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The Effects of Corruption on Growth, Investment, and Government Expenditure

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Abstract

This paper discusses the possible causes and consequences of corruption. It provides a synthetic review of recent studies that analyze this phenomenon empirically. In addition, it presents further results on the effects of corruption on growth and investment, and new cross-country evidence on the link between corruption and the composition of government expenditure.

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¹Helpful conversations with Andrei Shleifer and Vito Tanzi are gratefully acknowledged. The views expressed here are strictly personal. The author does not necessarily agree with the subjective indices relating to any given country. This paper is forthcoming in the conference volume "Corruption and the World Economy," edited by Kimberly Ann Elliott, Washington: Institute for International Economics.

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Summary

The study of the causes and consequences of corruption has a long history in economics, dating back at least to the literature on rent seeking. However, related empirical work has been rather limited, partly because the efficiency of government institutions--and corruption, in particular--cannot easily be quantified.

Renewed interest in the topic has recently led a number of researchers to attempt to quantify the extent to which corruption permeates economic interactions by using indices sold by private rating agencies. These indices are typically based on the replies to standardized questionnaires by consultants located in a variety of countries. In spite of a number of data limitations, the indices provide a wealth of information that has enabled researchers to obtain a number of interesting results.

This paper has two main goals. The first is to list a number of possible causes and consequences of corruption, with emphasis on those links that have been or--at least in principle--could be investigated through the use of cross-country regression analysis. Simultaneously, the paper provides a synthetic review of recent studies that make use of cross-country regressions on corruption. These studies provide tentative evidence that corruption may have considerable, adverse effects on economic performance, suggesting that it is important for policymakers to pay attention to this phenomenon. More interestingly, identifying possible causes of corruption may suggest a number of ways to curb it.

The second goal of this paper is to present further results on the effects of corruption on investment and economic growth by using a larger data set to expand the analysis of Mauro (1995) and to present new evidence on the relationship between corruption and the composition of government expenditure. Even though the results need to be interpreted with caution, corruption is found to lower investment and economic growth, and to alter the composition of government expenditure, specifically by reducing the share of spending on education.

I. INTRODUCTION

The study of the causes and consequences of corruption has a long history in economics, dating back at least to the seminal contributions to the rent-seeking literature by Bhagwati (1982), Krueger (1974), Rose-Ackerman (1978), Tullock (1967) and others. However, related empirical work has been rather limited, partly because the degree of efficiency of government institutions cannot easily be quantified. Corruption in particular is a difficult phenomenon to measure, owing to its very nature.

Renewed interest in the topic has recently led a number of researchers to attempt to quantify the extent to which corruption permeates economic interactions by using indices sold by private rating agencies. These indices are typically based on the replies to standardized questionnaires by consultants located in a variety of countries, and therefore have the obvious drawback of being subjective. Nevertheless, the correlation between indices produced by different rating agencies is very high, suggesting that there seems to be a certain consensus among observers on the ranking of countries according to their degree of corruption. In addition, the high prices charged by the rating agencies to their customers (usually multinational companies and international banks) constitute indirect evidence that the information provided is actually useful.

At the same time, the consultants who produce these indices may sometimes be influenced in their judgement by the economic performance of the countries that they monitor. Thus, when using such indices to analyze the relationship between corruption and economic variables, it is important to be extremely cautious before interpreting correlations in a causal sense. One way of addressing this possible endogeneity problem is through the use of instrumental variables, as discussed in Section III. An additional drawback of the indicators of corruption that are currently available is that they do not distinguish among the various types of corruption, such as, for example, high-level versus low-level corruption,² or well-organized versus poorly-organized corruption.³ In spite of these limitations, the indices provide a wealth of information that has enabled researchers to obtain a number of interesting results.

This paper has two main goals. The first one is to list a number of possible causes and consequences of corruption, with emphasis on those links that have been or--at least in principle--could be investigated through the use of cross-country regression analysis. In doing so, it provides a synthetic review of recent studies that make use of cross-country regressions on corruption. While data limitations imply that the empirical work is subject to a number of

²An example of the former might be the decision by top ministers to purchase an expensive aircraft fighter in order to be able to obtain large bribes, while an example of the latter could be the request for a petty bribe by a public official in order to speed up the issue of a driver's license.

³Under poorly-organized corruption, the required amount and appropriate recipient of a bribe are not clear, and payment does not guarantee that the favor will be actually obtained. The uncertainty that characterizes poorly-organized corruption systems makes them even more deleterious (Shleifer and Vishny, 1993).

difficulties, these studies provide tentative evidence that corruption may have considerable, adverse effects on economic performance, suggesting that it is important for policy makers to pay attention to this phenomenon. More interestingly, the identification of possible causes of corruption may suggest a number of ways in which attempts could be made to curb it. While in some cases the distinction between causes and consequences is rather blurred, there are cases in which the importance of the direction of causality should not be overstated in the process of drawing possible policy conclusions, as argued in Section IV.

The second goal of this paper is to present further results on the effects of corruption on investment and economic growth by using a larger data set to expand the analysis of Mauro (1995), and to present new evidence on the relationship between corruption and the composition of government expenditure. Even though the results need to be interpreted with caution, corruption is found to lower investment and economic growth, and to alter the composition of government expenditure, specifically by reducing the share of spending on education.

The paper is organized as follows. Section II provides a synthetic survey of recent studies on corruption. Section III describes the data and provides new empirical evidence. Section IV concludes and raises a number of issues for the debate on policy implications.

II. CAUSES AND CONSEQUENCES OF CORRUPTION--A SYNTHETIC SURVEY

This section lists a number of possible causes and consequences of corruption, emphasizing those that have been or could be analyzed through cross-country regressions.

A. Causes of Corruption

In the original literature on rent seeking, the existence of **rents** (typically, government-induced ones) constitutes the ultimate source of rent-seeking behavior. Building upon these theoretical contributions, recent empirical studies analyze the possible causes of corruption by regressing indices of corruption on potential explanatory variables.

A number of possible causes of corruption are related to the extent of government intervention in the economy, and--more generally--to variables (such as the level of import tariffs or civil service wages) that are determined by **government policy**. When pervasive regulations exist and government officials have an excessive degree of discretion in applying them, private parties may be willing to pay bribes to government officials in order to obtain any rents that the regulations may generate. Identification of such policy-induced sources of

corruption is obviously helpful in bringing it under control. The following are some of the sources of corruption that have been identified in the literature.⁴

- The original rent-seeking literature emphasizes **trade restrictions** as the prime example of government-induced sources of rents (Krueger, 1974). For example, in the presence of quantitative restrictions on imports of a certain good, the necessary import licenses are very valuable and importers may be willing to bribe the relevant official in order to obtain them. More generally, protection of home industries from international competition generates rents that local entrepreneurs may be willing to pay for, in the form of bribes. Ades and Di Tella (1994) find that a higher degree of openness of the economy (measured on the basis of the sum of imports and exports as a share of GDP) is significantly associated with lower corruption.

