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Does Corruption Affect Income Inequality and Poverty?

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Abstract

This paper demonstrates that high and rising corruption increases income inequality and poverty by reducing economic growth, the progressivity of the tax system, the level and effectiveness of social spending, and the formation of human capital, and by perpetuating an unequal distribution of asset ownership and unequal access to education. These findings hold for countries with different growth experiences, at different stages of development, and using various indices of corruption. An important implication of these results is that policies that reduce corruption will also lower income inequality and poverty.

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SUMMARY

Studies of the consequences of corruption have mainly focused on economic efficiency. This paper illustrates that corruption can also have distributional consequences.

Corruption increases income inequality and poverty through lower economic growth; biased tax systems favoring the rich and well-connected; poor targeting of social programs; use of wealth by the well-to-do to lobby government for favorable policies that perpetuate inequality in asset ownership; lower social spending; unequal access to education; and a higher risk in investment decisions of the poor.

Cross-country regression analysis for 1980–97 shows that high and rising corruption increases income inequality and poverty through the above channels. The impact of corruption on income inequality and poverty is considerable. A worsening in the corruption index of a country by one standard deviation (2.52 points on a scale of 0 to 10) is associated with the same increase in the Gini coefficient as a reduction in average secondary schooling of 2.3 years. A one-standard-deviation increase in the growth rate of corruption (a deterioration of 0.78 percentage point) reduces income growth of the poor by 7.8 percentage points a year. The results are valid for countries at different stages of economic development, with different growth experiences, and using various indices of corruption. They hold even when controlling for other factors that affect income inequality and poverty such as natural resources, capital-output ratios or capital productivity, educational attainment, access to education, and distribution of land. The results further show that higher social spending reduces poverty but has no effect on income inequality.

These findings suggest that adverse distributional consequences of corruption can be mitigated by sound management of natural resources; broad-based, labor-intensive growth; efficient spending on education and health; effective targeting of social programs; and increased access to education.

I. INTRODUCTION

Government officials may use their authority for private gain in designing and implementing public policies. This phenomenon—defined broadly as corruption (Tanzi, 1997a)—may result in enriching these officials as well as private individuals who obtain a larger share of public benefits or bear a lower share of public costs. In this way, corruption distorts the government's role in resource allocation. It has been argued (Tanzi, 1995) that the benefits from corruption are likely to accrue to the better-connected individuals in society, who belong mostly to high-income groups. Thus, corruption would affect not only broad macroeconomic variables, such as investment and growth, but also income distribution. It has been further contended that corruption increases poverty by creating incentives for higher investment in capital-intensive projects and lower investment in labor-intensive projects (United Nations Development Programme, 1997). Such a bias in investment strategy deprives the poor of income-generating opportunities.

To date, no empirical evidence has been presented to corroborate the relationship between either corruption and income distribution or corruption and poverty. This paper seeks to ascertain if such relationships are supported by cross-country data.

Many studies have investigated the efficiency implications of corruption through its impact on investment, growth, and expenditure allocations. The empirical results show that corruption lowers investment and, consequently, economic growth (Mauro, 1995; Knack and Keefer, 1996). There is some discussion in the literature on whether the negative impact on growth operates through reduced private investment or through reduced public investment. The recent paper by Tanzi and Davoodi (1997) provides evidence that corruption actually increases public investment, especially investment in unproductive projects, and squeezes expenditure allocations for operations and maintenance, thereby lowering the productivity of the public capital stock. The paper also shows that corruption tends to reduce government revenue, which limits the ability of the government to provide goods and services critical to its population. In a somewhat similar vein, Mauro (1997) shows that corruption distorts the composition of public expenditure; corrupt governments spend relatively less on education because of the limited scope for collecting bribes under this type of spending. This does not mean, however, that education spending is exempt from corrupt practices; in fact, in many developing countries, government payrolls are inflated by ghost workers—workers who are on the payroll but who do not actually exist, including ghost teachers (Abed et al, 1998).

