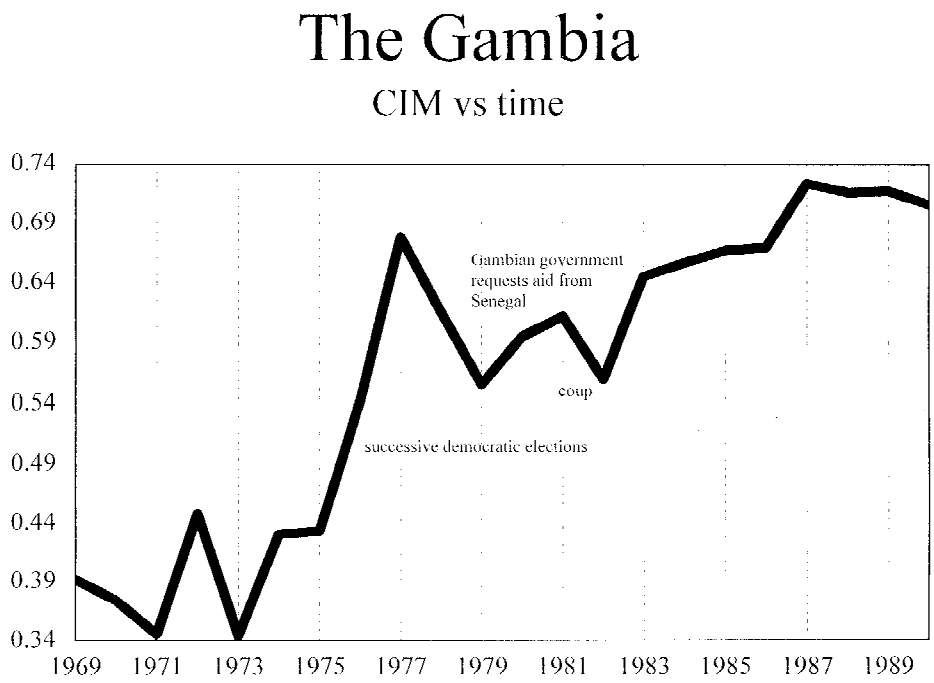

Figure 2. Contract-intensive money, The Gambia, 1969 to 1989.

4.3. Chile

Following a period of unsustainable expansionary policies, accelerating inflation, and some moves by the Allende government away from a market economy based on private property, a military government took over in 1973. Within a few years the new government dramatically changed economic management in the direction of economic orthodoxy in microeconomic, monetary, and fiscal policies. The late 1970s and early 1980s witnessed a degree of unorthodoxy in the use of exchange-rate policy to combat inflation, and these policies, perhaps combined with the explosion of the Mexican debt crisis in 1982, produced a banking crisis in 1982, followed by a severe recession. By 1985 the severe recession was over, macroeconomic policy seemed to be back on track, and the regime continued to pursue its economically orthodox policies including deregulation and privatization of the economy. The data show a marked decline in CIM in the early 1970s, followed by a dramatic rise in the ratio in the late 1970s, remaining at a very high level since the mid-1980s. The ratio exhibited only a moderate negative reaction to the macroeconomic and financial crisis of the early 1980s, suggesting that CIM was not very sensitive to the problems of the financial sector and that its increase in the late 1970s and its steadiness at a high level in the 1980s was mainly a consequence of the security of contract enforcement and property rights (see Figure 3).

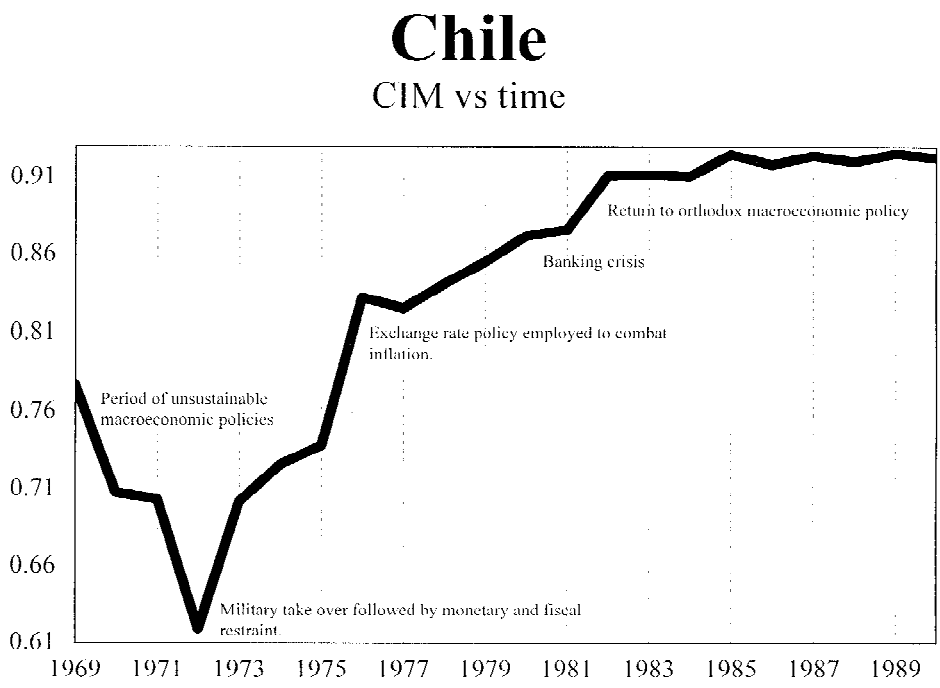

Figure 3. Contract-intensive money, Chile, 1969 to 1989.

4.4. Brazil

There was a similar dramatic change in economic policy in Brazil after the military coup in 1964. Recession occurred in 1965 and 1966, as the new regime brought inflation down from the high level in the last years under Goulart. From 1967 to 1974 there was what has been described as "the economic miracle," and growth remained high during the 1970s, although it was based on excessive foreign borrowing and was ultimately unsustainable.

The data for Brazil from the IFS yearbooks do not correspond to the data on the IFS tapes for the years 1969 to 1970. Thus there is a break in the series. The data in the earlier series show a fairly constant level of CIM during 1960 to 1964, followed by a jump in 1965 and a gradual rise in the late 1960s. The later series shows a further rise during the 1970s and 1980s. The data for Brazil stop in 1985 (see Figure 4).

