# CORRUPTION AND GROWTH*

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This paper analyzes a newly assembled data set consisting of subjective indices of corruption, the amount of red tape, the efficiency of the judicial system, and various categories of political stability for a cross section of countries. Corruption is found to lower investment, thereby lowering economic growth. The results are robust to controlling for endogeneity by using an index of ethnolinguistic fractionalization as an instrument.

## I. INTRODUCTION

Many economists argue that malfunctioning government institutions constitute a severe obstacle to investment, entrepreneurship, and innovation. North [1990] emphasizes the importance of an efficient judicial system to enforce contracts as a crucial determinant of economic performance. Low security of property rights over physical capital, profits, and patents may reduce incentives and opportunities to invest, innovate, and obtain foreign technology. Cumbersome and dishonest bureaucracies may delay the distribution of permits and licenses, thereby slowing down the process by which technological advances become embodied in new equipment or new productive processes.

The debate on the effects of corruption is particularly fervent. Beginning with Leff [1964] and Huntington [1968], some authors have suggested that corruption might *raise* economic growth, through two types of mechanisms. First, corrupt practices such as "speed money" would enable individuals to avoid bureaucratic delay. Second, government employees who are allowed to levy bribes would work harder, especially in the case where bribes act as a piece rate. While the first mechanism would increase the likelihood that corruption be beneficial to growth only in countries

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where bureaucratic regulations are cumbersome, the second one would operate regardless of the level of red tape. In contrast, Shleifer and Vishny [1993] argue that corruption would tend to lower economic growth, and Rose-Ackerman [1978] warns of the difficulty of limiting corruption to areas in which it might be economically desirable.[1] Murphy, Shleifer, and Vishny [1991] provide evidence that countries where talented people are allocated to rent-seeking activities tend to grow more slowly.

Although most economists would probably agree that efficient government institutions foster economic growth, the magnitude of these effects has yet to be measured.[2] In order to fill this gap, I analyze a newly assembled data set, consisting of the *Business International* (BI) indices on corruption, red tape, and the efficiency of the judicial system for the period 1980–1983. The indices are based on standard questionnaires filled in by BI's correspondents stationed in about 70 countries. The purpose of this paper is to identify the channels through which corruption and other institutional factors affect economic growth and to quantify the magnitude of these effects.[3] To my knowledge, this is the first systematic cross-country empirical analysis that relates indicators of bureaucratic honesty and efficiency to economic growth.[4]

In attempting to measure the extent to which government institutions affect economic growth, one has to recognize that institutions and economic variables evolve jointly: not only do institutions affect economic performance, but also economic variables may affect institutions.[5] In order to address the issue of endogeneity, I use an index of ethnolinguistic fractionalization (which measures the probability that two persons drawn at

1. See Shleifer and Vishny [1993] for a more complete review of the literature on corruption.

2. However, there are authors who predict that there would be a *negative* correlation between good institutions and economic growth. For example, Olson [1963] argues that rapid economic growth would bring about political instability.

3. While the cross-country empirical literature on economic growth has so far devoted little attention to the efficiency and honesty of the bureaucratic and judicial systems, there is a considerable literature on the effects of political variables, which is surveyed in Levine and Renelt [1992].

4. The first systematic empirical analysis of bureaucratic efficiency is provided by Putnam [1993], who analyzes the regions of Italy and finds that "civicness"—both a century ago and today—is strongly associated with bureaucratic efficiency and income levels. He defines civicness as the extent to which citizens cooperate rather than free ride, and interact as equals rather than as patrons and clients. He measures civicness as a composite index of objective measures such as the number of recreational and cultural associations.

5. Tornell [1993] models the joint evolution of income and the system of property rights. Alesina, Ozler, Roubini, and Swagel [1992] empirically analyze the joint determination of political stability and economic growth.

random from a country's population will not belong to the same ethnolinguistic group) as an instrument. Ethnolinguistic fractionalization is highly correlated with corruption and other institutional variables. Yet it can be assumed to be exogenous both to economic variables and to institutional efficiency.

I find that corruption lowers private investment, thereby reducing economic growth, even in subsamples of countries in which bureaucratic regulations are very cumbersome. The negative association between corruption and investment, as well as growth, is significant, both in a statistical and in an economic sense. For example, if Bangladesh were to improve the integrity and efficiency of its bureaucracy to the level of that of Uruguay (this corresponds to a one-standard-deviation increase in the *bureaucratic efficiency* index introduced in the next section), its investment rate would rise by almost five percentage points, and its yearly GDP growth rate would rise by over half a percentage point. The magnitude of the estimated effects is even larger when instrumental variables are used.

The paper is organized as follows. The next section describes the data. Section III presents empirical evidence on the relationship between corruption, other institutional factors, and economic growth. Section IV concludes by suggesting possible interpretation of the results and directions for further research.

## II. Description of the Data

### *II.1. The Business International Indices of Corruption and Institutional Efficiency*

The indices proxying for corruption and various other institutional variables are drawn from Business International (BI), now incorporated into *The Economist Intelligence Unit*. BI is a private firm that sells these indices typically to banks, multinational companies, and other international investors. BI published indices on 56 "country risk" factors for 68 countries, for the period 1980–1983, and on 30 country risk factors for 57 countries, for the period 1971–1979. "Factor assessment reports" are filled in by BI's network of correspondents and analysts based in the countries covered. Assessment reports undergo further checks at BI's regional level, as well as BI's corporate headquarters, in order to ensure accuracy and consistency of the results. The indices reflect the analysts' perspectives on risk and efficiency factors, and may be

taken to represent investors' assessments of conditions in the country in question. Evidence for the accuracy and relevance of the indices is provided by the considerable price that BI's clients are willing to pay in order to obtain them.[6]

In this paper I restrict my analysis to nine indicators of institutional efficiency. I choose these nine factors for two reasons: first, they are assessed independently of macroeconomic variables; second, they refer to the interests of *any* firm operating in the country in question, rather than specifically to foreign-owned multinational companies. The BI indices are integers between 0 and 10 and a high value of the index means that the country in question has "good" institutions. In Section III each indicator is the simple average for the country in question for the period 1980–1983.[7] BI's definitions of these indices are reported below.[8]

(1) *Political Change—institutional.* "Possibility that the institutional framework will be changed within the forecast period by elections or other means."

(2) *Political Stability—social.* "Conduct of political activity, both organized and individual, and the degree to which the orderly political process tends to disintegrate or become violent."

(3) *Probability of Opposition Group Takeover.* "Likelihood that the opposition will come to power during the forecast period."

(4) *Stability of Labor.* "Degree to which labor represents possible disruption for manufacturing and other business activity."

(5) *Relationship with Neighboring Countries.* "This includes political, economic and commercial relations with neighbors that may affect companies doing business in the country."

(6) *Terrorism.* "The degree to which individuals and businesses are subject to acts of terrorism."

(7) *Legal System, Judiciary.* "Efficiency and integrity of the legal environment as it affects business, particularly foreign firms."

(8) *Bureaucracy and Red Tape.* "The regulatory environment foreign firms must face when seeking approvals and permits. The degree to which it represents an obstacle to business."

(9) *Corruption.* "The degree to which business transactions involve corruption or questionable payments."

6. The data set I use would cost several thousand dollars if it were to be sold commercially.

7. The average over four years is a less noisy indicator of institutional variables, which we may expect to change only slowly.

8. The indices are described in more detail in Business International Corporation [1984].

In assigning a "grade" to the country in which they are based, BI correspondents follow general criteria which are outlined in the questionnaires they fill in. For example, for the bureaucracy and red tape index, a grade of 10 is given in the case of "smoothly functioning, efficient bureaucracy," while a grade of 4 means "constant need for government approvals and frequent delays." I collected the 1980–1983 data set by consulting the BI archives at their New York headquarters.[9] These indices were assembled by hand from hard copy. Descriptive statistics for all regression variables are provided in Appendix 1.

All BI indices are positively and significantly correlated, even controlling for GDP per capita. For example, the simple correlation between the corruption and red tape indices is 0.79 and the partial correlation—controlling for per capita GDP—is 0.66. The median of the simple correlations is 0.54, and the median of the partial correlations—controlling for per capita GDP—is 0.40 ($p$-value = 1 percent in both cases). Appendix 2 reports the correlation matrix for the BI indices. A number of mechanisms may contribute to explaining the positive correlation among all categories of institutional efficiency. Corruption may be expected to be more widespread in countries where red tape slows down bureaucratic procedures. In addition, the *Santhanam Committee Report* (quoted in Myrdal [1968, p. 952]) argues that corruption may even lead to more bureaucratic delay.[10] In fact, when individuals offer speed money to officials, they contribute to establishing a custom, so that the granting of, say, a license will be artificially delayed until a bribe is received. Corrupt practices such as speed money (which may actually avoid delay for an individual) may therefore increase red tape for the economy as a whole. The fact that all categories of country risk tend to move together is an interesting result.[11] At the

9. In Mauro [1993] I also analyze the 1971–1979 data set published in *Managing and Evaluating Country Risk* [1981]. The 1980–1983 indices refer to a larger number of different categories of country risk and are reported on a finer scale than the 1971–1979 ones, so they provide more information. In particular, the corruption index is available only from 1980. The results from the 1971–1979 data broadly confirm those presented in this paper.

10. Krueger [1993] and De Soto [1989] also argue that corrupt bureaucrats will intentionally introduce new regulations and red tape, in order to be able to extract more bribes by threatening to deny permits.