In general, the corruption literature has tended to emphasize the efficiency implications of corruption, while overlooking its distributional consequences.[2] In part, this reflects the belief that the rich or well-connected typically use bribes to be the first in line for a rationed government good or service, and the poor or individuals at the lower end of income

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[2]Exceptions include Tanzi (1995) and Rose-Ackerman (1997a). For an exhaustive review of the corruption literature, see Rose-Ackerman (1997b) and Tanzi (forthcoming).

distribution obtain the rationed good or service after waiting in line (Bardhan, 1997). In this way, bribes are assumed to clear the market because they reflect individuals' willingness to pay. These views, similar to the early efficiency-enhancing views of corruption (Leff, 1964; Huntington, 1968), ignore that corruption may create permanent distortions from which some groups or individuals can benefit more than others. They also ignore that individuals with high willingness to pay are not necessarily the intended beneficiaries of government programs. Moreover, the distributional consequences of corruption are likely to be more severe the more persistent the corruption,[3] and the more entrenched the vested interests. The impact of corruption on income distribution is also a function of the government's involvement in allocating and financing scarce goods and services.[4] Finally, empirical work on the distributional consequences of corruption has been hindered by a lack of consistent and reliable cross-country data on income inequality and poverty that only lately has been rectified (Deininger and Squire, 1996; Ravallion and Chen, 1997).

This paper is organized as follows. The next section lists arguments on how corruption may affect income inequality and poverty. Section III presents two models of income inequality and poverty. Sections IV and V document the direct and indirect impacts of corruption on income inequality and poverty. Section VI summarizes the results and policy implications of this paper's findings.

II. Corruption, Income Inequality, and Poverty

Corruption can affect income inequality and poverty through various channels, including overall growth, biased tax systems, and poor targeting of social programs as well as through its impact on asset ownership, human capital formation, education inequalities, and uncertainty in factor accumulation.

Growth

High corruption can lead to high poverty for two reasons. First, evidence suggests that a higher growth rate is associated with a higher rate of poverty reduction (Ravallion and Chen, 1997), and that corruption slows the rate of poverty reduction by reducing growth. Second, income inequality has been shown to be harmful to growth (Alesina and Rodrik,

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[3]See Bardhan (1997) for a discussion of the persistence of corruption and the empirical section of this paper for supporting evidence.

[4]See Tanzi (forthcoming) for a discussion of the political economy of corruption and the reform of the state.

1994; Persson and Tabellini, 1994),[5] and if corruption increases income inequality, it will also reduce growth and thereby limit poverty reduction (Ravallion, 1997).[6]

Biased tax systems

Corruption can lead to tax evasion, poor tax administration, and exemptions that disproportionately favor the well-connected and wealthy population groups. This can reduce the tax base and the progressivity of the tax system, possibly leading to increased income inequality.

Poor targeting of social programs

Corruption can affect the targeting of social programs to the truly needy. The use of government-funded programs to extend benefits to relatively wealthy population groups, or the syphoning of funds from poverty-alleviation programs by well-connected individuals, will diminish the impact of social programs on income distribution and poverty.

Asset ownership

High concentration of asset ownership can influence public policy and increase income inequality. In a society where asset ownership is concentrated in a small elite, asset owners can use their wealth to lobby the government for favorable trade policies, including exchange rate, spending programs, and preferential tax treatment of their assets. These policies will result in higher returns to the assets owned by the wealthy and lower returns to the assets owned by the less well-to-do, thereby increasing income inequality. Furthermore, assets can be used as collateral to borrow and invest; therefore, inequality in ownership of assets will limit the ability of the poor to borrow and increase their lifetime income and will perpetuate poverty and income inequality (Li, Squire, and Zou 1996; Birdsall and Londoño, 1997).