4.5. Grenada

According to the *Europa Yearbook*, Grenada functioned as a democracy during its preindependence years in the 1960s and up through independence in 1974. But Grenada was not

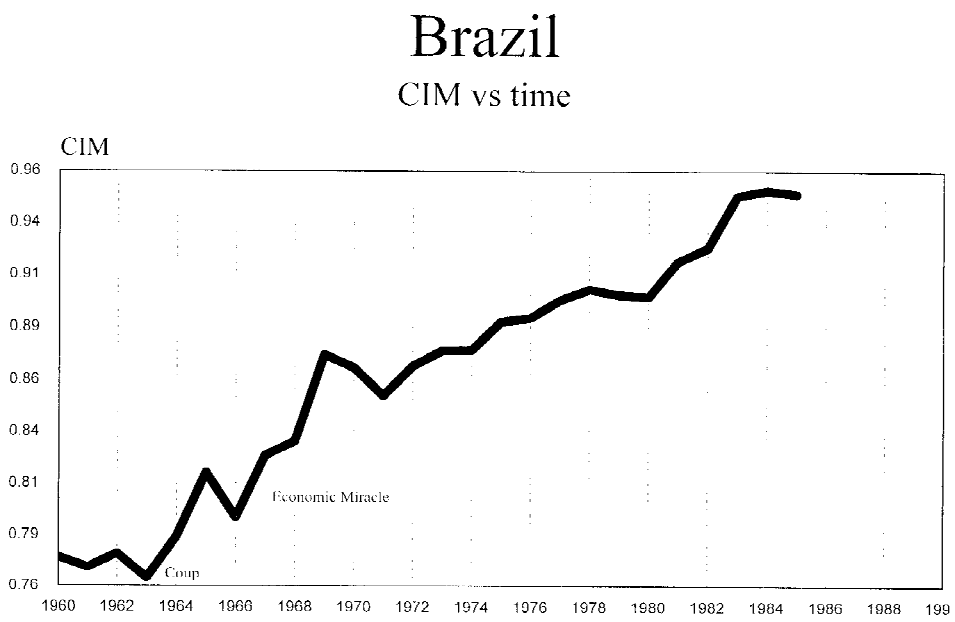

Figure 4. Contract-intensive money, Brazil, 1960 to 1990.

a placid democracy like its neighbor, Barbados. In the late 1970s the opposition accused Prime Minister Gairy of being autocratic and corrupt, and in 1979 Maurice Bishop, the leader of the left-wing PRG (People's Revolutionary Government), led a bloodless coup. The constitution was suspended. During 1980 and 1981 there was an increase in repression and mounting fears by the PRG of an invasion by the United States. During 1982 Grenada was aligning itself with Cuba and the USSR. In 1983 the armed forces were put on alert out of fear of a U.S. invasion. Bishop tried to conciliate the United States, but was assassinated in a coup by more radical forces. The U.S. invasion occurred in October 1983. By December, most American troops had pulled out. There were preparations during 1984 for elections, which were held in December. Though there was tension over the trial of the coup leaders and restrictions on some left-wing politicians in 1988 and 1989, there was a return to democracy and relative stability.

Though there is a break in the data series for Grenada in 1983,[4] the year of the second coup and the U.S. intervention, the data are nonetheless instructive. From the mid-1970s to 1983, when political developments must have made contract and property rights less secure, there was a large decline in CIM. The new data series starting in 1984 shows an increase in CIM along with the installation and gradual consolidation of a new democratic regime (see Figure 5).

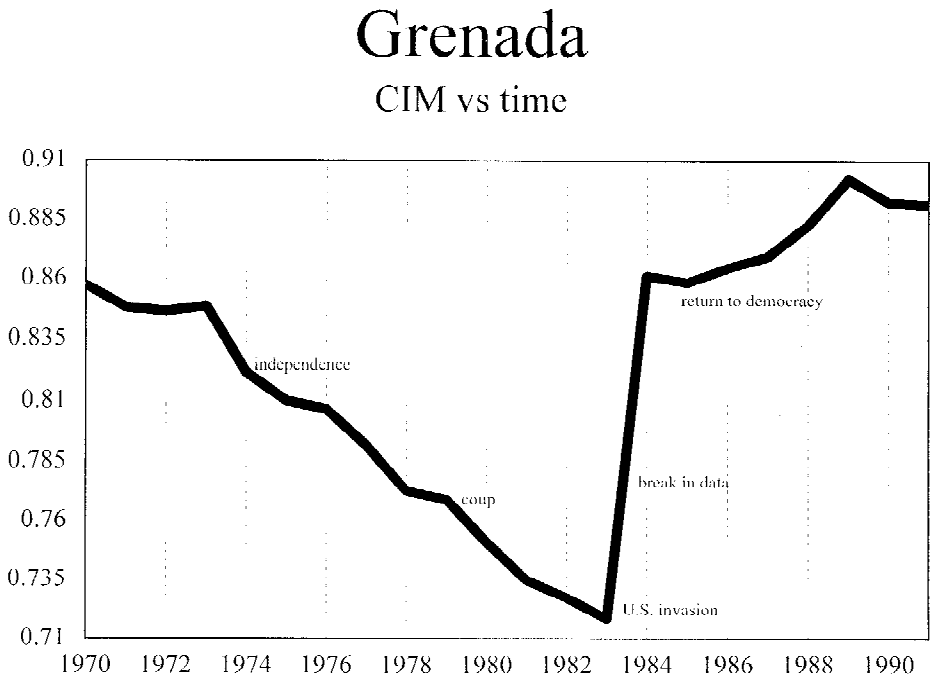

Figure 5. Contract-intensive money, Grenada, 1970 to 1990.

4.6. Turkey

The following summary paraphrases Haggard and Kaufman (1992, p. 298). The democratic government began losing control over the economy in the late 1970s. There was political fragmentation under proportional representation: government coalitions proved difficult to form, were hostage to the demands of small antisystem parties, and were pulled toward policy positions more radical than those of most of the electorate. In these circumstances it was difficult to cut government expenditure or adjust to the withdrawal of foreign lending. A stabilization program was announced in January 1980, but the government was quickly deadlocked over political issues and was ousted by the military in September. An economist, Ozal, became the leading economic policy maker under the military, and he won the (less-than-free) election held in 1983. In 1988, after democracy had been restored, he was reelected.

The data show a flat level of the CIM ratio from 1972 to 1975, followed by a decline to 1978. There was a slight recovery in 1979 and 1980, a jump in 1981, followed by a gradual rise to 1986, and then another mild decline in the late 1980s (see Figure 6).