11. The finding that all indicators of bureaucratic efficiency and political stability tend to move together could not have been expected unambiguously, a priori. For example, in popular debate it is sometimes argued that corruption is more likely to become pervasive in countries where there are few changes in the elite running the country, that is, in stable countries. This argument is often made in connection with the corruption scandals in Italy and Japan in the early 1990s. One might also have expected that by allowing bureaucrats or other politically influen-

same time this multicollinearity makes it difficult to tell which of the several institutional factors examined is crucial for investment and growth.[12] As a consequence, it may be desirable to combine groups of variables into composite indices.

On the basis of the definitions of the variables, it seems that the judiciary system, red tape, and corruption indices represent closely related variables and that their simple average may be a reasonable proxy for what I will label bureaucratic efficiency. Part of the rationale for aggregating the indices into composite subindices is that there may be measurement error in each individual index, and averaging the individual indices may yield a better estimate of the determinants of investment and growth. Indeed, I consider the bureaucratic efficiency index to be a more precise measure of corruption than the corruption index on its own. Similarly, the simple average of the institutional change, social change, opposition takeover, stability of labor, relationship with neighboring countries, and terrorism indices may be a reasonable proxy for political stability. In addition to being closely related on a priori grounds, the indices that I choose to group together are more strongly correlated with each other. In some estimates I aggregate all nine indices into an average index of institutional efficiency, which I define as including bureaucratic efficiency, as well as political stability.

Table I is a frequency histogram of the bureaucratic efficiency index (BE) for 1980–1983. The country BI reported to have the best institutions is Singapore, which in 1980–1983 obtained grades of 10 out of ten for all the indices I use. It also had the highest investment rate over 1960–1985. Singapore experienced minimal corruption (and remarkable political stability) under the People's Action Party of Lee Kuan Yew. The ruling party is closely knit, and its younger members are gradually given more responsibilities. At the opposite extreme in 1980–1983, BI considered Zaire as having the worst institutions among the countries in the sample. According to BI's consultants, corruption was rampant. Zaire's investment rate has been extremely low. A casual glance at Table I shows

tial groups to collect bribes, the government may be able to achieve political stability, at least in the short run. For example, Business International [1984] has argued that Zaire's President Mobutu Sese Seko has been able to retain the support of the ruling *Mouvement Populaire de la Revolution* and of the military, by permitting large-scale corruption.

12. This is a common finding. Putnam [1993, p. 74] reports that all his indicators of bureaucratic efficiency for the Italian regions tend to move together to a remarkable extent, too.

TABLE I
BUREAUCRATIC EFFICIENCY INDEX

| 1.5–4.5 | 4.5–5.5 | 5.5–6.5 | 6.5–7.5 | 7.5–9 | 9–10 |
|---|---|---|---|---|---|
| Egypt | Algeria | Angola | Argentina | Austria | Australia |
| Ghana | Bangladesh | Dominican Rep. | Ivory Coast | Chile | Belgium |
| Haiti | Brazil | Ecuador | Kuwait | France | Canada |
| Indonesia | Colombia | Greece | Malaysia | Germany | Denmark |
| Iran | India | Iraq | Peru | Ireland | Finland |
| Liberia | Jamaica | Italy | South Africa | Israel | Japan |
| Nigeria | Kenya | Korea | Sri Lanka | Jordan | Hong Kong |
| Pakistan | Mexico | Morocco | Taiwan | Zimbabwe | Netherlands |
| Thailand | Philippines | Nicaragua | Uruguay | | New Zealand |
| Zaire | Saudi Arabia | Panama | | | Norway |
| | Turkey | Portugal | | | Singapore |
| | Venezuela | Spain | | | Sweden |
| | | Trinidad/Tobago | | | Switzerland |
| | | | | | United Kingdom |
| | | | | | United States |

BE is the bureaucratic efficiency index, which I compute as the simple 1980–1983 average of three Business International indices: judiciary system, red tape, and corruption. A *high* value of the BE index means that the country's institutions are good.

that richer countries tend to have better institutions than poorer countries, and that fast-growers also tend to be among the countries with a higher bureaucratic efficiency index. Nevertheless, there are a few of surprises. In 1980 BI reported Thailand to be the most corrupt country, yet its economic performance has been relatively good. Korea has been a fast grower, in spite of the fact that it was reported to have relatively inefficient institutions. [13]

Figures I–III provide scatter plots of per capita GDP, the investment rate, and the per capita GDP growth rate versus the bureaucratic efficiency index for the 67 countries for which both Summers and Heston [1988] and BI data are available in 1980–1983. All these correlations are significant at the 1 percent level.

One of the most striking features of the data set is the strong association between bureaucratic efficiency and political stability.[14] Table II arranges the countries in the data set in a matrix, grouping them by quintiles depending on their bureaucratic efficiency and

13. The BI indices refer to the period immediately following the assassination of President Park Chung-hee.

14. Corruption may be more deleterious and thus reported as a more serious problem in politically unstable countries. Shleifer and Vishny [1993] argue that countries with weak (and, therefore, unstable) governments will experience a very deleterious type of corruption, in which an entrepreneur may have to bribe several public officials and still face the possibility that none of them really have the power to allow the project to proceed.

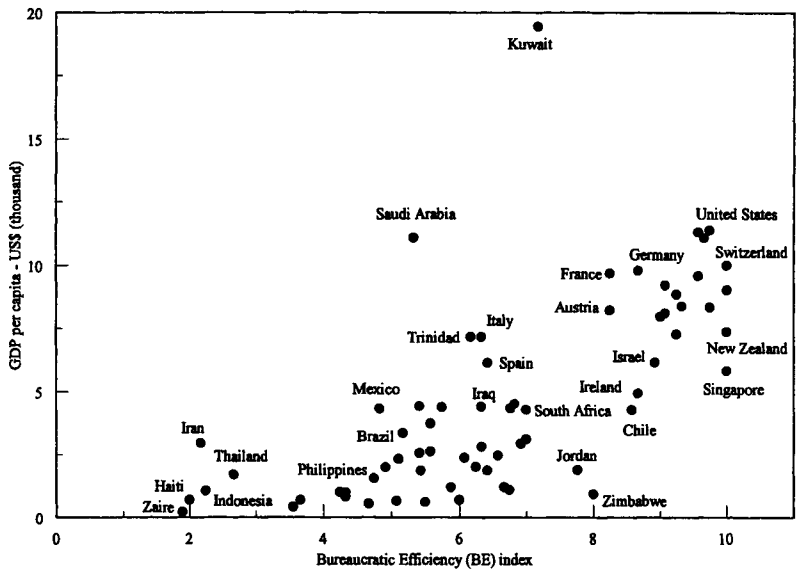


FIGURE I
Per Capita Income and Bureaucratic Efficiency

BE index is 1980–1983 average of BI indices of corruption, red tape, and judiciary.
Per capita GDP at PPP in 1980 is from Summers and Heston [1988].
67 countries, $r = 0.68$.

political stability indices. Most countries lie near or on the diagonal. The simple correlation coefficient between the bureaucratic efficiency index and the political stability index is 0.67, and the partial correlation coefficient controlling for per capita GDP in 1980 is 0.45, both significant at the 1 percent level. Yet, several relatively stable countries are reported to have relatively inefficient, corrupt bureaucracies. Conversely, several countries with relatively efficient, honest bureaucracies are relatively politically unstable. Based upon the 1980–1983 BI indices, Egypt, Greece, Indonesia, Saudi Arabia, and Turkey are at least two quintiles better on the grounds of political stability than on the grounds of bureaucratic efficiency. On the other hand, Angola, Chile, Iraq, Israel, Nicaragua, Peru, South Africa, and Zimbabwe score at least two quintiles better on bureaucratic efficiency than on political stability.[15] For example, Indonesia under President Suharto was

15. A similar matrix appears in Coplin and O'Leary [1982]. They classify 73 countries by political instability and restrictions of business. Their classification broadly confirms the one reported in Table II.

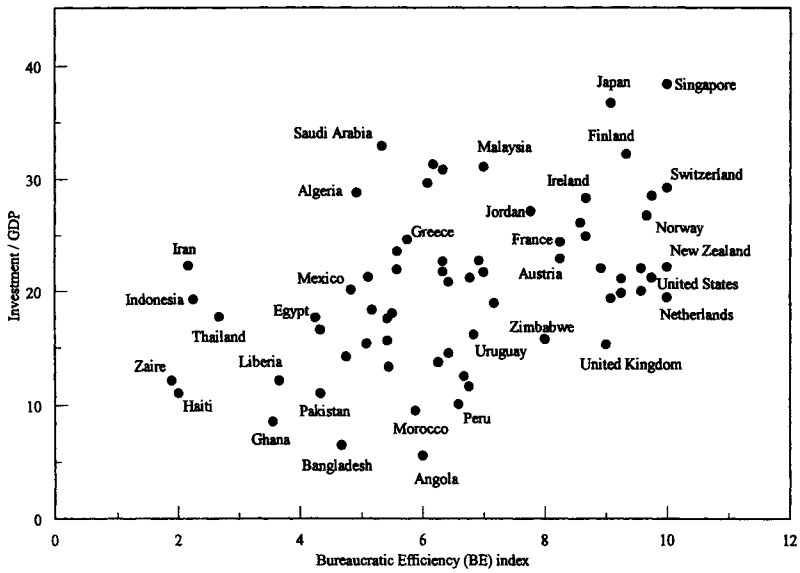


FIGURE II
Investment and Bureaucratic Efficiency

BE index is 1980–1983 average of BI indices of corruption, red tape, and judiciary.
Average investment 1980–1985 from Summers and Heston [1988].
67 countries, $r = 0.46$.

relatively politically stable, although BI reports that companies were hindered by a corrupt, cumbersome bureaucracy. According to BI's consultants, Peru's fragile democracy and its problems with social violence and terrorism and South Africa's racial tensions and active trade unions were in sharp contrast to their relatively efficient bureaucracies. Thus, even though bureaucratic efficiency and political stability are positively and significantly correlated, there is a wealth of information in the bureaucratic efficiency indices that can be used to analyze the determinants of investment and growth.