Human capital formation, education inequalities, and social spending

Corruption can affect income distribution and poverty via its impact on human capital formation and the distribution of human capital. First, corruption weakens tax administration and can lead to tax evasion and improper tax exemptions, as discussed above. Therefore, for a

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[5]Growth is harmed because high income inequality creates pressures either for populist programs, which reduce the overall productivity of public resources, or for postponing much needed adjustment to support the growth process (for example, Alesina and Drazen, 1991; Laban and Struzenegger, 1994; and Alesina et al, 1996).

[6]It is possible for income inequality to be high enough that it results in rising poverty, despite high growth (Ravallion, 1997).

given tax system, the higher the level of corruption, the lower the tax revenue and the lower the resources available for funding public provision of certain services, including education.

Second, corruption increases the operating cost of government, and, therefore, reduces the resources available for other uses, including the financing of social spending that is crucial to the formation of human capital. In fact, higher corruption is found to be associated with lower education and health spending (Mauro, 1997).

Third, wealthy urban elites can lobby the government to bias social expenditure toward higher education and tertiary health, which tend to benefit high-income groups. Corruption can also increase expenditure on tertiary health because bribes can be more easily extracted from the building of hospitals and purchasing of state-of-the-art medical equipment than from expenditure on vaccinations.

Finally, corruption can increase the share of recurrent expenditure devoted to wages as opposed to operations and maintenance (Tanzi and Davoodi, 1997). This lowers the quality of education and health services and affects the ability of the state to improve educational attainment levels.

Uncertainty and factor accumulation

If the "rules of the game" in a corrupt country are unclear and biased toward the well-connected, the poor and the less-well-connected face an added risk premium in their investment decisions. This unequally distributed risk increases expected returns to any investment for the well-connected relative to the less-well-connected. Therefore, low income and poor groups—the less-well-connected—will be discouraged from investing in any resource—human, physical capital, or land—and income inequality and poverty will be perpetuated or accentuated.

III. Models

A. Corruption and Income Inequality

The empirical model of inequality used in this paper is in the spirit of Atkinson (1997). It specifies the personal distribution of income in terms of factor endowments, distribution of factors of production, and government spending on social programs.[7] Specifically, the Gini coefficient is assumed to depend on the following variables:

- Initial distribution of assets (the initial Gini coefficient for land ownership);

[7]The models of Bourguignon and Morrisson (1990) and Londoño and Szekely (1997) are also based on the same underlying principle.

- Education inequality (percent of adult population with no schooling expressed as a fraction of percent of adult population with completed secondary and higher education);[8]
- Education stock or educational attainment (average years of secondary education in population aged 15 and over);
- Capital stock-to-GDP ratio;
- Natural resource endowment (share of natural resources in total exports);
- Corruption (various corruption indices);
- Social spending (various spending measures relative to GDP);
- Expenditure dummy—equals one when the Gini coefficient is expenditure-based and zero when it is income-based;
- Recipient dummy—equals one when the recipient of income or the spending unit is a person and zero when it is a household; and
- Net income dummy—equals one when the Gini coefficient is based on net income and zero when it is based on gross income.

Distribution of income-generating assets has an impact on income distribution. Distribution of land is used as a proxy for asset distribution because data on the distribution of other income-generating assets, such as bonds and equity, are available for only a limited number of countries. Inequality in the distribution of land is expected to be positively correlated with income inequality for two reasons. First, the distribution of land has a direct impact on the distribution of income in a given time period, particularly in countries where income from land constitutes a large share of total income. Second, land can be used as collateral for borrowing and investing; therefore, inequitable land distribution limits the ability of the poor to borrow and increase their lifetime income.

Education inequality is expected to be positively correlated with income inequality (Tinbergen, 1975). A more egalitarian distribution of human capital will improve income distribution both by boosting the earning potential of the poor (Londoño and Szekely, 1997) and by limiting the ability of the wealthy to lobby policymakers in their favor. In a similar vein, a higher educational endowment is expected to decrease inequality (Tinbergen, 1975).