- Government **subsidies** (including **tax expenditures**) can constitute sources of rents, as argued by Clements, Hugounenq and Schwartz (1995). Ades and Di Tella (1995) explain corruption as a function of **industrial policy**, showing that subsidies to manufacturing as a proportion of GDP are related to corruption indices.⁵

- **Price controls** (which can be quantified on the basis of indicators such as those in the World Bank's World Development Report, 1983) are also a potential source of rents, and of the ensuing rent-seeking behavior. For example, entrepreneurs may be willing to bribe government officials to maintain the provision of inputs at below-market prices.

- Similarly, **multiple exchange rate practices and foreign exchange allocation schemes** (whose importance may be proxied by parallel exchange market premia, such as those used by Levine and Renelt, 1992) lead to rents. For example, supposing that, in a given country, state-owned commercial banks conduct rationing of foreign exchange by allocating it according to the priorities established by each bank manager, then entrepreneurs may be willing to pay bribes in order to obtain the necessary foreign exchange to purchase their imported inputs.

- **Low wages in the civil service** relative to private sector wages or per capita GDP are also a potential source of (low-level) corruption, following efficiency-wage mechanisms (Kraay and Van Rijckeghem, 1995, and Haque and Sahay, 1996). When civil service pay is too low, civil servants may be obliged to use their positions to collect bribes as a way of making ends meet, and in any case their expected cost of being caught and fired is correspondingly low. It might be useful to take such considerations into account when faced

⁴For a discussion of how government activities may bring about corruption see also Tanzi (1994), who stresses that the problem becomes worse when regulations lack simplicity and transparency.

⁵Ades and Di Tella (1995) also argue that, in evaluating the effects of industrial policies, it is necessary to take into account the fact that they generate corruption as an unintended by-product.

with difficult tradeoffs on whether an excessive civil service wage bill should be lowered through cutting salaries or through reducing the number of staff. Fiscal Affairs Department (1995, 15) warns of the dangers involved in across-the-board civil service wage cuts.

At the same time, there are a number of other sources of rents that are **not due to government policy**. In their presence, policy makers need to be alert to the fact that rent-seeking behavior may be more likely to arise. Furthermore, attempts to evaluate the effects of certain aspects of government policy on corruption need to take these other factors into account. The following are some of these additional causes of corruption.

- **Natural-resource endowments** constitute a textbook example of sources of rents, since they can typically be sold at a price that far exceeds their cost of extraction. Sachs and Warner (1995) argue that resource-rich economies may be more likely to be subject to extreme rent-seeking behavior than resource-poor economies are. Specifically, they find that the fraction of primary product exports in total exports is associated with indices of bureaucratic efficiency, though not at the conventional levels of statistical significance.

- Finally, **sociological factors** may contribute to creating an environment in which the availability of rents is more likely to result in rent-seeking behavior. Shleifer and Vishny (1993) suggest that countries where the population consists of several different ethnic groups are more likely to be characterized by a less organized--and therefore more deleterious--type of corruption. This hypothesis is used in Mauro (1995), where it is found that an index of ethnolinguistic fractionalization is correlated with corruption. Tanzi (1994) argues that public officials are more likely to do favors to their relatives in societies where family ties are strong.

B. Consequences of Corruption

Corruption has a number of adverse consequences that economists and policy makers are concerned about. In particular, recent empirical evidence seems to suggest that corruption lowers economic growth. There is a wide range of channels through which this may happen.

- In the presence of corruption, entrepreneurs are aware that a portion of the proceeds from their investments may be claimed by corrupt officials. Payment of bribes is often required up front if the necessary permits are to be issued. Therefore, corruption may be interpreted to act as a tax--though of a particularly pernicious nature, given the need for secrecy and the uncertainty that come with it--which correspondingly reduces incentives to invest. Mauro (1995) provides tentative empirical evidence that corruption **lowers investment and economic growth**. The magnitudes of these effects are considerable: a one-standard-deviation improvement in corruption indices drawn from Business International (BI) causes investment to rise by 5 percent of GDP and the annual per capita GDP growth rate to rise by half a percentage point. The evidence seems to suggest that a large portion of the effects on economic growth takes place through the effects on investment. Using indices from the *International Country Risk Guide* (ICRG), Keefer and Knack (1994) obtain broadly

similar results and, in their estimates, institutional variables have a significant direct effect on growth in addition to the indirect effect through investment.⁶ Further evidence on these relationships, obtained using the simple average of the BI and ICRG indices as an indicator for corruption, is presented in Section III.

- Murphy, Shleifer and Vishny (1991) argue that in situations where rent seeking provides more lucrative opportunities than productive work does, the **allocation of talent** will be worse: the more talented and highly educated individuals will be more likely to engage in rent seeking than in productive work, with adverse consequences on their country's growth rate.

- The possibility that corruption might reduce the effectiveness of **aid flows**, through the diversion of funds, is of particular relevance to developing countries. The vast literature on aid flows has addressed the question of whether the fungibility of aid resources may imply that aid flows ultimately finance unproductive public expenditures. Perhaps as a result of this ongoing debate, many donor countries have focused increasingly on issues of good governance, and in some cases where governance is judged to be very poor, some donors have scaled back their assistance ("Official Financing for Developing Countries", *World Economic and Financial Surveys*, International Monetary Fund, Washington, DC, December 1995, 32-34).

- Corruption may also bring about **loss of tax** revenue when it takes the form of tax evasion or the improper use of discretionary tax exemptions. Strictly speaking, these phenomena fall under the definition of corruption only when there is a counterpart payment to the tax official responsible.

- By affecting tax collection or the level of public expenditure, corruption may lead to **adverse budgetary consequences**. Alternatively, in the case where it takes the form of the improper use of directed lending at below-market interest rates by public sector financial institutions, corruption may result in an undesirable monetary stance.

- The allocation of public procurement contracts through a corrupt system may lead to lower **quality of public infrastructure and services**. For example, corrupt bureaucrats could allow the use of cheap materials in the construction of buildings or bridges that would subsequently collapse.