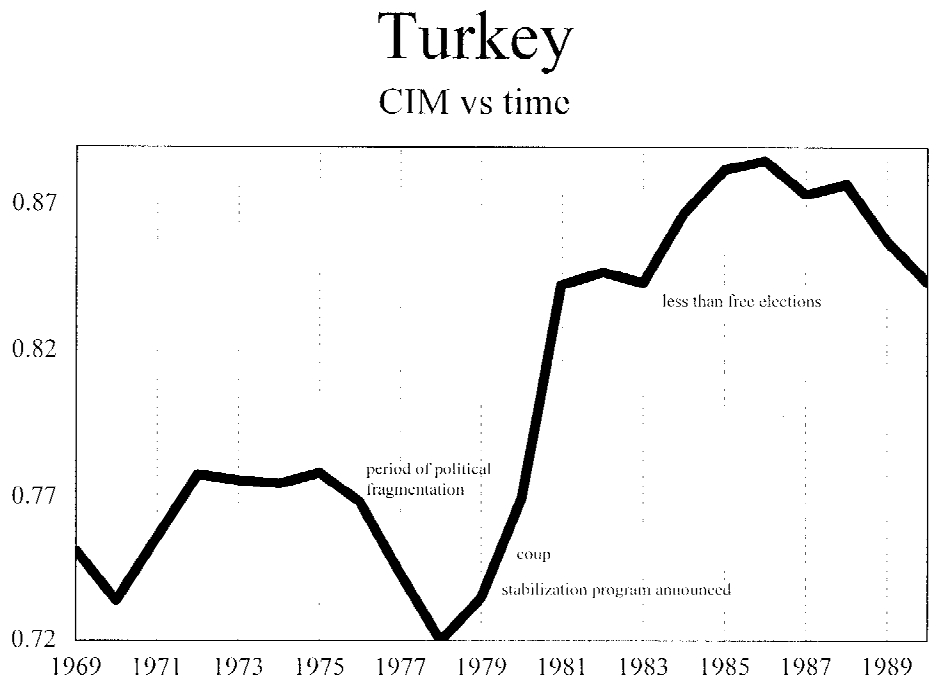

Figure 6. Contract-intensive money, Turkey, 1969 to 1989.

4.7. Indonesia

In the 1960s the country suffered serious macroeconomic and political instability. In 1965 an attempted communist takeover failed and was followed by a civil war in which millions were killed and the Communists suppressed. In 1966 Western-trained economists gained Suharto's ear and a stabilization program was carried out in the late 1960s. After 1970 Indonesia was ruled by a stable single-party government with an economic bureaucracy that was, because of the low level of independent interest-group mobilization and the absence of electoral pressures, relatively insulated and able to continue orthodox economic policies (see also Haggard and Kaufman, 1992, p. 289).

The data show a fairly flat level of CIM in the early 1960s; there are no data for 1963 and 1964. There is some rise from 1965 to 1968, consistent with the end of the civil war, followed by a dramatic and sustained rise from 1970 onward as the new regime showed evidence of considerable staying power, predictable enforcement of contract and property rights, and prudence in the management of economic policy.

Most of the foregoing countries fall into two main groups. In one group of countries—Chile, Brazil, and Indonesia—weak governments with ill-chosen interventionist economic policies were replaced by strong military dictatorships in which economic technocrats had

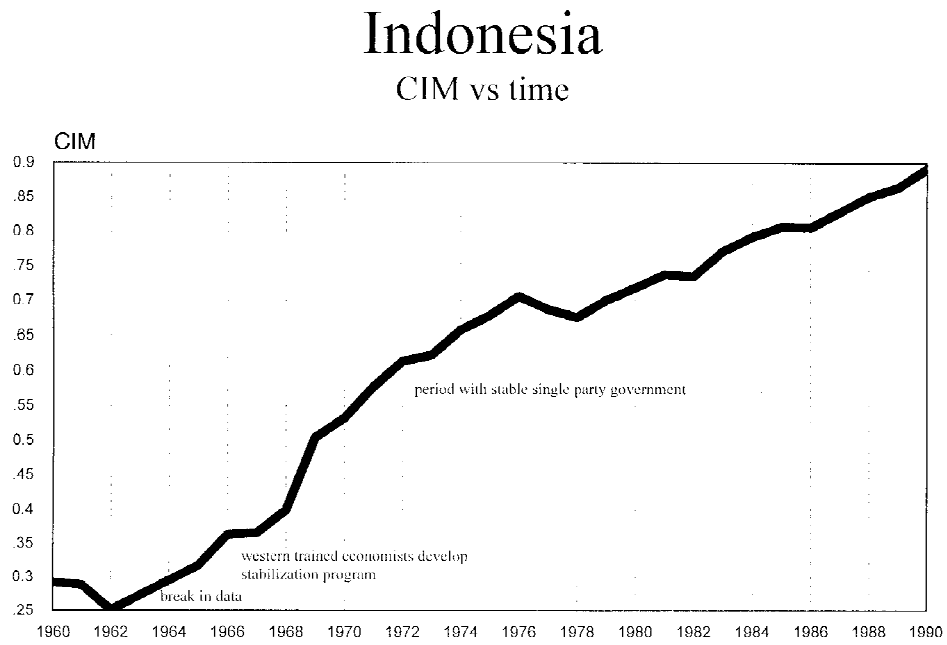

Figure 7. Contrast-intensive money, Indonesia, 1960 to 1990.

considerable influence. In all three cases, the CIM ratio rose dramatically after the change in government and economic policies. In the second group of countries—The Gambia, Grenada, and Turkey—a democratic regime suffered a period of political uncertainty with an actual or threatened military coup, and then after a time democratic stability was restored. During the period of turmoil there was a decline in the CIM ratio, but this ratio rose again after the restoration of democracy. These patterns are consistent with related work the authors have done (see Clague, Keefer, Knack, and Olson, 1996), suggesting that the security of contract and property rights is greater under strong and secure autocrats than under those of short tenure or in transient democracies and reaches the highest levels in lasting democracies.