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[8]Adult population is defined as population aged 15 years and over.

A higher capital-output ratio or lower productivity of capital is expected to be associated with higher income inequality. This may happen in developing economies where the majority of economic activity is concentrated in a traditional, low-productivity, unskilled labor sector, but also have islands of high-productivity and high-skilled labor. Similarly, a high natural resource endowment is expected to be associated with higher income inequality because of the high concentration of ownership and rent in this type of wealth as well as the high capital intensity and low complementarity between capital and labor in the natural resource sector. As discussed, corruption is expected to increase income inequality.

Government transfers and spending on social services can constitute a major source of income in poor households. Well-targeted social programs (proxied here by different measures of social spending) are expected to lower income inequality.

Survey-type dummies are included as explanatory variables because differences in measured inequality can be due to differences in the type of survey data used. These are: dummies for type of cash flow (income versus expenditure), choice of recipient unit (household versus personal), and type of income (gross versus net). An income-based measure of inequality is expected to show higher inequality than an expenditure-based measure. This is consistent with aggregate consumption theories in which individuals can smooth their consumption via borrowing and lending while their income fluctuates. Furthermore, measurement errors for income may be higher than for consumption, particularly in developing countries, which tends to inflate measured income inequality. Individual-based Gini coefficients are expected to be higher than household-based ones. This is because poor households tend to be larger than rich ones, and because households are better able to make interpersonal and intertemporal adjustments in expenditure patterns than individuals. The Gini coefficient based on net income should be lower than one based on gross income if tax systems are progressive and redistribute income in favor of the poor.

B. Corruption and Poverty

The model of poverty used in this paper relies on cross-country models that determine overall income growth in the economy.[9] The model expresses the income growth of the bottom 20 percent of the population, a measure of change in poverty,[10] as a function of the following variables:

- Aggregate economic growth (real per capita GDP growth rate);

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[9]See Sala-I-Martin (1997) and Sachs and Warner (1997).

[10]This measure has been previously used by Deininger and Squire (1996) and Birdsall and Londoño (1997). Income growth of the bottom 20 percent of the population is defined as the average yearly growth rate in real per capita GDP of the bottom quintile of the population, measured in purchasing power parity-adjusted US dollars.

- Natural resource endowment (share of natural resources in total exports);
- Initial income of the poor (real income of the bottom 20 percent of the population in 1980 measured in purchasing power parity U.S. dollars) ;
- Initial secondary schooling (years of secondary education in population aged 15 and over in 1980);
- Education inequality (percent of adult population with no schooling, expressed as a fraction of percent of adult population with completed secondary and higher education);
- Initial distribution of assets (the initial Gini coefficient for land);
- Social spending (various measures relative to GDP); and
- Growth in corruption (various indices).

The rate of change of the income of the bottom 20 percent is chosen as the dependent variable because it is less prone to measurement errors than levels of poverty.[11] Another advantage of this formulation is that it is unaffected by country-specific factors that influence the level of poverty.

It has been argued that resource-rich countries grow less rapidly than resource-scarce countries (Sachs 1995, Sachs and Warner, 1997). Therefore, natural resource endowment is included in the model to examine if it affects income growth of the poor directly as well as indirectly through aggregate growth.

Initial income of the poor is included to account for diversity in initial conditions among countries. It is also intended to capture the extent to which the poor in one country are catching up with the poor in other countries. If there is a catch-up or convergence effect, the lower the initial income of the poor, the higher their income growth will be. Therefore, the coefficient on the initial income of the poor is expected to be negative.

Initial secondary schooling is included to measure the impact of human capital on the income growth of the poor. A positive coefficient is expected if human capital contributes positively to income growth of the poor. Two measures of distribution of factors of production are included: education inequality and the initial Gini coefficient for land. Each factor-distribution measure is expected to be negatively associated with the income growth of the poor.