- Finally, corruption may affect **the composition of government expenditure**, a possibility that the empirical section of this paper focuses on. Corrupt government officials may be more likely to choose to undertake types of government expenditure that allow them

⁶One way in which the growth rate may be affected even for a given investment rate is through changes in the allocation of resources among sectors (Easterly, 1990), and perhaps--more specifically--between the formal and informal sectors (Loayza, 1996).

to collect bribes and to maintain them secret. Shleifer and Vishny (1993) suggest that large projects on specialized items--whose exact value is difficult to monitor--lead to more lucrative opportunities for corruption. More generally, opportunities for levying bribes may be expected to be more abundant on items produced by firms operating in oligopolistic markets, where rents are available. A priori, one might expect that it is easier to collect substantial bribes on large infrastructure projects or high-technology defense equipment than on textbooks and teachers' salaries. For example, Hines (1995) argues that international trade in military aircraft is particularly susceptible to corruption. In other areas, such as health, the picture is less clear-cut: opportunities to collect bribes may be abundant in the case of hospital buildings and state-of-the-art medical equipment, but may be more limited in the case of doctors' and nurses' salaries. Previous empirical work on the potential links between corruption and the composition of government expenditure is extremely limited. Among the few contributions, Rauch (1993) analyzes both the determinants and the effects of government expenditure composition by using a data set on U.S. cities. He finds that the wave of municipal reform that took place during the Progressive Era increased the share of total municipal expenditure allocated to road and sewer investment, which in turn increased the growth in city manufacturing employment. In order to study this relatively unexplored issue, this paper uses a cross-section of countries, and finds tentative evidence that corruption may lower government spending on education as a proportion of GDP.

III. EMPIRICAL RESULTS

This section describes the data used in this paper (Section III.1), presents further results on the effects of corruption on investment and economic growth (Section III.2) and reports new evidence on the relationship between corruption and the components of government expenditure (Section III.3).

A. Description of the Data

This paper uses the (simple) indices of corruption drawn from two private firms:

- (1) *Political Risk Services, Inc.*, which publishes the *International Country Risk Guide*, used and described in detail by Keefer and Knack (1995). The index used in this paper, which was compiled by the IRIS Center (University of Maryland), is the 1982-1995 average and is available for over a hundred countries.
- (2) *Business International* (now incorporated into *The Economist Intelligence Unit*), for which the full data set used in this paper is provided, together with a more complete description, in Mauro (1995). The index is the 1980-83 average and is available for 67 countries.

Both indices are on a scale from 0 (most corrupt) to 10 (least corrupt), with similar distributions. The corruption index used in this paper's empirical analysis is the simple average

of the two above indices, when both are available.⁷ The two indices are very strongly correlated ($r=0.81$). At the same time, it may be argued that the process of averaging helps reduce the errors in each individual index. There are 106 observations in the Barro (1991) sample for which the overall corruption index is available. The sample statistics are as follows: mean = 5.85, standard deviation = 2.38, minimum = 0.59, maximum = 10.

In some estimates in this paper, instrumental variables are used to address potential endogeneity bias. The first is an index of ethnolinguistic fractionalization,⁸ which is a good instrument because, in accordance with Shleifer and Vishny's (1993) arguments, more fractionalized countries tend to have more dishonest bureaucracies.⁹ The other instruments are two dummy variables (compiled by consulting the *Encyclopaedia Britannica*) on whether (following Taylor and Hudson, 1972) the country ever was a colony (after 1776), and on whether the country achieved independence after 1945. The colonial dummies are good instruments because they are found to be highly correlated with a country's corruption index.¹⁰ In addition, these three variables may be valid instruments to the extent that ethnolinguistic fractionalization and colonial history are unrelated to economic growth, investment, or the composition of government expenditure, other than through their effects on corruption.¹¹

This paper uses three standard sources of data on the composition of government expenditure.

⁷The ICRG index covers all the 106 countries in the sample, while the BI index covers only 67 countries.

⁸The 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, Moscow, 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 *ELF* index is computed by Taylor and Hudson (1972) as

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

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. *ELF* measures the probability that two randomly selected persons from a given country will not belong to the same ethnolinguistic group.

⁹The index of ethnolinguistic fractionalization has a correlation coefficient of 0.39 (significant at the conventional levels) with the corruption index.

¹⁰The simple correlation coefficients are 0.46 and 0.38 respectively, both significant at the conventional levels.

¹¹Strictly speaking, ethnolinguistic fractionalization and colonial dummies are only likely to be valid instruments for a country's degree of institutional efficiency in a broader sense. Nevertheless, they are used in this paper mostly in order to address endogeneity problems that might be due to the subjective nature of the indices.

- (1) The Barro (1991) data set, which contains the 1970-85 averages of government spending on defense, education, social security and welfare, public investment and total government expenditure for over a hundred countries. The primary sources are the International Monetary Fund's *Government Finance Statistics* (GFS) and data from Unesco. All macroeconomic variables are also drawn from Barro (1991), since his data set provided the basis for much recent empirical work on the determinants of economic growth.
- (2) The Devarajan et al. (1993) data set of developing countries, to which the industrial countries were added, so as to obtain a larger sample of around ninety-five countries. The data ultimately come from the GFS and refer to the 1985 observation. The components of education (school, university and other education) and health (hospitals, clinics and other health) expenditure are available for about sixty countries.
- (3) The Easterly and Rebelo (1993) data set, which consolidates the public investment expenditure of the general government with public investment expenditures undertaken by public enterprises for ninety-six countries. It provides data on the composition of public investment by sector (agriculture, education, health, housing & urban infrastructure, transport & communication, industry & mining) for a sample of about forty developing countries. Public investment data are also available by level of government (general government versus public enterprises) for about fifty countries. The primary sources are the World Bank Country Reports, United Nations National Accounts and the *World Development Report* published by the World Bank.

B. The Effects of Corruption on Investment and Economic Growth

Using similar cross-country regressions to those in Mauro (1995), this section uses a larger data set to provide further evidence that corruption may affect investment and economic growth.¹² A univariate regression of the 1960-85 average investment rate on the corruption index shows that the association between these variables is significant at the conventional levels (Table 1.a, column 1). This is also the case for a univariate regression of the 1960-85 average annual per capita GDP growth on the corruption index (Table 1.b, column 1). The magnitude of the effects is considerable: a one-standard-deviation (2.38) improvement in the corruption index is associated with over a 4 percentage point increase in its investment rate and over a 1/2 percentage point increase in the annual growth rate of per capita GDP. This means that if a given country were to improve its corruption "grade" from a "6 out of 10" to an "8 out of 10", then its investment/GDP ratio would rise by almost 4 percentage points and its annual per capita GDP growth would rise by almost half a percentage point.

¹²The analysis in this paper relies only on cross-sectional regressions using averages of the data over the sample period, as a country's degree of institutional efficiency typically evolves rather slowly. At the same time, Mauro (1993) shows that the relationship between investment and corruption is significant in a fixed-effects panel.