5. CIM and Complementary Measures of the Quality of Governance

The specific country examples offer reassurance that contract-intensive money mirrors real changes in politics, institutions, and economic policies. In this section we provide evidence that it is also positively correlated with independent measures of quality of governance and institutions used in prior studies. These independent measures are systematic subjective ratings generated by scholars, such as Gastil's indexes of political freedoms and civil liberties (used, for example, in Scully, 1988), or produced by private firms that meet the market test

by selling their measures of political and institutional risk to investors, such as the ICRG, BERI, and BI ratings (introduced by Knack and Keefer, 1995; Mauro, 1995; and used by many others).

There is a danger that these subjective measures may be influenced by outcomes: when economic performance is good, the evaluators may be subtly induced to report that governance is also good. The CIM ratio may also have some limitations; a study of the period averages for individual countries suggests that some of the cross-country variation in CIM may be idiosyncratic and have little to do with differences in contract enforcement and security of property.[5] Fortunately, because the subjective measures and CIM—which is an objective outcome of portfolio decisions by individuals and firms in the countries at issue—are generated by different and independent processes, they almost certainly have no idiosyncracies or biases in common. Thus it is a good sign for CIM, and for the subjective measures, that CIM's correlations with these complementary measures of institutional quality are fairly high and remarkably consistent (at .62 or .63). Each type of measure adds credibility to the other.

Beyond its objectivity and precision as an indicator of property rights security, CIM also has the virtue of being readily available on a timely basis for a large number of countries (and for many of them the data go back quite a number of years). Since CIM appears to be both a credible and a useful new measure of the quality of a country's institutions and economic policies, we proceed to test its relationship to economic outcomes.

6. Governance and the Size of Finance and Other Contract-Dependent Sectors

The first hypothesis suggested by the foregoing discussion is that those sectors of the economy that are especially dependent on contract enforcement should be relatively larger in those countries with better contract enforcement and property rights. Levine (1998, p. 598) provides evidence that subjective indicators of property rights are an important determinant of the extent of financial intermediation in a country and concludes that "countries that effectively enforce compliance with laws [governing the legal rights of creditors, among other things] tend to have better-developed banks than countries where enforcement is lax." In this section, we expand on this theme by showing that CIM as well as the subjective measures are positively associated with the development of a wide range of contract-intensive activities.

The insurance industry, for example, is exceptionally dependent on contract enforcement, since those who pay premia receive nothing on the spot and can benefit from insurance only if the policy contract is honored when there is a valid claim, often long after the contract has been signed. Accordingly, we obtained data on insurance premia as a percent of gross national product up to 1994 from the International Insurance Council and tested whether CIM and other measures of institutional quality predicted average insurance premia (from the five years 1990 through 1994) over GDP for the period. Since the demand for insurance may be related to income and wealth, we controlled for per capita GDP (1990). As Table 1 shows, there is a statistically significant positive association between CIM (and ICRG and BERI) and the relative size of the insurance industry. Each ten-percentage-point rise in CIM is associated with a rise in the insurance share of GDP of about 1.2 percentage points—a sizable amount, since on average the insurance sector comprises 4 percent of GDP.

Table 1. Contract intensive money and the financial sector.

	Equations for Insurance/GDP, 1990–1994			Equations for Finance/GDP, 1980–1990		
Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
Constant	−17.060	−4.471	−8.137	−12.516	−12.006	−11.969
	(2.498)	(4.453)	(3.275)	(2.515)	(3.685)	(6.547)
Initial (log) GDP per capita	1.679	0.385	0.534	1.822	2.295	2.535
	(0.456)	(0.694)	(0.581)	(0.447)	(0.484)	(1.031)
Contract intensive money	7.682			11.007		
	(2.765)			(2.686)		
ICRG		0.153			0.186	
		(0.048)			(0.062)	
BERI			1.132			0.392
			(0.308)			(0.445)
Adj. R^2	.47	.41	.55	.41	.34	.26
N	57	62	44	104	78	45
Mean, D.V.	3.90	4.07	4.31	10.7	10.3	12.1

Note: Standard errors (in parentheses) are computed using White's heteroskedastic-consistent variance/covariance matrix. Finance/GDP is the percentage of GDP accounted for by finance, insurance, real estate, and business services, from U.N. National Accounts data.

To obtain the broadest reasonable measure of the industries that are especially dependent on contract enforcement, we took the aggregate of the finance, insurance, real estate, and business service sectors as a percentage of GDP from the UN National Accounts data. This measure was available for more countries and years than was the insurance data. We use the average of this variable over the 1980 to 1990 decade as the dependent variable in equations 4–6 of Table 1. Again, all three of the measures of institutional quality are positively related to the size of the financial sector, holding per capita income (1980) constant, and all but one of the relationships is statistically significant.

7. CIM and the Level of Income and Wealth

The second hypothesis generated by our argument is that the better are institutions as measured by CIM, the greater the degree of specialization and the gains from trade and the higher the level of capital accumulation, productivity, and per capita income. We test this hypothesis using the specifications introduced by Hall and Jones (1996) in their study of the determinants of income per worker in 1988. Hall and Jones include the ICRG index of property rights along with several other independent variables listed in the note to our Table 2. We replicate their regressions for the countries in their sample for which CIM data are available, except that we replace ICRG with CIM in one case, and add CIM in another (leaving ICRG as one of the Hall and Jones base regressors). Coefficients and standard errors for CIM and ICRG (but not for the other Hall-Jones regressors) are shown in Table 2. Adjusted R-squares in the first two rows of the top panel of Table 2 show

Table 2. CIM and levels of output, factor accumulation and TFP summaries of regression results.

	CIM	ICRG	adj. R^2
Log output/worker, 1988		1.938	.78
		(0.411)	
	1.852		.79
	(0.384)		
	1.393	1.274	.80
	(0.422)	(0.428)	
Log capital/worker, 1988		3.466	.69
		(0.685)	
	4.143		.74
	(0.569)		
	3.504	1.772	.75
	(0.656)	(0.735)	
Schooling/worker, 1985		8.356	.74
		(1.245)	
	5.736		.70
	(1.204)		
	3.290	6.787	.76
	(1.203)	(1.336)	
Log TFP, 1988		0.488	.66
		(0.299)	
	0.816		.68
	(0.312)		
	0.773	0.120	.67
	(0.339)	(0.319)	

Note: Table reports coefficients for CIM and ICRG. White-corrected standard errors are in parentheses. Other independent variables in every equation are latitude (distance from the equator), percent English-speaking, percent speaking another "international language," dummies for "capitalist-statist" and "capitalist" systems ("statist" is reference category), and fraction of years from 1950 to 1994 with open economy (from Sachs and Warner, 1995). Sample size is 110.

that CIM's explanatory power slightly exceeds that of ICRG and that CIM is a significant determinant of income per worker even in the presence of ICRG.