The fact that the indices reflect the *subjective* opinions of BI's correspondents presents both advantages and disadvantages. An advantage relates specifically to the political instability variables. Previous studies have used *objective* measures of political stability, such as the number of political assassinations or changes in government. Objective measures can often be misleading. For example, there have been over 50 changes of government in Italy since 1945, yet the country has been relatively politically stable. It

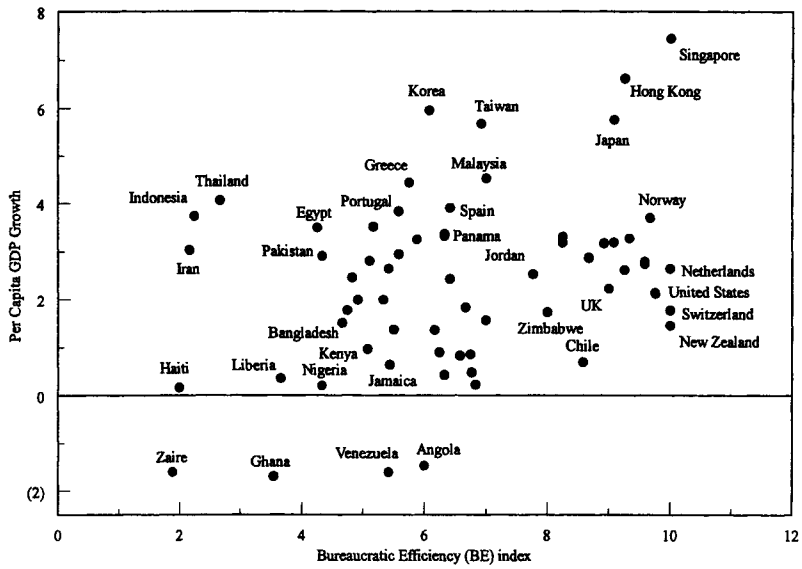


FIGURE III
Growth and Bureaucratic Efficiency

BE index is 1980–1983 average of BI indices of corruption, red tape, and judiciary.

Average GDP per capita growth 1960–1985 from Summers and Heston [1988]. 67 countries, $r = 0.32$.

may be argued that it is investors' *perceptions* of political uncertainty that determine the investment rate, and this is what subjective indices capture directly. A disadvantage is that it is unclear whether BI's attempts to ensure that the difference between a grade of 4 and 5 is the same as that between a 7 and an 8 are successful, which leads to difficulties in the interpretation of the coefficients. In order to address this concern, in one case I estimate the relationship between investment and dummies for "high," "medium," and "low" bureaucratic efficiency. An even more serious disadvantage is that one might suspect that the BI correspondents may be influenced by a country's economic performance when they evaluate its institutional efficiency.[16] In addition, good economic performance might increase institutional efficiency, regardless of how the latter is measured. In order to correct for such potential sources of endogeneity bias, I use an index of ethnolinguistic fractionalization as an instrument.

16. This would clearly be in conflict with the spirit of the questionnaires, and extensive interviews with BI personnel persuaded me that no macroeconomic

TABLE II
BUREAUCRATIC EFFICIENCY AND POLITICAL STABILITY

| | | Political stability (increasing →) | | | | |
|---|---|---|---|---|---|---|
| | | *5th quintile* | *4th quintile* | *3rd quintile* | *2nd quintile* | *1st quintile* |
| Bureaucratic efficiency (increasing ↓) | *5th quintile* | Ghana<br>Iran<br>Liberia<br>Pakistan<br>Philippines<br>Thailand<br>Zaire | Bangladesh<br>Haiti<br>Mexico<br>Nigeria | INDONESIA | EGYPT | |
| | *4th quintile* | Colombia | Ecuador<br>India<br>Kenya<br>Morocco | Algeria<br>Brazil<br>Jamaica<br>Portugal<br>Venezuela | GREECE<br>SAUDI ARABIA<br>TURKEY | |
| | *3rd quintile* | ANGOLA<br>IRAQ<br>NICARAGUA<br>PERU | Spain<br>Sri Lanka | Argentina<br>Dominican Republic<br>Korea<br>Panama<br>Trinidad/ Tobago | Italy<br>Ivory Coast | |
| | *2nd quintile* | ISRAEL | CHILE<br>SOUTH AFRICA<br>ZIMBABWE | Ireland<br>Jordan | Germany<br>Kuwait<br>Malaysia<br>Taiwan | Austria<br>France<br>Uruguay |
| | *1st quintile* | | | | Australia<br>Belgium<br>Denmark<br>New Zealand<br>United Kingdom | Canada<br>Finland<br>Hong Kong<br>Japan<br>Netherlands<br>Norway<br>Singapore<br>Sweden<br>Switzerland<br>United States |

The countries for which there is more than a one quintile discrepancy between the bureaucratic efficiency and the political stability indices are listed in small capital letters. The political stability index is the simple average of six Business International indices: institutional change, social change, opposition takeover, stability of labor, relationship with neighboring countries, and terrorism. The bureaucratic efficiency index is the simple average of three Business International indices: judiciary system, red tape, and corruption. There may not be exactly the same number of countries in each quintile.

### *II.2. The Index of Ethnolinguistic Fractionalization and Other Variables*

The raw data from which the index of ethnolinguistic fractionalization (ELF) is constructed refer to 1960 and come from the *Atlas Narodov Mira* [Department of Geodesy and Cartography of the State Geological Committee of the USSR 1964]. The latter is the result of a vast project whose goal was to provide an extremely accurate depiction of the ethnolinguistic composition of world population. The criteria for characterizing groups as ethnically separate related mainly to historical linguistic origin, and no economic or political variables were considered during the project. The ELF index is calculated by Taylor and Hudson [1972], who explicitly note that Soviet views did not bias the index. It is defined as

$$ELF = 1 - \sum_{i=1}^{I} \left(\frac{n_i}{N}\right)^2, \qquad i = 1, \ldots, I,$$

where $n_i$ is the number of people in the $i$th group, $N$ is total population, and $I$ is the number of ethnolinguistic groups in the country.[17] *ELF* measures the probability that two randomly selected persons from a given country will not belong to the same ethnolinguistic group. Therefore, the higher the ELF index, the more fragmented the country. Table III groups the countries in the sample arranged by the ethnolinguistic fractionalization index for 1960.

I assume that the extent to which countries are fractionalized along ethnolinguistic lines is exogenous and unrelated to economic variables other than through its effects on institutional efficiency.[18]

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variables are considered when constructing the BI indices. If this were the only source of endogeneity, it would be possible to correct for it simply by using the Barro [1991] objective variables as instruments. One could imagine a system of equations in which the number of assassinations, revolutions, and coups affects people's perceptions of country risk (the correlations are reported in Mauro [1993]), and the latter in turn affect investment and growth. The results of this estimation procedure are reported in Table V, row 7.

17. In 1960 Canada—the most fractionalized among industrialized countries—had 38.3 percent Anglo-Canadians, 30.1 percent French-Canadians, 5.7 percent Germans, 3.3 percent English, 2.6 percent Ukrainians, 2.5 percent Italians, 2.4 percent Dutch, 1.8 percent Poles, 1.7 percent Americans, 1.4 percent Jews, 1.2 percent Scots, 0.8 percent Irish, 0.8 percent Norwegians, 0.7 percent Swedes, 0.7 percent Russians, 0.5 percent Hungarians, 0.5 percent Athapaskans, 0.4 percent Algonquins, adding to a total of 95.3 percent, and yielding an ELF of 0.76.

18. Canning and Fay [1993] also assume that this homogeneity index is exogenous to both politics and economics. They use it as an independent variable in cross-country growth regressions. They show that homogeneity of the population

TABLE III
ETHNOLINGUISTIC FRACTIONALIZATION, 1960

| 100–75 | 75–55 | 55–35 | 35–15 | 15–5 | 5–0 |
|---|---|---|---|---|---|
| Angola | Canada | Algeria | Argentina | Austria | Dominican Rep. |
| Bangladesh | Ghana | Belgium | Australia | Brazil | Egypt |
| India | Malaysia | Ecuador | Finland | Chile | Germany |
| Indonesia | Pakistan | Iraq | France | Colombia | Haiti |
| Iran | Peru | Morocco | Israel | Denmark | Hong Kong |
| Ivory Coast | Philippines | New Zealand | Kuwait | Greece | Ireland |
| Kenya | Thailand | Singapore | Mexico | Jamaica | Italy |
| Liberia | Trinidad/ Tobago | Spain | Nicaragua | Jordan | Japan |
| South Africa | | Sri Lanka | Panama | Netherlands | Korea |
| Zaire | | Switzerland | Turkey | Saudi Arabia | Norway |
| | | Taiwan | United Kingdom | Sweden | Portugal |
| | | United States | Uruguay | Venezuela | |
| | | Zimbabwe | | | |

The ethnolinguistic fractionalization index for 1960 is drawn from Taylor and Hudson [1972].