The estimated coefficients become even larger when two-stage least squares techniques, with the index of ethnolinguistic fractionalization as an instrument, are used to address possible endogeneity bias (Table 1.a, column 2, and Table 1.b, column 2). The relationships continue to be significant even in multivariate regressions that take into account the effects of other standard determinants of investment and growth (Table 1.a, column 3 and Table 1.b, column 3).¹³ Also in this case, the magnitude of the coefficients rises when instrumental variables are used for the corruption index (Table 1.a, column 4 and Table 1.b, column 4). Finally, when the investment rate is added to the list of independent variables in the growth regression, the coefficient on the corruption index falls by two thirds (Table 1.b, column 5, compared to Table 1.a, column 3), though it remains just significant at the 5 percent level. This result implies that a large portion of the effects of corruption on economic growth takes place through investment, though it leaves open the possibility that some of the effects take place directly, rather than through the investment rate.

While the general result that corruption may have large, adverse effects on economic growth and investment may have important implications, it has already received considerable attention elsewhere.¹⁴ Section III.3 focuses on a particular channel through which corruption may affect economic performance, namely the possible link between corruption and the composition of government expenditure.

C. The Effects of Corruption on the Composition of Government Expenditure

This section analyzes the potential effects of corruption on the composition of government expenditure, a previously unexplored issue at least in the context of cross-country work. It asks whether corrupt politicians choose to spend more on those components of public expenditure on which it is easier to levy bribes. The Appendix derives a generalization of the Barro (1990) model that shows that if corruption acted simply as though it were a tax on income, then the amount and composition of government expenditure would be independent of corruption. As a consequence, it seems reasonable to interpret any empirical relationships between corruption indices and particular components of government spending as tentative evidence that the way in which corrupt bureaucrats obtain revenue is not simply as a proportion of total income, but rather, that bribes can be more efficiently collected on some government expenditure components than on others.

The question whether corruption affects the composition of government expenditure is an interesting one to consider because, even though the empirical literature has so far yielded mixed results on the effects of government expenditure and, in particular, its composition, on

¹³The specification chosen here is the base regression in Levine and Renelt (1992) and includes initial per capita GDP, the initial secondary education enrollment rate, and the population growth rate.

¹⁴A number of additional robustness tests for similar regressions using the BI data set are reported in Mauro (1993, 1995).

economic growth,¹⁵ most economists seem to think that the level and type of spending undertaken by governments do matter for economic performance. For example, even though cross-country regression work has not conclusively shown a relationship between government spending on education and economic growth, it has gathered fairly robust evidence that school enrollment rates (Levine and Renelt, 1992) and educational attainment (Barro, 1992) play a considerable role in determining economic growth.

Perhaps, part of the reason why it has proved difficult to find significant and robust effects of the composition of government expenditure on economic growth is that the quality of the available data may be relatively low, both because it is difficult to ensure that all countries apply the same criteria in allocating projects among the various categories of government expenditure and because each public expenditure component presumably contains both productive and unproductive projects. The relatively noisy quality of the expenditure data implies that the nature of this study must necessarily be exploratory, and that a priori it is not very likely that significant relationships can be found. In spite of such data limitations, this section presents new, tentative evidence that corrupt governments may display predatory behavior in choosing the composition of government expenditure. Specifically, government spending on education seems to be negatively affected by corruption.

Table 2 analyzes the relationship between each component of public expenditure (as a ratio to GDP) reported in the Barro (1991) data set, and the corruption index.¹⁶ Government spending on education as a ratio to GDP is negatively and significantly correlated with corruption. The magnitude of the coefficient is considerable: a one-standard-deviation improvement in the corruption index is associated with an increase in government spending on education by around half a percent of GDP. Taken at face value, this result implies that if a given country were to improve its "grade" on corruption from--say--a "6 out of 10" to a "8 out of 10", on average its government would increase its spending on education by about half a percent of GDP. Figure 1 shows that this result is not just driven by a small group of countries.

¹⁵ Concerning the overall level of government expenditure, Levine and Renelt (1992) show that it does not seem to bear any robust relationship with economic growth. Previous work on the composition of government expenditure has been relatively limited. Devarajan et al. (1993) find that there is no clear relationship between any component of government expenditure and economic growth. Easterly and Rebelo (1993) do find some significant relationships: public investment on transport and communications is positively associated with economic growth, though not with private investment; public investment in agriculture is negatively associated with private investment; general government investment is positively correlated with both growth and private investment; and public enterprise investment is negatively correlated with private investment.

¹⁶ The reason why the various components of government spending are analyzed as a share of GDP is that the generalization of the Barro (1991) that is derived in the Appendix, which provides a useful theoretical benchmark, implies that if bribes could be levied just as easily on all income (rather than more easily on some government expenditure components than others), then the various components of government *as a ratio to* GDP should be unrelated to corruption.

Other components of government expenditure (though interestingly, not total government consumption expenditure) are also significantly associated with the corruption index at the conventional levels, most notably in the case of transfer payments, and social insurance and welfare payments. However, it is important to take into account the well-known empirical observation that government expenditure as a ratio to GDP tends to rise as a country becomes richer--a relationship known as Wagner's law.¹⁷ When the level of per capita income in 1980 is used as an additional explanatory variable, education turns out to be the only component of public spending whose association with the corruption index remains significant at the 95 percent level.¹⁸ The magnitude of the coefficient remains broadly the same as in the univariate regression.

Table 3 reports the results obtained by using the *Government Finance Statistics*, which include more finely disaggregated data, though possibly at the cost of lower cross-country comparability at the level of the more detailed items. Total government expenditure is again unrelated to corruption, and the results obtained when public expenditure is split by function are in line with those obtained using the Barro data set. In particular, controlling for per capita GDP, government expenditure on education is negatively and significantly associated with corruption. In addition, government expenditure on health is also found to be negatively and significantly associated with corruption. Finally, neither defense, nor transportation display any significant relationship with corruption. Of course, this does not mean that corruption is unrelated to spending on these items, but only that this simple analysis does not find any significant evidence that they are.

While significant relationships have been found between corruption and government expenditure on education and health, the link between corruption and the sub-components of education expenditure (schools, universities, and other) and health expenditure (hospitals, clinics, and other) is rather more blurred, with the association being (barely) significant at the 90 percent level only for spending on schools, and universities.