Hall and Jones also estimate determinants of factor accumulation—first, physical capital and, second, human capital. The second panel replicates their regressions of capital stock per worker, as estimated by them, on the same independent variables, with results broadly similar to those in the first panel. The third panel replicates the Hall-Jones human capital equation, in which they use the Barro-Lee (1993) educational attainment measure for 1985 as the dependent variable. Again, CIM (with or without ICRG in the model) is significantly related to factor accumulation. Finally, Hall and Jones estimated total factor productivity as

a residual, regressing these estimates on the same set of independent variables. The bottom panel of Table 2 shows that total factor productivity is significantly related to CIM. The correlation between CIM and the level of economic development does not depend on the Hall-Jones specification; we obtained similar results with other specifications.

8. CIM, Investment, and Growth

In this section, we enter contract-intensive money into widely used cross-country investment and growth regressions. Variable definitions, data sources, and descriptive statistics used in these regressions are provided in the appendix. The independent variables we employ in addition to CIM are conventional in this literature (see Barro, 1991; Levine and Renelt, 1992). Higher initial GDP per capita should be associated with lower productivity of additional investment and lower subsequent growth. The relative price of investment goods as a percentage of the U.S. level should be negatively associated with investment. Schooling attainment, measured as the mean years of completed education for the population aged twenty-five and over, is a proxy for human capital.[6] Bruno and Easterly (1998) and others have found that inflation can have a negative effect on investment and growth. To ensure that inflation's effects on currency demand do not influence our results, we therefore add a measure of inflation to each regression. This is the depreciation in the real value of money introduced by Cukierman and Web (1995)—that is, DEP = INF/(100+ INF), where INF is the rate of inflation in percent. (We consider inflation in more detail in Section 10.)

The regression results on the determination of the ratio of investment/GDP, averaged over the 1969 to 1990 period for which CIM data are consistently available for a large sample, are shown in Table 3. Equation (1) shows a strong, positive, and highly significant relationship between CIM and investment. Results for CIM are very similar for a subsample of developing (non-OECD) nations in equation (2), indicating that CIM is not merely capturing broad differences between the groups of developed and developing nations.

Standardized estimates of CIM's association with investment are large relative to those of other independent variables. A one-standard-deviation increase in CIM (i.e. an increase of .14) in equation (1) is associated with an increase in investment as a proportion of GDP of one-third of a standard deviation, or about three percentage points. This effect exceeds the impact of a one standard deviation increase of any one of the other four independent variables.

Since CIM and economic performance are measured contemporaneously in our analysis, our correlations conceivably capture effects of the latter on the former. Accordingly, in equations (3) and (4), respectively, we substitute the initial-year (1969) and end-year (1990) values of CIM for its 1969 to 1990 average. The coefficient for initial CIM exceeds that for the end-of-period (1990) CIM value. When both are entered together in a regression (not shown), the coefficient for initial CIM is more than double that of the final CIM, and only initial CIM is statistically significant. Both results are contrary to what we would expect if our estimates using the 1969 to 1990 average were biased upward by reverse causality.

To ensure that the association between CIM and investment in equation (1) is not sensitive to outliers, we report results of robust and median regressions in equations (5) and (6). The CIM coefficient is changed very little.

Table 3. Contract intensive money and investment/GDP, 1970 to 1992.

	Equations						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variation	Basic Model	Non-OECD	CIM 1969	CIM 1990	Robust Regression	Median Regression	M_2/GDP Added
Constant	−16.064	−9.882	−12.512	−12.698	−14.765	−11.852	−10.061
	(5.816)	(6.210)	(5.848)	(5.648)	(7.203)	(7.998)	(5.499)
Log 1970 GDP per capita	2.359	1.658	2.638	2.595	2.267	2.059	0.933
	(0.810)	(0.899)	(0.781)	(0.817)	(1.000)	(1.115)	(0.799)
Mean years of schooling, 1970	0.552	0.955	0.555	0.764	0.635	0.627	0.520
	(0.350)	(0.536)	(0.363)	(0.342)	(0.356)	(0.388)	(0.293)
Currency depreciation mean, 1969–1990	−6.087	−6.618	−6.352	−4.082	−4.738	−3.116	18.672
	(4.190)	(5.571)	(4.371)	(4.275)	(5.157)	(5.661)	(4.990)
Price level inv. goods, 1970	−0.027	−0.025	−0.032	−0.029	−0.032	−0.039	−0.022
	(0.011)	(0.010)	(0.010)	(0.012)	(0.010)	(0.011)	(0.010)
Contract-intensive money, 1969–1990	20.745	17.248	15.097	12.559	19.664	18.186	18.065
	(5.457)	(5.880)	(4.523)	(5.105)	(6.688)	(7.379)	(4.882)
M_2/GDP, 1969–1990							9.649
							(2.924)
Adj. R^2	.61	.47	.60	.59	—	—	.68

Note: Sample size is 72 in equation (2) and 95 for all other equations. Standard errors (in parentheses) are computed using White's heteroskedastic-consistent variance/covariance matrix, except in equations (5) and (6). R^2 does not have its usual interpretation in equations (5) and (6). Mean of dependent variable is 16.9 for 95-country sample, and 14.2 for 72-country sample.

Adding other regressors such as population growth, indicators of trade openness, and government size similarly leaves the CIM coefficient substantially unchanged.[7] Finally, we obtain similar results for CIM when the average of private investment/GDP for 1970 to 1985 as constructed by Barro (1991) and the average of equipment investment/GDP for 1975 to 1985 as estimated by DeLong and Summers (1991) are substituted for total investment.[8]

Growth equations are reported in Table 4. The growth regressors are the same as those used for investment, except that the price of investment goods is omitted. In equation (1), CIM is positively and significantly related to growth. Each standard deviation increase in CIM is associated with an increase in annual per capita growth of nearly one-half of a standard deviation, or nearly one percentage point. The association between CIM and growth is slightly weaker when developed nations are excluded, in equation (2).

Equation (3) omits the school enrollment variables, which are arguably endogenous to CIM. Where contract and property rights are enforced, the returns to specialized education may rise. These rights will also aid in the development of credit markets, which may make education beyond the primary level feasible for the poor (Galor and Zeira, 1993). As expected, the CIM coefficient increases somewhat when schooling is omitted in equation (3).