There is a negative and significant correlation between institutional efficiency and ethnolinguistic fractionalization, which makes the latter a good instrument.[19] The ELF index has a simple correlation coefficient equal to −0.38 with the institutional efficiency index, −0.41 with the political stability index, −0.28 with the bureaucratic efficiency index, and −0.31 with the corruption index, all significant at the 1 percent level. A number of mechanisms may explain this relationship. Ethnic conflict may lead to political instability and, in extreme cases, to civil war. The presence of many different ethnolinguistic groups is also significantly associated with worse corruption, as bureaucrats may favor members of their same group. Shleifer and Vishny [1993] suggest that more homogeneous societies are likely to come closer to joint bribe maximization, which is a less deleterious type of corruption than noncollusive bribe-setting. Strictly speaking, the ELF index is a

has a positive and significant effect on productivity growth. They also argue that it is a predetermined proxy for political stability. However, they do not use the homogeneity index as an *instrument* for political stability. Hibbs [1973] uses the index in a large system of simultaneous equations which is ultimately designed to explain mass political violence and other indicators of political instability.

19. Ethnolinguistic fractionalization is a valid instrument, while lags of the right-hand side variables such as beginning-of-period indicators of corruption and political instability would be unlikely to be valid instruments, because such institutional variables are highly autocorrelated.

valid instrument only for the institutional efficiency index, as fractionalization affects both corruption and political instability.

By consulting von der Mehden [1969], the *Encyclopaedia Britannica,* and the *World Handbook of Political and Social Indicators,* I also compiled a data set on the colonial history of the 118 countries in the Barro [1991] data set. It includes the date of independence and the last colonizer. In some estimates, I make use of dummies on whether the country ever was a colony (after 1776, following Taylor and Hudson [1972]), and on whether the country was still a colony in 1945, as additional instruments.[20] A country's colonial history may affect its ability to form a stable government, as well as the honesty and efficiency of its bureaucracy. Ekpo [1979] suggests that recently independent former colonies will have more decentralized bribe collection machines, so that they will be subject to more deleterious corruption. At the same time, a country's colonial history may be assumed to be exogenous, and to have no direct effect on the investment rate.

Even though formal specification tests (of the overidentifying instruments, reported in the next section) do not reject the joint null hypothesis that the ELF index and the colonial history dummies are valid instruments, a note of caution is needed on the very long-run exogeneity of the instruments. Countries whose economic performance is poor tend to be militarily weak and are therefore more likely to be colonized. In addition, when drawing the remarkably straight borders of some nations, colonizers often paid little attention to the ethnolinguistic composition of the population. Therefore, one might suspect that some unmeasurable factor affecting economic variables may also have affected not only a country's colonial history, but also its ethnolinguistic fractionalization.

The macroeconomic data are drawn from Summers and Heston [1988] and Barro [1991]; the objective data on political uncertainty from Barro [1991]; and the data on equipment investment from De Long and Summers [1991]. In the next section the sample of 58 countries is the intersection between the countries for which the BI data are available, the sample of countries analyzed by Levine and Renelt [1992], who do not include the major oil exporters—which experienced high growth thanks merely to one

20. Hibbs [1973] also uses a postwar independence dummy as an instrument in his system of equations relating economic performance and political stability. I found no significant evidence that a country's economic performance or its institutional efficiency were affected by *which* country colonized it. This result confirms earlier findings by von der Mehden [1969].

natural resource—and the Barro [1991] sample of 98 countries. Appendix 3 provides the indices of corruption, red tape, judiciary system, bureaucratic efficiency, and political stability from BI, and ethnolinguistic fractionalization from Taylor and Hudson [1972].

## III. Empirical Estimates

This section empirically analyzes the links between corruption, as well as other institutional factors, and economic growth. Subsection III.1 focuses on the relationship between corruption and the investment rate. I find that corruption is strongly negatively associated with the investment rate, regardless of the amount of red tape. In alternative model specifications, the corruption and bureaucratic efficiency indices are significantly and robustly negatively associated with investment even controlling for other determinants of investment, including the political stability index. There is evidence that institutional inefficiency *causes* low investment. Subsection III.2 analyzes the relationship between institutional efficiency and economic growth. The bureaucratic efficiency index is significantly and robustly associated with low growth, even controlling for other determinants of growth. Again, there is evidence that institutional inefficiency *causes* low growth. The main channel through which bad institutions affect the growth rate is by lowering the investment rate.

### *III.1. Corruption and Investment*

Given the renewed debate in the literature on the effects of corruption, I provide some preliminary results using the corruption index. I find that there is a negative and significant association between corruption and the investment rate, both in OLS estimates and in 2SLS estimates using the ELF index as an instrument. The magnitude of the effect is considerable. A one-standard-deviation increase (an improvement) in the corruption index is associated with an increase in the investment rate by 2.9 percent of GDP. The magnitudes of the slope coefficients measuring the association between corruption and investment are far from being significantly different in low-red-tape and high-red-tape subsamples of countries (Table IV).[21] Therefore, these results do not provide any support for the claim that, in the presence of a slow

21. For Table IV, I use the full sample of 67 countries, in order to have the maximum power to reject the hypothesis that corruption has the same effects regardless of red tape.

TABLE IV
INVESTMENT AND CORRUPTION
Dependent Variable: Total Investment/GDP, 1980–1985 Average

| Constant | Corruption (slope coefficient) | $R^2$ | Sample | N | $p$-value of restriction |
|---|---|---|---|---|---|
| 0.125 | 0.0117 | 0.18 | Whole BI sample | 67 | |
| (6.63) | (4.41) | | | | |
| 0.018 | 0.0276 | (*) | Whole BI sample | 66 | |
| (0.23) | (2.56) | | Fractionalization as an instrument | | |
| 0.134 | 0.0105 | 0.09 | Low red tape[(1)] | 45 | |
| (3.52) | (2.29) | | (red tape index $\geq$ 5) | | |
| | | | | | 0.9 |
| 0.116 | 0.0138 | 0.23 | High red tape[(1)] | 22 | |
| (4.65) | (2.63) | | (red tape index $<$ 5) | | |
| 0.100 | 0.0152 | 0.11 | Low red tape[(2)] | 24 | |
| (1.30) | (1.80) | | (red tape index $>$ 7) | | |
| | | | | | 0.5 |
| 0.140 | 0.0083 | 0.07 | High red tape[(2)] | 43 | |
| (6.30) | (2.04) | | (red tape index $\leq$ 7) | | |

White-corrected $t$-statistics are reported in parentheses. A *high* value of the corruption (red tape) index means that the country does well in that respect, i.e., *low* corruption (red tape). The $p$-value of the restriction that the slope coefficients are the same in the two subsamples is calculated using a log-likelihood ratio test. [(1)]This Low red tape sample is defined as containing the countries that have a red tape index $\geq$ 5. [(2)]This Low red tape sample is defined as containing the countries that have a red tape index $<$ 7. (*) The $R^2$ is not an appropriate measure of goodness of fit with two-stage least squares.

bureaucracy, corruption would become beneficial, as suggested by Leff [1964] and Huntington [1968].

Table V analyzes the simple relationship between investment (or some of its components) and institutional variables in further detail.[22] A one-standard-deviation increase (an improvement) in the bureaucratic efficiency index is associated with an increase in the investment rate by 4.75 percent of GDP (obtained by multiplying 0.022, the slope coefficient, by 2.16, the standard deviation of the index). The estimated magnitude of the effects of bureaucratic efficiency on investment is even higher (and remains significant) when controlling for endogeneity by using 2SLS with the ELF index as an instrument than in the OLS estimates. The coefficient is still significant at the conventional levels (Table V, rows 3 and 4).

22. Further tests of robustness of this relationship are reported in Mauro [1993], where it is shown that the results are not driven by any particular group of countries (such as sub-Saharan Africa, Asian tigers, high income, or low income).