Table 3 also shows the results of the test of a hypothesis that is often heard in popular debate, namely that corruption is likely to lead to high capital expenditure by the government, perhaps on "white elephant" projects (prestigious projects that do not serve useful economic or social objectives). The data are somewhat in line with this hypothesis, but do not really provide significant evidence in favor of it. In fact, an improvement in the corruption index does coincide with a decline in capital expenditure by the government as a ratio to GDP, but this relationship is barely significant at the 90 percent level. Similarly, an improvement in the

¹⁷Easterly and Rebelo (1993) provide a literature review on Wagner's law and show that, in a panel of countries, several components of public spending rise (as a ratio to GDP) as income per capita rises.

¹⁸This analysis is a first pass at the data. Future research could introduce additional control variables, such as the demographic structure of the population (a higher share of people in schooling age implies higher education expenditure), and indicators of the relationship with neighboring countries (the possibility of war raises defense spending).

corruption index is associated with an increase in current expenditure by the government as a ratio to GDP, but not significantly so. Therefore, these results are interesting, but not too much should be made of them.

The level and composition of public investment are analyzed using the data from Easterly and Rebelo (1993). Interestingly, most relationships are not significant (Table 4). In particular, while there is fairly robust evidence that corruption lowers total (and private-see Mauro, 1995) investment, there is no clear relationship between corruption and public investment. A possible interpretation of this finding is that predatory behavior by corrupt governments may help sustain the level (though not the quality) of public investment as a ratio to GDP, even as private investment declines. In addition, none of the components of public investment (including that on education) is significantly associated with the corruption indices. In part, these findings may be due to the fact that the sample is relatively small and consists only of developing countries, yielding relatively little variation in the right-hand side variables of the regressions. However, it is also possible to speculate that, while bribes are difficult to levy on teachers' salaries, they are easier to levy on the construction of school buildings.

Finally, Table 5 conducts a number of simple robustness tests of the relationship between corruption and government expenditure on education by, first, relaxing some of the assumptions on functional form that have been made in the previous estimates and, second, controlling for possible endogeneity problems by using instrumental variables. When the ratio of government expenditure on education is regressed on the corruption index and total government expenditure as a ratio to GDP, the relationship remains significant, though only barely so when per capita GDP is included in the specification. Government expenditure on education as a share of total government consumption expenditure is significantly correlated with the corruption index, but only when per capita GDP is not included in the regression. Thus, the relationship between corruption and government expenditure on education seems to be somewhat sensitive to changes in the specification, though not overly so.

To the extent that the direction of causality to be captured is that from corruption to government spending on education, it is interesting to estimate this relationship using instrumental variables (the index of ethnolinguistic fractionalization and the colonial dummies). Interestingly, the coefficient on corruption falls by about half in the regression of government expenditure on education as a ratio to GDP when instrumental variables are used (Table 5, rows 5 and 6, compared to Table 2, row 1); however, the use of instrumental variables raises the coefficient on corruption in the regression of government expenditure as a share of total government consumption expenditure (Table 5, rows 7 and 8 compared to row 3). Thus, there is some tentative support for the hypothesis that corruption *causes* a decline in government expenditure on education, but the results are somewhat mixed.

Overall, it seems that there is suggestive, though by no means conclusive, evidence that corruption is negatively associated with government expenditure on education and possibly on health. Even though there are indications that the direction of the causal link may be at least in part from corruption to the composition of spending, the issue of the direction of

causality remains somewhat unresolved. At the same time, the extent to which potential policy conclusions depend on the direction of causality should not be overstated.

IV. THE DIRECTION OF CAUSALITY: IS IT RELEVANT FOR POLICY?

While, for the sake of clarity of exposition, the review of the literature has presented the variables that might be related to corruption as though they could unambiguously be categorized as either causes or consequences of it, the direction of causality is rather blurred in some cases. For example, it is not clear whether the existence of regulations may lead bureaucrats to ask for bribes to help entrepreneurs circumvent them, or whether corrupt bureaucrats may be more likely to create regulations. The same is true for the empirical relationship that this paper focuses on: just as the existence of corruption may cause a less-than-optimal composition of government expenditure, it may be the case that high government spending on items where monitoring is difficult causes opportunities for corruption. The empirical section of this paper has made some attempts to identify the correct direction of the causal links, but the issue of causality has not been fully resolved, and perhaps it is unlikely to be even with further research, since causality may well operate in both directions.

In general, the direction of causality has important implications for policy prescriptions, but in some cases policy conclusions are not entirely dependent on it. With reference to the specific case of the composition of government spending, it seems that the observed *correlation* between corruption and the composition of government expenditure may constitute sufficient grounds to consider whether it might be desirable to encourage governments to allocate a larger proportion of their spending to those items that are less susceptible to corruption, subject to the following qualifications.

If it is a less-than-optimal composition of government spending to cause corruption by creating opportunities for it, then encouraging governments to improve the composition of their spending might be an effective way of reducing corruption. If, on the other hand, it is corruption to cause a less-than-optimal composition of government expenditure,¹⁹ then corrupt governments would attempt to circumvent steps designed to encourage them to spend proportionately more on items that are less susceptible to corruption. In fact, corrupt governments could substitute publicly-unproductive but privately-lucrative projects for publicly-productive but privately-not-lucrative ones *within* a given expenditure category and still be able to show that--say--their share of spending on education has risen. In this second case, would encouraging governments to improve the composition of their spending be an effective way of curbing corruption? The answer hinges on whether, as a practical matter, it is possible to specify the composition of government expenditure in such a way as to make it

¹⁹The estimates in Table 5 provide tentative evidence that observed correlation between corruption and government expenditure composition may be due to this causal direction at least in part.

difficult for corrupt officials to find scope for raising bribes while still appearing to adopt a more desirable composition of government spending.

Therefore, even if a priori considerations and the tentative evidence presented in Section III.3 suggest that any correlation between corruption and the composition of government spending may at least in part reflect causality from corruption to the composition of spending, it is still possible that encouraging governments to improve the composition of their spending be an effective way of curbing corruption. However, this is the case only to the extent that the composition of spending may be specified so as to make substitution *within* its categories difficult.

V. CONCLUDING REMARKS

This paper has analyzed a number of causes and consequences of corruption. It has provided a synthetic review of recent studies that estimate empirically some of these links, but several others remain on the agenda for future research. In addition, even though data limitations imply that the results must be interpreted with caution, it has presented further evidence that corruption may have considerable, adverse effects economic growth, largely by reducing private investment, but perhaps also through a variety of other channels, which may include a worsening in the composition of public expenditure. More specifically, this paper has presented new, tentative evidence of a negative and significant relationship between corruption and government expenditure on education, which is a reason for concern, since previous literature has shown that educational attainment is an important determinant of economic growth. A possible interpretation of the observed correlation between corruption and government expenditure composition is that corrupt governments find it easier to collect bribes on some expenditure items than on others. While a potential policy implication might be that it would be desirable to encourage governments to improve the composition of their expenditure, an important issue is whether, as a practical matter, that composition can be specified in such a way that corrupt officials would not be able to substitute publicly unproductive but privately lucrative projects *within* the various expenditure categories.