The addition of investment/GDP as a regressor in equation (4) indicates that much of the impact of contract enforcement and governance as measured by CIM is through investment

Table 4. Contract intensive money and growth, 1970 to 1992.

	Equations							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variation	Basic Model	Non-OECD	Schooling Omitted	Inv/GDP Added	Robust Regression	Median Regression	2SLS	M_2/GDP Added
Constant	−0.162	0.906	−1.849	2.960	−0.710	−0.788	−2.196	1.638
	(1.920)	(2.078)	(1.153)	(1.917)	(2.219)	(3.395)	(2.745)	(1.776)
Log 1970 GDP per capita	−0.477	−0.496	−0.286	−0.789	−0.558	−0.602	−0.726	−0.832
	(0.308)	(0.331)	(0.276)	(0.279)	(0.317)	(0.476)	(0.378)	(0.308)
Mean years of schooling, 1970	0.116	0.342		0.035	0.088	0.097	−0.009	0.108
	(0.099)	(0.133)		(0.090)	(0.114)	(0.176)	(0.149)	(0.083)
Currency depreciation mean, 1969–1990	−4.028	−5.348	−4.100	−3.009	−3.220	−2.332	−4.201	−2.076
	(1.085)	(1.513)	(1.059)	(1.035)	(1.641)	(2.617)	(1.735)	(1.050)
Contract-intensive money, 1969–1990	6.751	4.945	7.571	2.860	8.168	8.383	12.425	5.936
	(2.598)	(2.731)	(2.423)	(2.226)	(2.030)	(3.048)	(4.541)	(2.342)
Investment/GDP 1969–1990				0.417				
				(0.033)				
M_2/GDP, 1969–1990								3.093
								(0.901)
Adj. R^2	.21	.22	.60	.37	—	—	—	.29

Note: Sample size is 72 in equation (2) and 95 for all other equations. Standard errors (in parentheses) are computed using White's heteroskedastic-consistent variance/covariance matrix, except in equations (5) to (7). Instruments in 2SLS include a set of colonial heritage dummies and Sullivan's (1991) measure of ethnolinguistic homogeneity. R^2 does not have its usual interpretation in equations (5) to (7). Mean of dependent variable is 1.30 for 95-country sample, and 1.03 for 72-country sample.

effects rather than through efficiency effects. The CIM coefficient in equation (4) is only about one-half its value in equations (1) through (3). This result is consistent with the conceptual framework outlined in Section 2.

Results from robust and median regressions reported in equations (5) and (6) indicate that the association between CIM and growth is not sensitive to outlying observations. The CIM coefficients in these tests are slightly larger than in equation (1). As in the case of investment, results also are little affected by adding other commonly used regressors such as population growth, trade intensity, and government size.

Unlike the case with CIM and investment, there is some evidence that the CIM-growth relationship may partially arise from reverse causality. The coefficient for end-of-period (1990) CIM exceeds that of initial (1969) CIM when these two variables are substituted for the period average of CIM (whether in separate regressions or together). Accordingly, we attempt in equation (6) to test the growth impact of the exogenous component of CIM using two-stage least squares.

The instruments for CIM include the other right-hand-side variables (currency depreciation, initial income, and schooling), the percentage of a country's population belonging to the largest ethnic group (from Sullivan, 1991), and a set of colonial heritage dummies,

indicating whether a nation was colonized by the British, the French, the Spanish, the Portuguese, or by others (e.g., the Dutch, Belgians, Italians, or Japanese) or was never colonized. The test of overidentifying restrictions fails to reject the null hypothesis that the instruments do not belong in the growth equation. Results in equation (7) indicate that the exogenous component of CIM is significantly correlated with growth.

The tests reported in Tables 3 and 4 are all cross-sectional tests on country averages over the 1969 to 1990 period. Our focus here is not as much on short-term policy changes as on continuing institutions for contract enforcement and property rights that, in stable environments, should not change much from year to year. We have not, in general, run tests treating each country-year in our sample as a separate observation. Nonetheless, we briefly summarize here severe tests of CIM's relationship to economic performance, focusing only on the idiosyncratic variations over time in CIM, investment, and income in each country. We do this using two-way fixed effects models, with country and year fixed effects, both with the annual data and with decade averages. These tests should capture most connections CIM has with short- and medium-term changes in policy and with the less stable countries where there are major institutional changes in a given year or decade. We find that variations over time within countries in CIM are significantly correlated with investment but not with growth.

9. Is CIM a Measure of the Contracting Environment or Financial Sector Development?

Significant research has identified a strong and causal relationship between financial development and growth (King and Levine, 1993a; Levine, 1998), leading lead one to reasonably ask whether contract-intensive money is simply an alternative measure of financial-sector development. This is a difficult question since, as Levine (1998) has shown, financial-sector development is itself very sensitive to subjective measures of the security of property and contract rights in a country. We offer several arguments in favor of the conclusion that CIM is properly regarded as a broad measure of the general security of contracts and property rights in all sectors of a country and not primarily those in the financial sector.

Measures of financial development reflect basic contractual features of a country, but they also track specific characteristics of the financial sector, such as the extent to which the sector facilitates diversification and the monitoring of managers (see Levine, 1997). Conversely, measures of the security of property rights, including CIM, while indirectly related to the capacity of the financial sector to diversify risk, should more directly and strongly capture the overall security of transactions in a country, including not only financial-sector transactions, but all contracts that put substantial resources at risk of contractual noncompliance (such as contracts between independent power producers and utilities). They should also capture not only the risk of government expropriation of financial assets (for example, through bank nationalization), but the expropriation through arbitrary regulation or outright confiscation of any type of fixed asset.

One piece of evidence that CIM is more appropriately categorized as a general indicator of contractual and property rights rather than as an indicator of financial development is its significant correlation with subjective measures of institutional quality, discussed earlier. A more rigorous test of the proposition is to conduct a factor analysis of many different

Table 5. Factor analysis of governance and financial development indicators' rotated factor pattern (varimax rotation).