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[11]Use of international poverty lines, such as the proportion of the population living on less than US$1 a day, will solve some but not all of the measurement problems.

Well-targeted social programs are believed to transfer relatively more income to the poor and reduce the incidence of poverty. In reality, it is quite conceivable that much of the benefits of social programs accrue to the middle- and higher-income groups.[12] To assess the impact of social spending on the income growth of the poor, three broad proxies for social spending are tried, all in relation to GDP; these are government spending on (1) social security and welfare, (2) education and health, and (3) the sum of spending items (1) and (2) plus housing and community amenities. Finally, in line with the model of income inequality, various indices of corruption are used to examine whether a higher growth rate of corruption reduces the income growth of the poor.

IV. Empirical Results

A. Indices of Corruption: The Stylized Facts

Six corruption indices are used throughout this paper to evaluate the sensitivity of the empirical results (Appendix II, Table 8). All corruption indices are highly correlated, with correlation coefficients ranging from 0.88 to 0.98, and all are statistically significant at the 1 percent level. Because each corruption index refers to a different time period, the high and positive correlation coefficients suggest that a country's rank in the corruption index is stable over time. However, since the sample of countries differs across the six indices, (ranging from 38 to 87 countries), results may vary depending on which corruption index is used. If the results hold across different corruption indices, it will be an indication of their robustness.

B. Impact of Corruption on the Gini Coefficient

The models of income inequality and poverty are estimated using OLS on cross-country data for 1980–97. (Results from instrumental variable technique, which are similar to the ones from OLS, are also reported.) The income inequality regression is estimated using three specifications. In the first one, the Gini coefficient is regressed on a constant, three survey-type dummies, natural resource abundance, ratio of physical capital stock to GDP, education inequality, initial Gini coefficient for land, and a corruption index. In the second specification, education inequality is replaced with mean years of secondary schooling. The third specification includes both education variables to test for their relative impact on income inequality.

Table 1 reports the results for all three specifications. The explanatory variables account for about 72 percent of cross-country variation in income inequality. In addition, the F-statistic for each regression is statistically significant at the 1 percent level. In all three

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[12]For evidence on benefit incidence of social spending, see Tanzi (1974) and Alesina (1998).

Table 1. Corruption and Income Inequality: OLS Estimates
(Dependent variable: the Gini coefficient)

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	27.60 ***	34.40 ***	29.60 ***	29.40 ***	33.60 ***	29.70 ***
	(4.30)	(6.39)	4.61	(5.82)	(6.21)	(5.05)
Expenditure dummy	-2.79	-1.82	-2.46	-3.61 *	-2.92	-3.46
	(-1.03)	(-0.63)	(-0.86)	(-1.46)	(-1.00)	(-1.21)
Recipient dummy	1.85	1.77	1.33	1.03	1.34	1.00
	(0.58)	(0.48)	(0.39)	(0.33)	(0.39)	(0.31)
Net income dummy	-6.91 ***	-7.00 ***	-6.78 ***	-7.45 ***	-7.81 ***	-7.47 ***
	(-3.26)	(-2.94)	(-3.11)	(-3.97)	(-3.94)	(-3.91)
Natural resource abundance	38.90 **	35.80 **	37.40 **	28.40 **	25.90 *	28.30 **
	(2.38)	(2.18)	(2.38)	(1.83)	(1.65)	(1.82)
Capital stock-GDP ratio	0.05 **	0.04 *	0.04 *	0.05**	0.05 *	0.05 **
	(2.28)	(1.43)	(1.85)	(2.37)	(1.55)	(1.83)
Education inequality	2.32 **		1.90 *	1.55*		1.49
	(1.98)		(1.56)	(1.30)		(1.16)
Secondary schooling		-1.85*	-1.05		-0.91	-0.23
		(-1.31)	(-0.82)		(-0.49)	(-0.13)
Initial Gini coefficient for land	0.10 *	0.12 *	0.12 *	0.12**	0.13 *	0.12 **
	(1.49)	(1.48)	(1.55)	(1.68)	(1.52)	(1.57)
Real per capita GDP ($x10^2$)				-0.07**	-0.67*	-0.06 *
				(-1.90)	(1.57)	(-1.51)
Corruption	1.74 ***	1.72***	1.53 ***	0.93 *	1.00*	0.92 *
	(3.01)	(2.74)	(2.61)	(1.49)	(1.43)	(1.41)
Adjusted R^2	0.73	0.72	0.73	0.76	0.74	0.75
Number of observations	38	38	38	37	37	37
F-statistic	13.80 ***	12.80***	12.20 ***	13.30***	12.50 ***	11.60 ***