TABLE 1: a) The Effects of Corruption on Investment (as a ratio to GDP, 1960-85 average)

Independent Variable	(1)	(2)	(3)	(4)
Constant	0.0780 (4.19)	-0.0025 (-0.05)	0.1226 (3.66)	0.0543 (0.47)
<i>Corruption index</i>	0.0187 (7.03)	0.0320 (3.93)	0.0095 (2.09)	0.0281 (0.99)
Per capita GDP in 1960			-0.0062 (-0.91)	-0.0213 (-0.96)
Secondary education in 1960			0.1749 (2.95)	0.1241 (1.21)
Population growth			-0.8226 (-0.82)	-1.0160 (-1.05)
Estimation method	OLS	2SLS	OLS	2SLS
R ²	0.32	(*)	0.44	(*)

b) The Effects of Corruption on GDP Growth (per capita, 1960-85 average)

Independent Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.0035 (0.85)	-0.0284 (-2.12)	0.0012 (1.50)	-0.0404 (-0.81)	-0.0012 (-0.16)
<i>Corruption index</i>	0.0029 (4.74)	0.0081 (3.61)	0.0038 (2.95)	0.0175 (1.40)	0.0028 (2.01)
Per capita GDP in 1960			-0.0075 (-4.49)	-0.0182 (-1.79)	-0.0069 (-4.78)
Secondary education in 1960			0.0401 (3.09)	0.0034 (0.09)	0.0217 (1.82)
Population growth			-0.4124 (-1.83)	-0.5192 (-1.29)	-0.3255 (-1.81)
Investment					0.1056 (3.09)
Estimation method	OLS	2SLS	OLS	2SLS	OLS
R ²	0.14	(*)	0.31	(*)	0.42

Data sources: Barro (1991), Business International, and Political Risk Services/IRIS.

There are 94 observations. The *corruption index* is the simple average of the indices produced by Political Risk Services (compiled by IRIS, for 1982-95) and Business International (for 1980-83). One standard deviation of the *corruption index* equals 2.38. A *high* value of the *corruption index* means that the country has *good* institutions in that respect. White-corrected *t*-statistics are reported in parentheses. *N* is the number of observations. 2SLS indicates that the index of ethnolinguistic fractionalization from Taylor and Hudson (1972) was used as an instrument. (*) The R² is not an appropriate measure of goodness of fit with 2SLS.

TABLE 2: Corruption and the Composition of Government Expenditure

Dependent Variable (average 1970-85, in percent of GDP)	Constant	Corruption Index	Per capita GDP (1980)	R ²	N
Government Expenditure on Education	0.028 (7.48)	0.0023 (3.97)		0.13	103
Government Consumption Expenditure	0.213 (11.85)	-0.0047 (-1.70)		0.03	106
Government Consumption Expenditure excluding education and defense	0.146 (10.69)	-0.0070 (-3.35)		0.10	93
Government Expenditure on Defense	0.032 (3.64)	0.0004 (0.28)		0.00	93
Government Transfer Payments	-0.039 (-2.22)	0.0208 (7.22)		0.45	73
Social Insurance and Welfare Payments	-0.044 (-4.41)	0.0156 (7.94)		0.48	75
Government Expenditure on Education	0.029 (6.85)	0.0020 (2.20)	0.0003 (0.43)	0.13	103
Government Consumption Expenditure	0.189 (10.20)	0.0052 (1.46)	-0.0094 (-4.88)	0.16	106
Government Consumption Expenditure excluding education and defense	0.116 (7.79)	0.0049 (1.41)	-0.011 (-4.54)	0.25	93
Government Expenditure on Defense	0.030 (2.25)	0.0009 (0.25)	-0.0004 (-0.17)	0.00	93
Government Transfer Payments	0.013 (0.78)	0.0001 (0.03)	0.018 (5.60)	0.64	73
Social Insurance and Welfare Payments	-0.015 (-1.70)	0.0041 (1.64)	0.010 (4.47)	0.59	75

Data sources: Barro (1991), Business International, and Political Risk Services/IRIS.

The *corruption* index is the simple average of the indices produced by Political Risk Services (compiled by IRIS, for 1982-95) and Business International (for 1980-83). One standard deviation of the *corruption* index equals 2.38. A *high* value of the *corruption* index means that the country has *good* institutions in that respect. White-corrected *t*-statistics are reported in parentheses. *N* is the number of observations.

TABLE 3: Corruption and the Composition of Government Expenditure,
Government Finance Statistics data

Dependent Variable 1985 observation, as ratio of GDP	Constant	Corruption Index	per capita GDP (1980)	R ²	N
Total Government Expenditure	0.233 (4.16)	0.0043 (0.36)	0.0112 (1.59)	0.122	88
Current Government Expenditure	0.141 (3.33)	0.0124 (1.34)	0.0094 (1.64)	0.238	85
Capital Government Expenditure	0.081 (4.54)	-0.0064 (-1.61)	0.0011 (0.43)	0.118	86
Government Expenditure on Education	0.021 (3.95)	0.0030 (2.29)	-0.0020 (-1.93)	0.070	85
Government Expenditure on Schools	0.012 (2.01)	0.0028 (1.60)	-0.0022 (-1.69)	0.077	57
Government Expenditure on Universities	0.004 (2.71)	0.0008 (2.45)	-0.0006 (-2.79)	0.074	56
Other Government Expenditure on Education	0.007 (1.93)	0.0001 (0.01)	-0.0002 (-0.29)	0.003	54
Government Expenditure on Health	0.001 (0.13)	0.0027 (2.34)	0.0012 (1.27)	0.301	86
Government Expenditure on Hospitals	0.006 (1.62)	0.0006 (0.64)	0.0005 (0.69)	0.063	54
Government Expenditure on Clinics	-0.002 (-0.41)	0.0012 (1.02)	0.0003 (0.31)	0.093	28
Other Government Expenditure on Health	0.001 (0.32)	0.0011 (0.83)	-0.0009 (-1.18)	0.042	44
Government Expenditure on Defense	0.034 (2.42)	-0.0009 (-0.24)	0.0010 (0.41)	0.003	82
Government Expenditure on Transportation	0.013 (4.13)	0.0009 (1.02)	-0.0003 (-0.39)	0.023	85

Data sources: *Government Finance Statistics*, Business International, and Political Risk Services/IRIS.