Variable	Factor 1 Loadings	Factor 2 Loadings
Gastin index	.89	−.25
Executive constraints	−.80	.25
Wright property rights index	.75	−.25
CIM	−.72	.36
ICRG property rights index	−.72	.54
Revolutions and coups frequency	.51	−.37
Kobrin expropriation frequency	.45	−.44
PRIVY	−.28	.85
M_2/GDP	−.18	.81
PRIVATE	−.44	.70
BANK	−.53	.66

Note: Variable definitions and sources are listed in the appendix.

measures of "quality of governance and institutions," on the one hand, and "financial development" on the other, using the four indicators of financial depth in King and Levine (1993a), CIM, and six different measures of institutions in the factor analysis. We allow the analysis to identify two factors. As Table 5 shows, the institutional variables, including CIM, load most heavily on Factor 1. The absolute value of the Factor 1 loading of CIM is twice that of its Factor 2 loading. The four indicators of financial development—PRIVY, M_2/GDP, PRIVATE, and BANK (described in the data appendix)—all load more heavily onto the second factor. These are the results one would expect if CIM is predominantly an indicator of the security of contracts and property rather than of financial development.

A third piece of evidence that CIM is more of an institutional than a financial-sector variable emerges from our country examples. These show that CIM tracks dramatic political developments that have little to do directly with the financial sector, although they may, simultaneously, also influence the usual measures of financial development.

Finally, CIM and indicators of financial development seem to capture different aspects of economic growth and investment. If we return to the growth and investment equations of the previous section, adding King and Levine's primary measure of financial depth, M_2/GDP, leaves the CIM coefficient essentially unchanged. This is evident in equations (7) of Tables 3 and 4, where the CIM coefficient is only slightly less after the inclusion of the measure of financial depth than it is in the basic model. Financial depth is also significant, further reinforcing the notion that the variables capture different aspects of the institutional and economic environment in countries. CIM isolates the impact of improved contract enforcement and property rights security, which has a generalized effect that encompasses but is not exclusive to the financial sector. M_2/GDP captures the specific attributes of the financial sector that increase growth and investment, including the effect of the financial sector on the ability of economic agents to diversify risk and exert control over managers.

On the basis of these tests, we argue that CIM, even though it is derived from data in the money markets, is nevertheless most appropriately regarded as a more general measure of the quality of governance and institutions. There are policy implications of this conclusion.

Countries with low CIM (or low scores on other, more subjective measures of property rights and contract security) would be advised to examine closely government policies related to enforcement of contracts between private economic actors and the due process guarantees that governments afford firms and individuals when they create and implement policies. Countries that exhibit low indicators of financial development need to address both the general contractual environment that inhibits growth of the financial sector and also examine specific policy issues that affect the sector, including the presence of discriminatory taxation (King and Levine, 1993b), laws unfavorable to creditors, and poorly developed bankruptcy procedures.

10. Alternative Explanations for the CIM Findings

There are two possible problems that could arise in interpreting the foregoing results. The first is that CIM might be an artifact of inflation, interest rates, or monetary policies. CIM is related to inflation in two contrary ways. On the one hand, inflation reduces the value of money, raises nominal interest rates, and therefore provides an incentive to shift money from currency and noninterest-bearing accounts into interest-paying time deposits or into foreign-currency accounts. This increases CIM. If changes in CIM were driven by changes in inflation in this way, it would be less likely that we would find positive associations between CIM and growth, investment, or other, subjective indicators of the security of property and contract rights.

On the other hand, with very high rates of inflation there is also greater uncertainty about the rate of inflation and even about the viability of the existing governmental and financial institutions. This makes deposits in financial institutions, and especially deposits with limits or penalties on timing of withdrawals, riskier, and tends to reduce CIM. If this effect dominates, higher CIM would be associated with lower inflation; since lower inflation is likely to be associated with higher growth and investment, the possibility arises of a spurious positive relationship between CIM and these economic outcomes.

We have two pieces of evidence that our CIM results are not simply an artifact of inflation-related phenomena. First, all of our results are robust to the inclusion of inflation, as Tables 3 and 4 demonstrate. Second, we find that only when the rate of inflation is very high—above about 60 percent per year—is it associated with lower CIM. Below this level, however, higher rates of inflation are associated with higher CIM, creating a bias for most of our observations against finding a positive relationship between CIM and growth and investment.

The second possible problem with interpretation arises if CIM is only a proxy for savings.[9] Countries with high savings rates (due, for example, to age profiles of their populations) might, because time deposits and other financial instruments are better vehicles for saving than currency, have high values of CIM. Since national savings rates are highly correlated with national investment rates, the association of CIM with investment might be a product of these influences. We examine this issue in two ways and find no support for the conclusion that CIM is simply a proxy for saving rates. First, in a fixed-effects regression of the annual observations of CIM on income and saving, with time and country dummies, we find that the coefficient of saving is extremely small. This result is robust to a variety of specifications. Second, we find that CIM is also a strong predictor of components of total

investment—private investment and equipment investment—that are not forced, through accounting identities, to be as strongly associated with savings rates as is total investment.

11. Conclusions

This article contributes to a growing literature that emphasizes the institutional or governmental foundations of well-functioning markets. While it is true that the markets for many self-enforcing transactions emerge spontaneously and bring some gains from trade everywhere, many of the markets that a society needs if it is to develop and achieve its economic potential are missing in most countries. In this article we use our new measure of the security of contract enforcement and property rights, contract-intensive money, to support the claim that only countries where governments give private parties the capacity to make credible commitments that they could not otherwise make, and thereby achieve gains from trade that they could not otherwise obtain, achieve their economic potential.

We base the importance of CIM on the following three propositions: (1) the contract-intensive money ratio is a measure of the proportion of transactions that rely on third-party enforcement; (2) this proportion is a good indicator of the reliability of contract enforcement and the security of property rights in countries; and (3) contract enforcement reliability and property rights security are important for high levels of productivity and rapid economic growth.

While it is difficult to test these propositions one at a time, we have marshaled a good deal of evidence that is consistent with all three. In a series of case studies of dramatic change in politics and governance, CIM changed in ways consistent with these propositions. CIM is also correlated with other, subjective measures of the quality of governance and institutions that are now widely used in the literature.

Consistent with the theory, countries with relatively high values of CIM—and relatively high scores on other measures of quality of governance—have relatively more insurance and financial development. This is true even though we control for the level of per capita income. Governments that give their citizens the capacity to obtain more gains from trade and specialization also improve economic economic performance in other ways. The empirical evidence developed in the article indicates that CIM is strongly associated with the size of the capital stock, the level of per capita income, and the total factor productivity of countries. We also find that countries with a high level of CIM tend to grow faster and to exhibit higher rates of investment.