TABLE V

INVESTMENT AND BUREAUCRATIC EFFICIENCY

| Row | Dependent variable | Constant | Corruption BI Index | Bureaucratic efficiency BI index | Institutional efficiency BI index | $R^2$ | $N$ |
|---|---|---|---|---|---|---|---|
| 1 | Total investment/GDP (1960–1985) | 0.086 (4.14) | 0.018 (6.43) | | | 0.40 | 58 |
| 2 | Total investment/GDP (1960–1985) Instrument: fraction-alization | −0.021 (−0.27) | 0.033 (3.04) | | | (*) | 57 |
| 3 | Total investment/GDP (1960–1985) | 0.059 (2.74) | | 0.022 (7.47) | | 0.46 | 58 |
| 4 | Total investment/GDP (1960–1985) Instrument: fraction-alization | −0.082 (−0.78) | | 0.043 (2.84) | | (*) | 57 |
| 5 | Total investment/GDP (1960–1985) | −0.023 (−0.65) | | | 0.032 (6.73) | 0.44 | 58 |
| 6 | Total investment/GDP (1960–1985) Instrument: fraction-alization | −0.133 (−1.28) | | | 0.047 (3.37) | (*) | 57 |
| 7 | Total investment/GDP (1960–1985) Instruments: revcoup, assass | −0.014 (−0.25) | | | 0.030 (4.00) | (*) | 58 |
| 8 | Total investment/GDP (1960/1985) Instruments: colonial dummies | −0.148 (−1.77) | | | 0.049 (4.35) | (*) | 58 |
| 9 | Total investment/GDP (1960–1985) Instruments: fract., colonial dummies | −0.119 (−1.66) | | | 0.045 (4.73) | (*) | 57 |
| 10 | Total investment/GDP (1970–1985) | 0.066 (3.04) | | 0.021 (6.94) | | 0.42 | 58 |
| 11 | Total investments/GDP (1970–1985) Instrument: fraction-alization | −0.084 (−0.79) | | 0.043 (2.88) | | (*) | 57 |
| 12 | Total investment/GDP (1980–1985) | 0.075 (3.58) | | 0.019 (6.04) | | 0.33 | 58 |
| 13 | Total investment/GDP (1980–1985) Instrument: fraction-alization | −0.054 (−0.51) | | 0.037 (2.48) | | (*) | 57 |
| 14 | Equipment investment/ GDP (1975–1985) | −0.072 (−0.64) | | 0.009 (5.44) | | 0.37 | 41 |
| 15 | Nonequipment inv./ GDP (1975–1985) | 0.011 (4.40) | | 0.007 (2.07) | | 0.07 | 41 |
| 16 | Equip. inv./nonequip. inv. (1975–1985) | 0.065 (0.87) | | 0.041 (3.94) | | 0.21 | 41 |
| 17 | Private investment/ GDP (1970–1985) | 0.052 (2.26) | | 0.020 (6.12) | | 0.40 | 50 |
| 18 | Public investment/GDP (1970–1985) | 0.022 (3.70) | | 0.002 (2.00) | | 0.06 | 50 |
| 19 | Private inv./public inv. (1970–1985) | 4.715 (2.76) | | 0.252 (1.17) | | 0.03 | 50 |

A *high* value of each index means the country has *good* institutions. One standard deviation equals 1.47 for the institutional efficiency index, 2.16 for the bureaucratic efficiency index, and 2.51 for the corruption index. White-corrected $t$-statistics are reported in parentheses. $N$ is the number of observations. Revcoup and assass are the number of revolutions and coups, and assassinations, respectively, between 1960 and 1985, from Barro [1991]. Fractionalization is the index of ethnolinguistic fractionalization in 1960, from Taylor and Hudson [1972]. (*) The $R^2$ is not an appropriate measure of goodness fit with two-stage least squares.

It might be argued that ethnolinguistic fractionalization may affect investment not only by increasing corruption and political instability, but also via a direct channel. For example, it might slow down the diffusion of ideas and technological innovations within the country. In order to address that possibility, I run 2SLS regressions of the investment rate on the institutional efficiency index using as instruments not only the ELF index, but also dummies for whether the country ever was a colony and for whether it achieved independence after 1945. A test of the overidentifying restrictions fails to reject the null hypothesis that the only channel through which ethnolinguistic fractionalization affects investment is via its effects on institutional efficiency (Table V, row 9; $p$-value = 0.25).

The components of investment that have been found to be more closely associated with economic growth (see De Long and Summers [1991] for equipment investment and Barro [1991] for private investment) also seem to be more closely associated with bureaucratic efficiency. Equipment investment is significantly more closely associated with bureaucratic efficiency than nonequipment investment is (Table V, rows 14–16). There are some indications that private investment is more closely associated with bureaucratic efficiency than public investment is, although this is not significantly the case (Table V, rows 17–19).[23]

Table VI shows that both corruption and bureaucratic inefficiency are negatively associated with the investment rate even after controlling for a variety of other determinants of investment.[24] I adopt two types of specification that have become standard in the cross-country growth literature. The first one is that which Levine and Renelt ([p. 946, their expression 2, 1992] henceforth, the LR specification) use as the basis for their analysis of "robustness" of growth regressions. In some estimates I use the ELF index as an instrument. The second one is that adopted by Barro ([p. 426, his Table III, 1991] henceforth, the B specification). The rationale for the LR and B specifications is that a number of

23. It might be the case that the more corrupt countries report as "public investment" also projects that really represent consumption expenditure by the bureaucratic elite. Easterly [1993] models some types of public capital as complements (e.g., infrastructure), and others as substitutes (e.g., government enterprises in agriculture and tourism) for private capital. In Mauro [1993] I present results obtained by analyzing the Easterly and Rebelo [1993] data set on disaggregated public investment.

24. The dependent variable in Table VI is the 1960–1985 average of the total investment to GDP ratio. Results obtained using 1970–1985 or 1980–1985 averages are quite similar.

TABLE VI
INVESTMENT ON CORRUPTION, BUREAUCRATIC EFFICIENCY
Dependent variable: investment/GDP (1960–1985 Average)

| Independent variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Constant | 0.104 | 0.114 | 0.196 | 0.036 | 0.039 | 0.186 | 0.001 |
| | (3.03) | (3.18) | (4.65) | (0.42) | (0.40) | (0.31) | (0.01) |
| GDP in 1960 | −0.008 | −0.006 | −0.004 | −0.026 | −0.021 | −0.015 | −0.017 |
| | (−1.31) | (−0.81) | (−0.60) | (−1.57) | (−1.41) | (−2.50) | (−2.73) |
| Secondary education in 1960 | 0.060 | 0.111 | 0.096 | −0.078 | 0.017 | 0.082 | 0.115 |
| | (0.97) | (1.68) | (1.40) | (−0.56) | (0.16) | (1.60) | (2.04) |
| Population growth | −1.373 | −0.620 | −0.913 | −2.754 | −1.144 | | |
| | (−1.38) | (−0.61) | (−0.82) | (−1.84) | (−1.12) | | |
| Primary education in 1960 | | | | | | 0.105 | 0.111 |
| | | | | | | (2.89) | (3.36) |
| Government expenditure | | | | | | −0.166 | −0.206 |
| | | | | | | (−1.06) | (−1.39) |
| Revolutions and coups | | | | | | −0.009 | −0.005 |
| | | | | | | (−0.22) | (−0.139) |
| Assassinations | | | | | | −0.164 | −0.276 |
| | | | | | | (−0.69) | (−1.03) |
| PPI60 | | | | | | −0.058 | −0.061 |
| | | | | | | (−2.81) | (−2.79) |
| PPI60DEV | | | | | | 0.043 | 0.035 |
| | | | | | | (1.24) | (1.04) |
| Africa | | | | | | | 0.036 |
| | | | | | | | (1.92) |
| Latin America | | | | | | | 0.017 |
| | | | | | | | (0.88) |
| High Bureaucratic efficiency dummy | | | 0.051 | | | | |
| | | | (2.26) | | | | |
| Low Bureaucratic efficiency dummy | | | −0.014 | | | | |
| | | | (−0.77) | | | | |
| Political stability index | | | | | | 0.013 | 0.014 |
| | | | | | | (1.64) | (1.79) |
| Bureaucratic efficiency index | 0.019 | | | 0.004 | | 0.010 | 0.009 |
| | (4.04) | | | (1.76) | | (2.19) | (1.76) |
| Corruption index | | 0.013 | | | 0.034 | | |
| | | (2.94) | | | (1.56) | | |
| Estimation method | OLS | OLS | OLS | 2SLS | 2SLS | OLS | OLS |
| $R^2$ | 0.51 | 0.47 | 0.44 | (*) | (*) | 0.65 | 0.66 |

A *high* value of a BI index means the country has *good* institutions. One standard deviation equals 2.16 for the bureaucratic efficiency (BE) index, 2.51 for the corruption index, and 1.29 for the political stability index. The high (low) BE dummy takes the value one when the BE index is above 8.33 (below 5.80); there are 19 high BE and 19 low BE countries. There are 58 observations in the case of OLS and 57 in the case of 2SLS. White-corrected $t$-statistics are reported in parentheses. The Barro [1991] regressors used are per capita GDP, primary education, secondary education, the purchasing-power parity value for the investment deflator (PPI60) and its deviation from the sample mean (PPI60DEV) in 1960, the 1960–1985 average of the ratio of government consumption expenditure (net of spending on defense and education) to GDP, population growth, the number of revolutions and coups, the number of assassinations, and dummies for Latin America and Sub-Saharan Africa where indicated. 2SLS indicates that the index of ethnolinguistic fractionalization in 1960, from Taylor and Hudson [1972], is used as an instrument. (*) The $R^2$ is not an appropriate measure of goodness of fit with two-stage least squares.

variables may affect the expected value and the variance of the marginal product of capital, thereby affecting the propensity to invest in the economy. These include initial per capita GDP; the educational level of the labor force, which may be a complement to physical capital in production processes; distortions, which may divert resources to less productive investment projects; and political uncertainty.

In the LR specification a one-standard-deviation improvement in the bureaucratic efficiency (corruption) index is significantly associated with an increase in the 1960–1985 average investment rate by 4.1 (3.3) percent of GDP (Table VI, columns 1 and 2). Application of the Levine and Renelt [1992] procedure (with their same control variables), which involves running a large number of regressions of investment on the variable of interest (in this case, the bureaucratic efficiency and corruption indices) and various conditioning sets shows that this relationship is robust. Using the ELF index as an instrument, the magnitudes of the coefficients remain considerable, although they become only marginally significant at the 10 percent level (Table VI, columns 4 and 5). When using dummies for high, medium, and low bureaucratic efficiency, the coefficients take the expected signs, although only the coefficient on high bureaucratic efficiency is significant at the conventional levels (Table VI, column 3).