The *corruption* index is the simple average of the indices produced by Political Risk Services (compiled by IRIS, for 1982-95) and Business International (for 1980-83). One standard deviation of the *corruption* index equals 2.38. A *high* value of the *corruption* index means that the country has *good* institutions in that respect. White-corrected *t*-statistics are reported in parentheses. *N* is the number of observations.

TABLE 4: Corruption and the Composition of Public Investment

Dependent Variable 1985 observation, as ratio of GDP	Constant	Corruption index	per capita GDP (1980)	R ²	N
Public Investment	0.110 (8.45)	-0.0041 (-1.95)		0.051	84
Public Investment	0.098 (6.67)	0.0009 (0.29)	-0.0060 (-2.75)	0.121	84
General Government	0.051 (4.76)	-0.0014 (-0.92)		0.021	51
Public Enterprises	0.060 (4.93)	-0.0022 (-1.21)		0.028	42
General Government	0.038 (2.34)	0.0030 (0.85)	-0.0040 (-1.98)	0.126	51
Public Enterprises	0.042 (3.83)	0.0052 (2.15)	-0.0079 (-4.21)	0.224	42
Agriculture	0.021 (2.15)	-0.0010 (-0.55)		0.013	44
Education	0.006 (2.58)	0.0001 (0.11)		0.001	42
Health	0.004 (2.59)	-0.0001 (-0.14)		0.001	37
Housing	0.004 (1.41)	0.0003 (0.57)		0.006	31
Industry	0.011 (1.79)	-0.0001 (-0.10)		0.001	32
Transportation	0.018 (3.94)	0.0004 (0.45)		0.004	36
Agriculture	0.023 (2.42)	-0.0007 (-0.37)	-0.0021 (-1.34)	0.033	44
Education	0.0058 (2.68)	0.0003 (0.49)	-0.0008 (-1.69)	0.035	42
Health	0.0046 (2.92)	0.0001 (0.19)	-0.0007 (-1.88)	0.038	37
Housing	0.0049 (1.60)	0.0008 (1.16)	-0.0016 (-1.82)	0.056	31
Industry	0.011 (1.88)	-0.0001 (-0.05)	-0.0003 (-0.28)	0.002	32
Transportation	0.019 (3.93)	0.0005 (0.55)	-0.0005 (-0.43)	0.007	36

Data sources: Easterly and Rebelo (1993), Business International, and Political Risk Services/IRIS.

The *corruption* index is the simple average of the indices produced by Political Risk Services (compiled by IRIS, for 1982-95) and Business International (for 1980-83). One standard deviation of the *corruption* index equals 2.38. A *high* value of the *corruption* index means that the country has *good* institutions in that respect. White-corrected *t*-statistics are reported in parentheses. *N* is the number of observations.

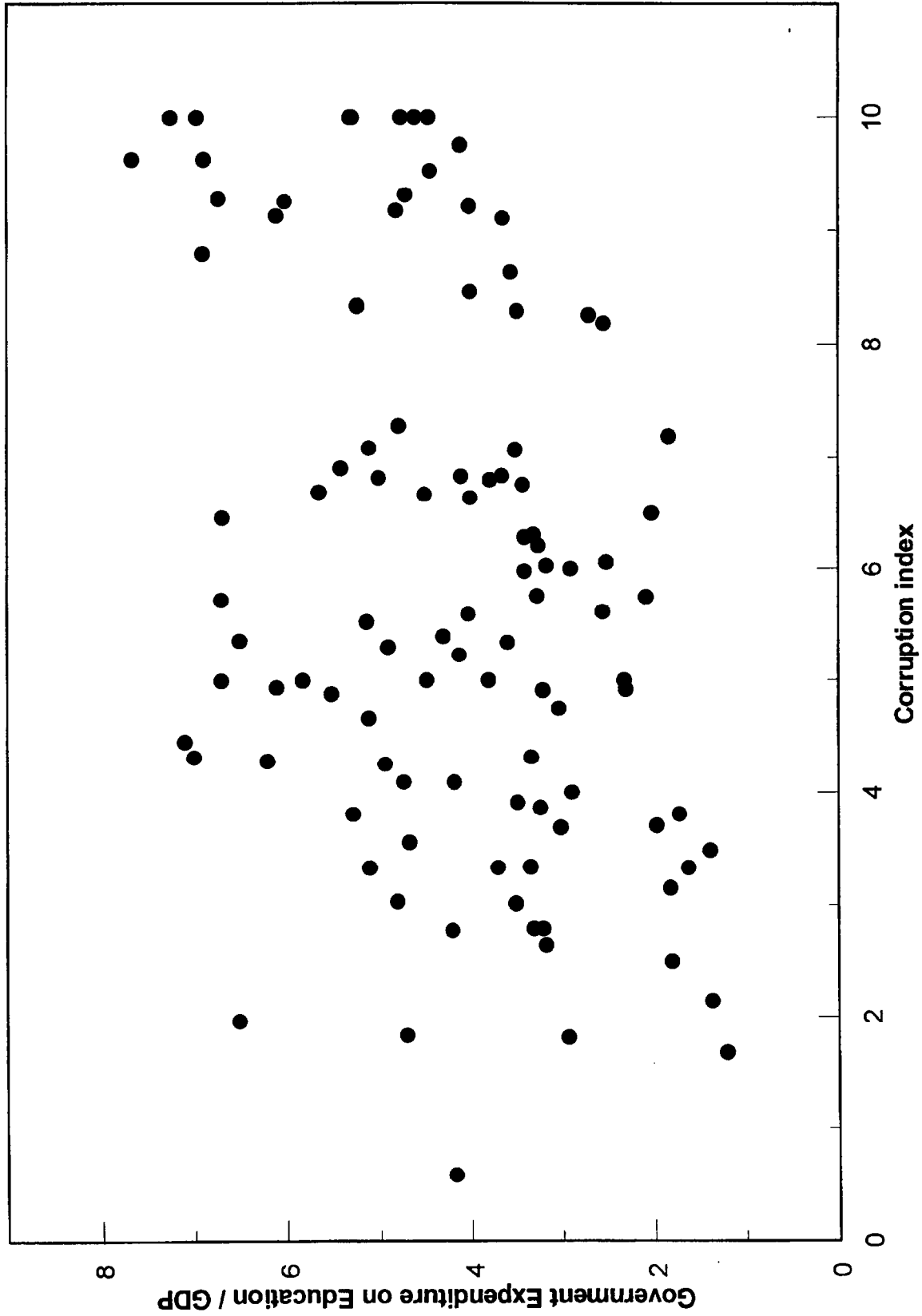
TABLE 5: Corruption and Government Expenditure on Education