The article concludes by investigating three interpretations of these results that diverge from the one that we offer, that CIM is a measure of the security of property and contract rights, and that it is the insecurity of these rights that suppresses investment and growth. We present evidence, however, that is inconsistent with these three interpretations: differences across countries in levels of CIM are not predominantly due to differences with respect to financial sector development, inflation, or savings.

In sum, this article introduces a measure of the security of economic rights that is available for many countries and for long periods, constituting, therefore, a valuable new resource for empirical studies. Because this measure is objective and not based on subjective evaluations, we are also able in this article to present the most persuasive evidence to date that economic

growth and investment significantly accelerate when governments impartially protect and precisely define the rights of all participants in the economy.

Appendix: Variable Definitions and Sources

Growth 1970–92
Average annual per capita GDP growth in percentage points, log method. Source: Summers and Heston (1991).

Investment/GDP, 1970–92
Investment as a percentage of GDP. Source: Summers and Heston (1991).

Log Initial GDP per capita, 1970
Source: Summers and Heston (1991).

Schooling, 1970
Average number of years of completed education, 25 and over population. Source: Barro and Lee (1993).

Price level of investment goods, 1970
As a percentage of the U.S. level. Source: Summers and Heston (1991).

Contract-Intensive Money (CIM), 1969–90
Ratio of noncurrency component of M_2 to total M_2. Source: International Financial Statistics (IFS).

Currency depreciation, 1969–90
Inflation rate/(100 + inflation rate). Source: IFS.

BANK
Ratio of deposit money bank domestic assets to deposit money bank domestic assets plus central bank domestic assets, average from 1960–89. Source: King and Levine (1993a), as constructed from IFS.

PRIVATE
Ratio of claims on the nonfinancial private sector to total domestic credit (excluding credit to money banks), average from 1960–89. Source: King and Levine (1993a), as constructed from IFS.

PRIVY
Ratio of claims on the nonfinancial private sector to GDP, average from 1960–89. Source: King and Levine (1993a), as constructed from IFS.

M_2/GDP, 1969–90
Source: IFS.

Revolutions plus coups frequency
Average number per year, 1960–88. Source: Arthur Banks, SUNY Binghamton.

Gastil Index
Sum of political freedoms and civil liberties indexes, each scaled 1–7, averaged from 1973–86. Source: Gastil (various years).

ICRG Index
Sum of 5 subjective variables each scaled 1–10: rule of law, quality of bureaucracy, corruption, risk of expropriation, and government repudiation of contracts. Source: Knack and Keefer (1995), as constructed from International Country Risk Guide, 1982–90.

BERI Index
Sum of 4 subjective variables each scaled 1–4: bureaucratic delays, contract enforceability, nationalization potential, and infrastructure quality. Source: Knack and Keefer (1995), as constructed from Business Environmental Risk Intelligence, 1972–90.

Wright property rights index
Subjective 1–4 rating, with higher scores indicating worse protection of property rights (Wright, 1982).

Kobrin Expropriation
1–4 ordinal scale defined by frequency of expropriations or nationalizations in 1960–79 period, with higher values indicating greater frequency, as reported in Kobrin (1985).

Executive Constraints
1–7 ordinal scale of constraints on power of the executive, with higher scores indicating more constraints. Source: Gurr (1990).

Descriptive Statistics for
95-country sample used in tables 3 and 4

	Mean	Std. dev.
Growth, 1970–92	1.30	1.96
Inv/GDP, 1970–92	16.9	8.4
Log per capita GDP, 1970	7.75	0.95
School attainment 1970	3.62	2.79
Currency depreciation 1969–90	0.13	0.11
Price of inv. goods, 1970	97.7	60.8
CIM, 1969–90	0.78	0.13
M_2/GDP, 1969–90	0.43	0.25

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Koford, Paolo Mauro, and Anand Swamy for valuable comments. The authors are solely responsible for all remaining errors.

Notes

1. The importance of third-party enforcement of contracts has long been recognized. In 1651 Thomas Hobbes said that, in the absence of government, the party that "performs first has no assurance that the other will perform after, because the bonds of words are too weak to bridle men's ambition, avarice, anger, and other passions without the fear of some coercive power" (1958 [1651], p. 15). The distinction between self-enforcing transactions and those that require third-party enforcement is key to the arguments in North (1990). Olson (1992) analyzes the difficulties of the transition from communism in terms of this distinction.
2. For example, Knack and Keefer (1997) find an association between the protection of property rights and levels of interpersonal trust in countries.
3. Currency comes from line 14a of International Financial Statistics, "currency outside deposit money banks." It does not include foreign currency in circulation, since there are no reliable measures of this, although foreign currency deposits in financial institutions, which are easily measured, are included in M_2. M_2 is defined by IFS as the sum of money and quasi-money, or the sum of lines 14a (currency outside banks), 24 (demand deposits), 15 (time deposits), and 25 (time and savings deposits, including foreign-currency deposits of resident sectors other than central government). We cannot control for variations in the mix of different types of money in M_2. For example, we would expect that where the incentives to hold currency increase, so also do incentives to substitute out of time deposits and into demand deposits. However, all components of M_2, including time and demand deposits, share the critical feature that they rely on economic actors to surrender control over their money to third parties for some period of time.
4. The Eastern Caribbean Central Bank was established in that year, and the currency figures become more precise starting in 1984. Prior to that year, the numbers of Eastern Caribbean Dollars circulating in Grenada were based on estimates, while after that year, the ECCB placed a letter "G" on the EC dollars issued there and was therefore able to track the currency circulation precisely. This information was kindly supplied by Mr. Kawar of the IMF.
5. For example, South Africa has the third-highest value, while Malawi ranks above Belgium.
6. Pritchett (1996) finds that school enrollment is not a good proxy for the stock of educational capital and that increases in the stock of educational capital do not predict increases in output. The conventional specification may nonetheless be justified since school enrollment may be a proxy measure of the desire and capability of a country's government to provide public goods that the market would otherwise underprovide.
7. A "monetarist" interpretation of CIM also suggests that real interest rates should be controlled for. Doing so only trivially affects the CIM coefficient and at a substantial cost in sample size due to gaps in the interest rate data. We therefore do not include the real interest rate in all regressions.
8. Results described in this paragraph are available on request. We use total investment from Summers and Heston (1991) as our primary investment variable because it is likely measured more accurately than are estimates of private or equipment investment.
9. We owe this suggestion to Brian Fikkert.

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