Controlling for all the variables in the B specification and the political instability index, the bureaucratic efficiency index is always positively and significantly associated with the investment rate, although the level of significance is only 10 percent when dummies for Africa and Latin America are included in the list of independent variables (Table VI, columns 6 and 7). The magnitude of the coefficient on bureaucratic efficiency is in this case half as large as in Table V.

The finding that corruption is negatively and significantly associated with investment is consistent with the view that corruption lowers the private marginal product of capital (for example, by acting as a tax on the proceeds of the investment).

### *III.2. Corruption and Growth*

Having provided evidence that corruption affects investment, and recalling that Levine and Renelt [1992] show that the investment rate is a robust determinant of economic growth, in this subsection I analyze the relationship between institutional efficiency and economic growth.

The corruption and the bureaucratic efficiency indices are both significantly associated with average per capita GDP growth over 1960–1985.[25] Again, I analyze the robustness of these simple relationships to alternative control variables, using the LR and B specifications as a model. A possible underlying rationale for these specifications is the neoclassical growth model. In that setting, population growth, education, and institutional variables (government expenditure, distortions, and corruption) contribute to determining steady-state per capita income levels. These variables and initial per capita income affect the speed with which the economy converges toward its steady state, thereby affecting the growth rate.

Controlling for the other determinants of growth included in the LR specification, the relationship is significant at the 5 percent level for the bureaucratic efficiency index, the more precise measure of corruption, though only at the 10 percent level for the corruption index. The magnitude of the effects is considerable: a one-standard-deviation improvement in the bureaucratic efficiency (corruption) index is associated with a 1.3 (0.8) percentage point (absolute) increase in the annual growth rate of GDP per capita (Table VII, columns 5 and 6). Application of the Levine and Renelt [1992] procedure (with their control variables), which involves running various regressions of per capita GDP growth on the bureaucratic efficiency or the corruption index and various conditioning sets, shows that this relationship is robust for bureaucratic efficiency, although not for corruption. The magnitude of the coefficients rises when the ELF index is used as an instrument (Table VII, columns 7 and 8). Controlling for all the Barro [1991] variables and the political stability index, the magnitude of the coefficient on bureaucratic efficiency becomes rather small and retains its significance at the 10 percent level only in some specifications (Table VII, columns 12 and 13).

The null hypothesis of no relationship between investment and corruption can be rejected at a level of significance higher than the null hypothesis of no relationship between growth and corruption can. This finding is consistent with the results reported by Levine and Renelt [1992], who find that indexes of revolutions and coups and civil liberties are not robustly correlated with growth, although they are robustly, negatively correlated with the investment rate.

25. Use of the 1970–1985 average per capita GDP growth as the dependent variable yields quite similar results in all specifications reported in Table VII.

TABLE VII

GROWTH ON CORRUPTION, BUREAUCRATIC EFFICIENCY

Dependent variable: Per Capita GDP growth (1960–1985 Average)

| Independent variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Constant | 0.05 | 0.012 | −0.049 | −0.034 | 0.012 | 0.019 | −0.011 | −0.010 | 0.002 | 0.004 | −0.006 | 0.006 | 0.013 | 0.001 | 0.007 |
| | (0.63) | (1.63) | (−1.53) | (−1.33) | (1.26) | (1.86) | (−0.45) | (−0.32) | (0.23) | (0.47) | (−0.52) | (0.48) | (1.12) | (0.11) | (0.67) |
| GDP in 1960 | | | | | −0.008 | −0.007 | −0.013 | −0.012 | −0.008 | −0.006 | −0.006 | −0.008 | −0.007 | −0.008 | −0.007 |
| | | | | | (−4.87) | (−3.88) | (−2.91) | (−2.53) | (−4.55) | (−4.25) | (−3.97) | (−9.38) | (−8.02) | (−8.23) | (−5.95) |
| Secondary education in 1960 | | | | | 0.011 | 0.031 | −0.031 | −0.001 | 0.005 | 0.017 | 0.007 | 0.020 | 0.006 | 0.015 | −0.005 |
| | | | | | (0.81) | (2.40) | (−0.71) | (−0.03) | (0.37) | (1.42) | (0.351) | (2.62) | (0.95) | (1.78) | (−0.51) |
| Population growth | | | | | −0.654 | −0.395 | −1.077 | −0.564 | −0.519 | −0.318 | −0.246 | | | | |
| | | | | | (−2.85) | (−1.88) | (−2.04) | (−1.66) | (−2.35) | (−1.81) | (−1.24) | | | | |
| Primary education in 1960 | | | | | | | | | | | | 0.018 | 0.015 | 0.014 | 0.007 |
| | | | | | | | | | | | | (2.58) | (2.42) | (1.99) | (1.27) |
| Government expenditure | | | | | | | | | | | | −0.114 | −0.095 | −0.108 | −0.082 |
| | | | | | | | | | | | | (−3.66) | (−3.22) | (−3.76) | (−3.36) |
| Revolutions and coups | | | | | | | | | | | | −0.008 | −0.010 | −0.008 | −0.009 |
| | | | | | | | | | | | | (−1.25) | (−1.45) | (−1.24) | (−1.66) |
| Assassinations | | | | | | | | | | | | −0.218 | −0.190 | −0.210 | −0.173 |
| | | | | | | | | | | | | (−4.11) | (−3.57) | (−4.29) | (−3.98) |
| PPI60 | | | | | | | | | | | | 0.001 | 0.003 | 0.003 | 0.009 |
| | | | | | | | | | | | | (0.06) | (0.64) | (0.73) | (1.86) |
| PPI60DEV | | | | | | | | | | | | −0.018 | −0.156 | −0.019 | −0.017 |
| | | | | | | | | | | | | (−2.88) | (−2.23) | (−3.14) | (−3.00) |
| Africa | | | | | | | | | | | | | −0.017 | | −0.021 |
| | | | | | | | | | | | | | (−4.26) | | (−5.21) |
| Latin America | | | | | | | | | | | | | −0.005 | | −0.006 |
| | | | | | | | | | | | | | (−1.19) | | (−1.70) |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Political instability index | | | | | | | | | | | | 0.003 (2.35) | 0.002 (1.95) | 0.003 (2.34) | 0.002 (1.82) |
| Investment 1960–1985 | | | | | | | | | 0.098 (2.82) | 0.125 (3.64) | 0.230 (3.14) | | | 0.051 (2.16) | 0.083 (3.60) |
| Bureaucratic efficiency index | 0.003 (2.58) | | 0.011 (2.33) | | 0.006 (3.08) | | 0.014 (1.88) | | 0.004 (2.03) | | | 0.001 (1.24) | 0.002 (1.89) | 0.001 (0.74) | 0.001 (1.35) |
| Corruption index | | 0.002 (1.97) | | 0.008 (2.34) | | 0.003 (1.91) | | 0.011 (1.49) | | 0.002 (1.13) | | | | | |
| Estimation methods | OLS | OLS | 2SLS | 2SLS | OLS | OLS | 2SLS | 2SLS | OLS | OLS | 2SLS (OI) | OLS | OLS | OLS | OLS |
| $R^*$ | 0.13 | 0.07 | (*) | (*) | 0.38 | 0.27 | (*) | (*) | 0.46 | 0.40 | (*) | 0.74 | 0.79 | 0.76 | 0.83 |

A *high* value of each index means the country has *good* institutions. One standard deviation equals 2.16 for the bureaucratic efficiency index, 2.51 for the corruption index, and 1.29 for the political stability index. White-corrected $t$-statistics are reported in parentheses. There are 58 observations in the case of OLS and 57 in the case of 2SLS. Initial GDP per capita, primary education, secondary education, population growth, the purchasing-power party value for the investment deflator (PPI60) and its deviation from the sample mean (PPI60DEV) in 1960, the 1960–1985 average ratio of government consumption expenditure (net of spending on defense and education) to GDP, the number of revolutions and coups, and the number of assassinations are from Barro [1991]. 2SLS indicates that the index of ethnolinguistic fractionalization in 1960, from Taylor and Hudson [1972], is used as an instrument. 2SLS(OI) indicates that all 9 BI individual indices listed in Section II are used as instruments. The $p$-value of the test of the overidentifying restrictions is 7.5 percent. (*) The $R^2$ is not an appropriate measure of goodness of fit with two-stage least squares.

Having provided some evidence in favor of the claim that corruption lowers economic growth, I now turn to analyzing the channels through which this takes place. In the context of an endogenous growth model, bureaucratic inefficiency could affect growth indirectly (by lowering the investment rate) or directly (for example, by leading to misallocation of investment among sectors) [Easterly 1993]. Similarly, in neoclassical growth models, corruption could affect the steady-state level of income (for example, by leading to misallocation of production among sectors). Therefore, when the economy is below its steady-state income level, higher corruption could lead to lower growth, for a given level of income. In addition, bureaucratic inefficiency could also lower the private marginal product of capital, thus lowering the investment rate.