Notes: Estimation is by OLS. Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. The corruption index used in this table corresponds to "Corruption 5" in the Appendix II, Table 9. It has been multiplied by -1 so that a high value of the index indicates a high level of corruption.

*** Significant at 1 percent level; ** significant at 5 percent level; and * significant at 10 percent level.

specifications, the survey-type dummies have the expected signs. Inequality is lower when the Gini coefficient is based on consumption rather than income, higher when the recipient unit is a person rather than a household, and lower when the coefficient is based on after-tax income than before-tax income.

The results also suggest that countries with high income inequality tend to have abundant natural resources, low capital productivity, high education inequality, low average secondary schooling, and unequal distribution of land. The estimated coefficients on these five variables are statistically significant at the conventional levels. These findings confirm Atkinson's (1997) hypothesis that factor endowments and their distribution are important determinants of income distribution.

As regards the impact of corruption on income inequality, it is necessary to first specify the nature of the null and alternative hypotheses. In the absence of prior empirical evidence linking corruption to income inequality, the null hypothesis that corruption has zero correlation with income inequality needs to be tested against the alternative hypothesis of nonzero correlation. The two-tailed test rejects the null hypothesis at the 1 percent significance level. However, rejection of the null hypothesis does not ascertain whether higher corruption is associated with higher income inequality. To prove this, additional tests are needed. The results from these tests show that higher corruption is indeed associated with higher income inequality at the 1 percent level of significance.[13] The magnitude of the effect of corruption on income inequality is considerable. A worsening in the corruption index of a country by one standard deviation (2.52 points on a scale of 0 to 10) is associated with an increase in the Gini coefficient of about 4.4 points (Table 1, Column 1). A partial scatter plot based on the regression (Table 1, Column 1) is shown in Figure 1.

Table 1 provides another new result. Distribution of education matters more than its mean in affecting income inequality. Specifications (1) and (2) show that education inequality and mean years of schooling matter when entered separately in the regression, but when both are included (that is, Specification 3), mean years of schooling ceases to be significant. This implies that, other things being equal, policies aimed at reducing education inequality through decreasing illiteracy are more important in reducing income inequality than policies aimed at increasing the mean years of schooling without due regard to education inequality.