Dependent Variable (average 1970-85)	Constant	Corruption index (1980)	per capita GDP (1980)	Govt Cons. Exp. / GDP	R ²	N
Govt Exp. on Educ. / GDP	0.010 (2.25)	0.0027 (5.48)		0.0863 (4.74)	0.278	103
Govt Exp. on Educ. / GDP	0.009 (2.15)	0.0014 (1.62)	0.0013 (1.75)	0.1042 (4.74)	0.318	103
Govt Exp. on Educ. / Govt. Cons. Exp.	0.103 (4.11)	0.0256 (5.40)			0.262	103
Govt Exp. on Educ. / Govt. Cons. Exp.	0.149 (6.49)	0.0056 (1.09)	0.0187 (5.00)		0.424	103
Govt Exp. on Educ. / GDP instrument: fractionalization	0.036 (4.08)	0.0011 (0.74)			*	100
Govt Exp. on Educ. / GDP instruments: fractionalization and col. hist.	0.033 (5.08)	0.0015 (1.36)			*	100
Govt Exp. on Educ. / Govt. Cons. Exp. instrument: fractionalization	0.068 (1.11)	0.0318 (3.04)			*	100
Govt Exp. on Educ. / Govt. Cons. Exp. instruments: fractionalization and col. hist.	0.059 (1.23)	0.0331 (3.95)			*	100

Data sources: Barro (1991), Business International, and Political Risk Services/IRIS.

The *corruption* index is the simple average of the indices produced by Political Risk Services (compiled by IRIS, for 1982-95) and Business International (for 1980-83). One standard deviation of the *corruption* index equals 2.38. A *high* value of the *corruption* index means that the country has *good* institutions in that respect. White-corrected *t*-statistics are reported in parentheses. *N* is the number of observations. "Fractionalization" is the index of ethnolinguistic fractionalization in 1960, from Taylor and Hudson (1972). "Colony" is a dummy for whether the country was ever a colony (after 1776). "Post-war independence" is a dummy for whether the country was still a colony in 1945. (*) The R² is not an appropriate measure of goodness of fit with instrumental variables (Two-Stage Least Squares).

Figure 1
Corruption and Government Expenditure on Education



Sources: Barro (1991), BI and ICRG.
Corruption index: simple average of BI and ICRG corruption indices
103 countries, $r = 0.36$

Appendix: A Generalization of the Barro (1990) Model as a Benchmark

This appendix develops a simple generalization of the Barro (1990) model, which may constitute a useful benchmark to analyze the relationship between corruption and the composition of government expenditure. It shows that if corruption were to act simply as a proportional tax on income, the ratio of each component of government expenditure to GDP would be the same, no matter how corrupt or unstable the government.

Following Barro (1990), taxes are assumed to be levied as a proportion of income. The production function is assumed to be of the form:

$$y = A k^{(1-\alpha)} \prod_{i=1}^N g_i^{\alpha_i}, \quad \sum_{i=1}^N \alpha_i = \alpha, \quad 0 < \alpha < 1 \quad (1)$$

where y is income per worker, A is a technological parameter, k is private capital per worker, and g_i is the flow of public services from government expenditure of type i , per worker. This is the simple extension to N types of government expenditure of the production function in Devarajan et al. (1993).

Defining ϕ_i so that

$$g_i = \phi_i g, \quad \sum_{i=1}^N \phi_i = 1 \quad (2)$$

where g is the total flow of public services from productive government expenditure per worker, the production function in (1) reduces to the Barro (1990) production function if $N=1$.

Barro (1990) examines two extreme cases: (i) A benevolent government maximizes the lifetime utility of the representative consumer, subject to the constraint that $\tau = g/y$; solving for the optimal τ yields $\tau^* = (g/y)^* = \alpha$; (ii) A self-interested (infinitely-lived) government obtains consumption equal to $C_g = [\tau - (g/y)]y$; that is, corrupt bureaucrats get to consume the "budget surplus" (τ represents the sum of a proportional tax rate and a proportional bribe rate); the self-interested government maximizes the present value of the future flow of utility derived from C_g , subject to $\tau \geq g/y$.

In order to analyze the role of institutions in determining the composition of public expenditure, it is interesting to analyze the problem of a government that maximizes a weighted average of the lifetime utility of the representative consumer and of the lifetime utility derived from consumption by its self-interested members. The maximization program may be expressed as: choose τ and (g/y) , subject to $\tau \geq g/y$, so as to maximize $(1 - \psi) U + \psi U_g$, with $0 \leq \psi \leq 1$, and where U is the lifetime utility of the representative consumer and U_g is the lifetime utility of the self-interested government official.

Following Barro (1990), lifetime utility of the citizen can be assumed to be:

$$U = \int_0^{\infty} e^{-\rho t} \left(\frac{c^{1-\sigma} - 1}{1 - \sigma} \right) dt \quad (3)$$

where ρ is the rate of time preference and σ is the inverse of the intertemporal elasticity of substitution. Similarly, lifetime utility of the self-interested government official can be assumed to be:

$$U_g = \int_0^{\infty} e^{-\theta t} \left(\frac{c_g^{1-\sigma} - 1}{1 - \sigma} \right) dt \quad (4)$$

where θ is the sum of the government official's rate of time preference and of her probability of death (a metaphor for government collapse, for analytical simplicity).

Cases (i) and (ii) analyzed by Barro (1990) are special cases of the above maximization program, where $\psi=0$ and $\psi=1$, respectively. The weight given to the lifetime utility of the self-interested government officials, ψ , may be taken to represent the degree to which the country is "corrupt".

It can be shown that more corrupt (higher ψ) and the more unstable (higher θ) the government, the higher τ , and therefore the lower private investment and economic growth. This result is consistent with the observation that corruption reduces private investment and growth (Section III.2).

On the other hand, in this model, it can also be shown that *the optimal share of government infrastructure services is independent of corruption and political stability*; that is, $(g/y)^* = \alpha$, regardless of the weights assigned to the two classes of people and of the discount rate. A proof of this proposition can be obtained by simply taking derivatives of $(1-\psi)U + \psi U_g$ with respect to τ and g/y . A few pages of algebra yield the result.

The following condition relating to the composition of productive government expenditure maximizes the lifetime utility of both the representative consumer and the self-interested bureaucrat:

$$\frac{\phi_j}{\phi_k} = \frac{\alpha_j}{\alpha_k}, \quad \forall j, k \quad (5)$$

As a consequence, any government would choose the composition of expenditure implied by (5), regardless of corruption and political instability. Therefore, under the assumptions of the Barro (1990) model, and most notably that corruption act as a proportional tax on income, the ratio of each component of government expenditure to GDP would be the same, no matter how corrupt or unstable the government.

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