In order to assess the empirical relevance of these mechanisms, I adopt two approaches. First, I add investment to the list of independent variables in OLS growth regressions, and observe the magnitude and significance of the coefficients on the bureaucratic efficiency and corruption indices. The inclusion of the investment ratio in the LR specification of the growth regression leads the coefficient on the bureaucratic efficiency index to fall by about a third, although it remains significant at the conventional levels. On the other hand, the coefficient on the corruption index falls substantially and becomes insignificant (Table VII, columns 9 and 10). Inclusion of the investment rate in the B growth regression leads the coefficient on the bureaucratic efficiency index nearly to halve and to become insignificant (Table VII, columns 14 and 15). Second, I recognize that while the investment rate affects growth, it is also possible that growth in turn affects the investment rate (for example, through an accelerator mechanism). In order to avoid such endogeneity bias, I run 2SLS regressions using the nine BI indices as instruments. This procedure requires the testable assumption that institutional variables affect the investment rate, but do not affect growth directly. Using a test of the overidentifying instruments, the null hypothesis that the only channel through which institutions affect economic growth is through investment can be rejected, but only at the 10 percent level (Table VII, column 11).

Therefore, on the basis of this data set, there is only weak support for the hypothesis that corruption reduces growth by leading to inefficient investment choices. Overall, even though the evidence is mixed, it seems that a considerable portion of the effects

of corruption on growth works through its effects on the total amount of investment.

## IV. Concluding Remarks

This paper has used a newly assembled data set consisting of subjective indices of bureaucratic honesty and efficiency to provide empirical evidence on the effects of corruption on economic growth. The negative association between corruption and investment, as well as growth, is significant in both a statistical and an economic sense. For example, if Bangladesh were to improve the integrity and efficiency of its bureaucracy to the level of that of Uruguay (corresponding to a one-standard-deviation increase in the bureaucratic efficiency index), its investment rate would rise by almost five percentage points, and its yearly GDP growth rate would rise by over half a percentage point. As these relationships are robust to controlling for endogeneity by using an index of ethnolinguistic fractionalization as an instrument, there is evidence that bureaucratic efficiency actually *causes* high investment and growth. Furthermore—though some caution is needed, owing to data limitations—the paper has shown the extent to which the relationship is robust to controlling for standard determinants of investment and growth. In particular, there is evidence that bureaucratic efficiency may be at least as important a determinant of investment and growth as political stability. A number of issues remain unresolved. I briefly describe three areas for further research.

First, the positive and significant correlation between indices of bureaucratic efficiency and political stability requires explanation. A possible interpretation is that corruption and instability may be intrinsically linked, in the sense that they may result from the same coordination problem among members of the ruling elite.[26] In Mauro [1993] I suggest a new strategic complementarity that may be intuitively described as follows. Consider a game among the politicians that form the government. Each politician

26. The literature has already suggested that external effects and strategic complementarities may play an important role in determining institutional efficiency and economic performance. Putnam [1993] argues that a *tragedy of the commons* may explain the institutional and the economic failure of some Italian regions. Andvig and Moene [1990], Sah [1991], and Tirole [1993] derive models with multiple equilibria in corruption. Murphy, Shleifer, and Vishny [1993] derive a model of multiple equilibria in corruption and the *level* of income. Mauro [Ch. 2, 1993] derives a model of multiple equilibria in corruption and economic growth, which draws on the same *strategic complementarity* as in Murphy, Shleifer, and Vishny [1993].

has to decide whether to set up a private bribe collection system. If the individual politician decides to set a high bribe rate, economic performance will worsen and the whole government will be less likely to be able to stay in power. By doing so, the individual politician shortens the other politicians's horizons, thus making them also more willing to obtain a large slice of the cake today and to disregard the size of the cake tomorrow. This strategic complementarity yields multiple equilibria in corruption, political instability, and economic growth.

Second, it may be interesting to analyze how different types of government behave with respect to the composition of government expenditure. In Mauro [1993], using data from Barro [1991] and Easterly and Rebelo [1993], I find that—controlling for GDP per capita—corrupt, unstable governments spend less on education. This finding is consistent with the suggestion by Shleifer and Vishny [1993] that corruption opportunities may be less abundant on education than on other components of government expenditure.

Third, the empirical findings in this paper suggest a partial explanation for the stylized fact that poor countries tend to have corrupt, cumbersome bureaucracies and to be politically unstable. As institutional inefficiency persists over time, bad institutions in the past may have played a considerable role in bringing about low economic growth, thus leading to poverty today. At the same time this paper has not analyzed the reverse causal link from poverty to bad institutions, which may deserve further study.

APPENDIX 1:
DESCRIPTIVE STATISTICS OF REGRESSION VARIABLES

| Series | Mean | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|
| Institutional efficiency index | 7.37 | 1.47 | 1.89 | 10 |
| Political stability index | 7.61 | 1.29 | 5.00 | 10 |
| Institutional change | 8.13 | 1.68 | 3.00 | 10 |
| Social change | 7.43 | 1.71 | 4.33 | 10 |
| Opposition takeover | 8.66 | 1.28 | 5.00 | 10 |
| Stability of labor | 6.73 | 1.51 | 4.00 | 10 |
| Neighboring countries | 6.62 | 2.30 | 2.00 | 10 |
| Terrorism | 8.10 | 1.58 | 4.25 | 10 |
| Bureaucratic efficiency index | 6.90 | 2.16 | 1.89 | 10 |
| Judiciary | 7.33 | 2.17 | 2.00 | 10 |
| Red tape | 6.37 | 2.23 | 2.00 | 10 |
| Corruption | 6.99 | 2.51 | 1.00 | 10 |

APPENDIX 1:
(CONTINUED)

| Series | Mean | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|
| Ethnolinguistic fractionalization | 34.6 | 29.0 | 0.0 | 90.0 |
| Per capita GDP growth 1960–1985 | 0.025 | 0.017 | −0.017 | 0.074 |
| Investment/GDP 1960–1985 | 0.21 | 0.07 | 0.07 | 0.37 |
| Per capita GDP in 1960 | 2.44 | 1.93 | 0.22 | 6.40 |
| Primary education in 1960 | 0.90 | 0.25 | 0.30 | 1.44 |
| Secondary education in 1960 | 0.30 | 0.22 | 0.02 | 0.86 |
| Population growth 1960–1985 | 0.018 | 0.010 | 0.003 | 0.043 |
| Government expenditure/GDP | 0.092 | 0.048 | 0.001 | 0.209 |
| Revolutions and coups | 0.15 | 0.20 | 0.00 | 0.92 |
| Assassinations | 0.24 | 0.40 | 0.00 | 2.19 |
| PPI60 | 0.73 | 0.34 | 0.26 | 2.57 |
| PPI60DEV | −0.02 | 0.34 | −0.49 | 1.83 |

There are 58 observations in the sample (57 for ethnolinguistic fractionalization). The Business International (BI) indices refer to the average of the 1980–1993 observations. The institutional efficiency index is the simple average of all nine individual indices. The political stability index is the simple average of the top six individual indices. The bureaucratic efficiency index is the simple average of the bottom three individual indices. A *high* value of a BI index means the country has *good* institutions. The index of ethnolinguistic fractionalization from 1960 is from Taylor and Hudson [1972]. The Barro [1991] regressors are per capita GDP, primary education, secondary education, the purchasing-power parity value for the investment deflator (PPI60) and its deviation from the sample mean (PPI60DEV) in 1960, the 1960–1985 average of the ratio of government consumption expenditure (net of spending on defense and education) to GDP, the number of revolutions and coups, and the number of assassinations.

APPENDIX 2:
CORRELATION MATRIX FOR BUSINESS INTERNATIONAL INDICES

| | Institutional change | Social change | Opposition takeover | Stability of labor | Neighbors | Terrorism | Judiciary | Red tape | Corruption |
|---|---|---|---|---|---|---|---|---|---|
| Institutional change | 1 | | | | | | | | |
| Social change | 0.75 | 1 | | | | | | | |
| Takeover | 0.81 | 0.64 | 1 | | | | | | |
| Labor | 0.40 | 0.52 | 0.42 | 1 | | | | | |
| Neighbors | 0.55 | 0.56 | 0.38 | 0.25 | 1 | | | | |
| Terrorism | 0.54 | 0.75 | 0.45 | 0.39 | 0.60 | 1 | | | |
| Judiciary | 0.67 | 0.68 | 0.53 | 0.30 | 0.60 | 0.56 | 1 | | |
| Red tape | 0.52 | 0.59 | 0.39 | 0.35 | 0.60 | 0.45 | 0.78 | 1 | |
| Corruption | 0.47 | 0.55 | 0.46 | 0.30 | 0.39 | 0.28 | 0.78 | 0.79 | 1 |

There are 67 observations in the sample. The Business International indices refer to the average of the 1980–1983 observations. A *high* value of a BI index means the country has good institutions.