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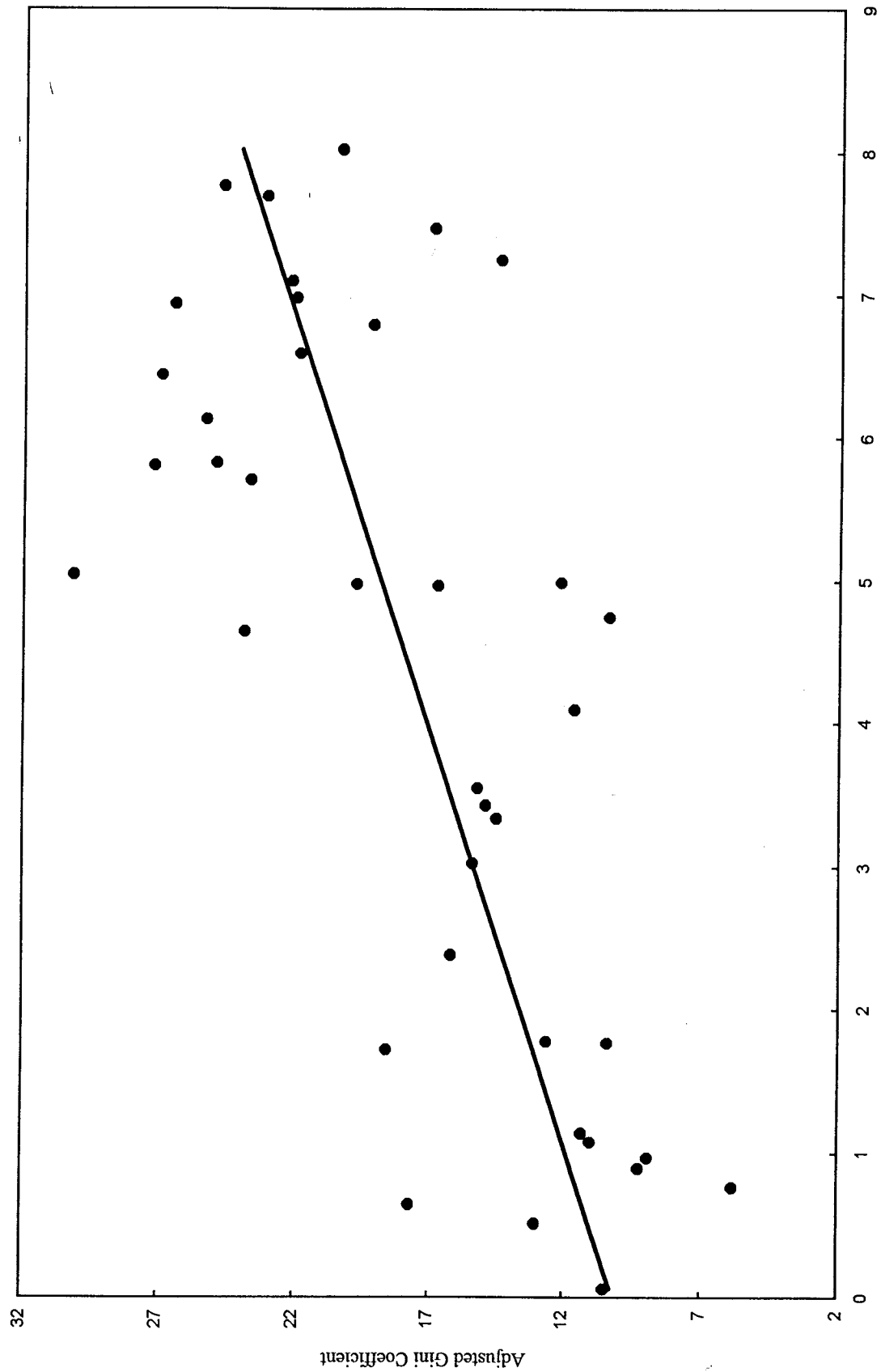
[13]There are two separate one-tail tests. In the first, the null hypothesis is that the coefficient on the corruption index is greater than or equal to zero (that is, higher corruption is associated with lower income inequality or corruption has zero correlation with income inequality). In the second, the null hypothesis is that the coefficient on the corruption index is less than or equal to zero (that is, higher corruption is associated with higher income inequality or corruption has zero correlation with income inequality). In both tests, the alternative hypothesis is the complement of the null hypothesis.

Figure 1. Corruption and Income Inequality



The Gini coefficient is adjusted using the regression in Table 1, Column 1. A high value of the corruption index means the country has a high level of corruption.