APPENDIX 3:
BUSINESS INTERNATIONAL AND ELF INDICES

| | Efficiency of the Judiciary System (1) | Red Tape (2) | Corruption (3) | Political stability (4) | Bureaucratic efficiency (average of 1–3) (5) | Ethnolinguistic fractionalization (6) |
|---|---|---|---|---|---|---|
| Algeria | 7.25 | 2.5 | 5 | 7.71 | 4.92 | 43 |
| Angola | 4 | 5.33 | 8.66 | 4.61 | 6.00 | 78 |
| Argentina | 6 | 6.66 | 7.66 | 7.72 | 6.77 | 31 |
| Australia | 10 | 9.25 | 10 | 8.50 | 9.75 | 32 |
| Austria | 9.5 | 7.25 | 8 | 9.04 | 8.25 | 13 |
| Bangladesh | 6 | 4 | 4 | 6.50 | 4.67 | NA |
| Barbados | NA | NA | NA | NA | NA | 22 |
| Belgium | 9.5 | 8 | 9.75 | 8.00 | 9.08 | 55 |
| Benin | NA | NA | NA | NA | NA | 62 |
| Bolivia | NA | NA | NA | NA | NA | 68 |
| Botswana | NA | NA | NA | NA | NA | 51 |
| Brazil | 5.75 | 4 | 5.75 | 7.54 | 5.17 | 7 |
| Burkina Faso | NA | NA | NA | NA | NA | 68 |
| Burma | NA | NA | NA | NA | NA | 47 |
| Burundi | NA | NA | NA | NA | NA | 4 |
| Cameroon | 7 | 6 | 7 | 8.50 | 6.67 | 89 |
| Canada | 9.25 | 9.5 | 10 | 9.00 | 9.58 | 75 |
| CAR | NA | NA | NA | NA | NA | 83 |
| Chad | NA | NA | NA | NA | NA | 69 |
| Chile | 7.25 | 9.25 | 9.25 | 6.46 | 8.58 | 14 |
| Colombia | 7.25 | 4.5 | 4.5 | 6.00 | 5.42 | 6 |
| Congo | NA | NA | NA | NA | NA | 66 |
| Costa Rica | NA | NA | NA | NA | NA | 7 |
| Cyprus | NA | NA | NA | NA | NA | 35 |
| Denmark | 10 | 9.5 | 9.25 | 8.50 | 9.58 | 5 |
| Dominican Rep. | 6.75 | 6 | 6.5 | 7.58 | 6.42 | 4 |
| Ecuador | 6.25 | 5 | 5.5 | 6.63 | 5.58 | 53 |
| Egypt | 6.5 | 3 | 3.25 | 8.67 | 4.25 | 4 |
| El Salvador | NA | NA | NA | NA | NA | 17 |
| Ethiopia | NA | NA | NA | NA | NA | 69 |
| Finland | 10 | 8.5 | 9.5 | 8.79 | 9.33 | 16 |
| France | 8 | 6.75 | 10 | 8.92 | 8.25 | 26 |
| Gabon | NA | NA | NA | NA | NA | 69 |
| Gambia | NA | NA | NA | NA | NA | 73 |
| Germany | 9 | 7.5 | 9.5 | 8.21 | 8.67 | 3 |
| Ghana | 4.66 | 2.33 | 3.66 | 5.00 | 3.55 | 71 |
| Greece | 7 | 4 | 6.25 | 8.63 | 5.75 | 10 |
| Guatemala | NA | NA | NA | NA | NA | 64 |
| Guinea | NA | NA | NA | NA | NA | 75 |
| Guyana | NA | NA | NA | NA | NA | 58 |
| Haiti | 2 | 2 | 2 | 6.67 | 2.00 | 1 |

APPENDIX 3
(CONTINUED)

| | Efficiency of the Judiciary System (1) | Red Tape (2) | Corruption (3) | Political stability (4) | Bureaucratic efficiency (average of 1–3) (5) | Ethnolinguistic fractionalization (6) |
|---|---|---|---|---|---|---|
| Honduras | NA | NA | NA | NA | NA | 16 |
| Hong Kong | 10 | 9.75 | 8 | 9.50 | 9.25 | 2 |
| Iceland | NA | NA | NA | NA | NA | 5 |
| India | 8 | 3.25 | 5.25 | 7.00 | 5.50 | 89 |
| Indonesia | 2.5 | 2.75 | 1.5 | 7.46 | 2.25 | 76 |
| Iran | 2 | 1.25 | 3.25 | 3.25 | 2.17 | 76 |
| Iraq | 6 | 3 | 10 | 5.72 | 6.33 | 36 |
| Ireland | 8.75 | 7.5 | 9.75 | 7.67 | 8.67 | 4 |
| Israel | 10 | 7.5 | 9.25 | 6.25 | 8.92 | 20 |
| Italy | 6.75 | 4.75 | 7.5 | 7.92 | 6.33 | 4 |
| Ivory Coast | 6.5 | 7.75 | 6 | 8.33 | 6.75 | 86 |
| Jamaica | 7.33 | 4 | 5 | 7.50 | 5.44 | 5 |
| Japan | 10 | 8.5 | 8.75 | 9.42 | 9.08 | 1 |
| Jordan | 8.66 | 6.33 | 8.33 | 7.78 | 7.77 | 5 |
| Kenya | 5.75 | 5 | 4.5 | 6.96 | 5.08 | 83 |
| Korea | 6 | 6.5 | 5.75 | 7.50 | 6.08 | 0 |
| Kuwait | 7.5 | 6.25 | 7.75 | 8.33 | 7.17 | 18 |
| Lesotho | NA | NA | NA | NA | NA | 22 |
| Liberia | 3.33 | 5 | 2.66 | 5.00 | 3.66 | 83 |
| Luxembourg | NA | NA | NA | NA | NA | 15 |
| Madagascar | NA | NA | NA | NA | NA | 6 |
| Malawi | NA | NA | NA | NA | NA | 62 |
| Malaysia | 9 | 6 | 6 | 8.42 | 7.00 | 72 |
| Mali | NA | NA | NA | NA | NA | 78 |
| Malta | NA | NA | NA | NA | NA | 8 |
| Mauritania | NA | NA | NA | NA | NA | 33 |
| Mauritius | NA | NA | NA | NA | NA | 58 |
| Mexico | 6 | 5.25 | 3.25 | 6.88 | 4.83 | 30 |
| Morocco | 6.66 | 5.33 | 5.66 | 7.11 | 5.88 | 53 |
| Mozambique | NA | NA | NA | NA | NA | 65 |
| Nepal | NA | NA | NA | NA | NA | 70 |
| Netherlands | 10 | 10 | 10 | 8.83 | 10.00 | 10 |
| New Zealand | 10 | 10 | 10 | 8.50 | 10.00 | 37 |
| Nicaragua | 6 | 4 | 8.75 | 5.50 | 6.25 | 18 |
| Niger | NA | NA | NA | NA | NA | 73 |
| Nigeria | 7.25 | 2.75 | 3 | 7.29 | 4.33 | 87 |
| Norway | 10 | 9 | 10 | 9.50 | 9.67 | 4 |
| Pakistan | 5 | 4 | 4 | 5.33 | 4.33 | 64 |
| Panama | 6.75 | 7.25 | 5 | 7.54 | 6.33 | 28 |
| Papua New G. | NA | NA | NA | NA | NA | 42 |
| Paraguay | NA | NA | NA | NA | NA | 14 |

APPENDIX 3
(CONTINUED)

| | Efficiency of the Judiciary System (1) | Red Tape (2) | Corruption (3) | Political stability (4) | Bureaucratic efficiency (average of 1–3) (5) | Ethnolinguistic fractionalization (6) |
|---|---|---|---|---|---|---|
| Peru | 6.75 | 5.75 | 7.25 | 6.04 | 6.58 | 59 |
| Philippines | 4.75 | 5 | 4.5 | 6.08 | 4.75 | 74 |
| Portugal | 5.5 | 4.5 | 6.75 | 7.54 | 5.58 | 1 |
| Rwanda | NA | NA | NA | NA | NA | 14 |
| Saudi Arabia | 6 | 5.25 | 4.75 | 8.33 | 5.33 | 6 |
| Senegal | NA | NA | NA | NA | NA | 72 |
| Sierra Leone | NA | NA | NA | NA | NA | 77 |
| Singapore | 10 | 10 | 10 | 10.00 | 10.00 | 42 |
| Somalia | NA | NA | NA | NA | NA | 8 |
| South Africa | 6 | 7 | 8 | 6.50 | 7.00 | 88 |
| Spain | 6.25 | 6 | 7 | 6.67 | 6.42 | 44 |
| Sri Lanka | 7 | 6 | 7 | 7.22 | 6.67 | 47 |
| Sudan | NA | NA | NA | NA | NA | 73 |
| Sweden | 10 | 8.5 | 9.25 | 9.00 | 9.25 | 8 |
| Switzerland | 10 | 10 | 10 | 9.25 | 10.00 | 50 |
| Syria | NA | NA | NA | NA | NA | 22 |
| Taiwan | 6.75 | 7.25 | 6.75 | 8.58 | 6.92 | 42 |
| Tanzania | NA | NA | NA | NA | NA | 93 |
| Thailand | 3.25 | 3.25 | 1.5 | 5.63 | 2.67 | 66 |
| Togo | NA | NA | NA | NA | NA | 71 |
| Trinidad/Tobago | 8 | 4 | 6.5 | 7.79 | 6.17 | 56 |
| Tunisia | NA | NA | NA | NA | NA | 16 |
| Turkey | 4 | 5.33 | 6 | 8.17 | 5.11 | 25 |
| Uganda | NA | NA | NA | NA | NA | 90 |
| United Kingdom | 10 | 7.75 | 9.25 | 8.33 | 9.00 | 32 |
| United States | 10 | 9.25 | 10 | 9.33 | 9.75 | 50 |
| Uruguay | 6.5 | 6 | 8 | 9.00 | 6.83 | 20 |
| Venezuela | 6.5 | 4 | 5.75 | 7.71 | 5.42 | 11 |
| Yemen | NA | NA | NA | NA | NA | 2 |
| Zaire | 2 | 2.66 | 1 | 5.05 | 1.89 | 90 |
| Zambia | NA | NA | NA | NA | NA | 82 |
| Zimbabwe | 7.5 | 7.75 | 8.75 | 6.50 | 8.00 | 54 |

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