To put in perspective the magnitude of the impact of corruption on income inequality, it is instructive to compare it with the impact of education on income inequality. A worsening in the corruption index of a country by one standard deviation (2.52 points on a scale of 0 to 10) is associated with the same increase in the Gini coefficient as a reduction in average secondary schooling of 2.3 years.[14]

The above regressions used the expanded 1997 corruption index from Lambsdorff (forthcoming). This index has the broadest country coverage of all corruption indices compiled by Goettingen University and *Transparency International* (1997). To test whether the results are unique to this particular corruption index, the above regressions are estimated using five additional indices of corruption.[15] The results show that higher corruption is still associated with higher income inequality at the conventional statistical levels (Appendix II, Table 9).

A broad measure of social spending, when added to Columns 1, 2, and 3 of Table 1, is found to have no statistically significant effect on income inequality at the conventional levels.[16] This result is consistent with the observations made by Tanzi (1974) and Alesina (1998). Even when controlling for the level of social spending, higher corruption continues to be associated with higher income inequality.

Finally, real per capita GDP is added to the previous regression in order to investigate if corruption is merely a proxy for the stage of economic development (Columns 4, 5, and 6 of Table 1). The associated coefficients on per capita GDP are significant at the 10 percent level and have a negative sign, indicating that richer countries have, on average, a more equal distribution of income than poorer countries. Higher corruption continues to be associated with higher income inequality, with the coefficient on the corruption index being statistically significant at the 10 percent level.[17] The statistical significance of corruption increases when

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[14]This estimate is based on Table 1, Column 2: (1.72 x 2.52) ÷ -1.85 = -2.3. The estimate is even higher if point estimates from Column 6 of Table 1 are used.

[15]Four indices are compiled by Goettingen University and *Transparency International* (1997) and one by Tanzi and Davoodi (1997). See Appendix I for more details.

[16]Similar results are obtained with the two narrower measures of social spending; these are government spending on (1) education and health, and (2) social security and welfare. Regression results that include social spending are not reported. These are available from authors upon request.

[17]The coefficient on the corruption variable is halved relative to regressions which exclude real per capita GDP, the reason being that countries with low levels of per capita GDP have, on average, higher levels of corruption. The simple correlation coefficient between real per capita

(continued...)

other indices of corruption are used (Appendix II, Table 9). These findings suggest that corruption is harmful to income inequality even when the impact of real per capita GDP is controlled for. None of these findings change when a broad measure of social spending is also added to the regression.[18] As before, social spending has no effect on income inequality.[19]

C. Corruption and Income Inequality: Which Way is the Causality?

The above regression results establish the existence of a statistically significant *positive association* between corruption and income inequality. However, this association could stem from "reverse" causation, that is, high income inequality could be causing high corruption. Furthermore, the observed association could be due to other factors.

The technique of instrumental variable estimation is used to ascertain whether this is indeed the case. The technique isolates the pure impact of corruption on income inequality by using variables (i.e., instruments) which are correlated with corruption and which have no impact on income inequality and are not influenced by a "third" variable or variables that might be causing both income inequality and corruption. Three such instruments are chosen. They are the proportion of a country's population that speaks English at home, distance of a country from the equator (referred to as latitude), and an index of ethnolinguistic diversity within each country (referred to as ethnicity).[20] The regression of the corruption index

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[17](...continued)
GDP and the corruption index is negative with a t-statistic of -12.

[18]To determine if these findings hold in the presence of a Kuznets curve, a quadratic term in real per capita GDP is added to regressions in Columns 4, 5, and 6, which already include level of real per capita GDP. No evidence of the existence of a Kuznets curve is found; higher corruption continues to be associated with higher income inequality. The latter findings also holds when growth in real per capita GDP is added to regressions in Columns 1, 2, and 3.

[19]Similar results are obtained when using narrower measures of social spending.

[20]Each instrument changes slowly over time; the second instrument, latitude, not at all. Each is predetermined with respect to future evolution of income inequality. For example, the ethnicity variable refers to 1960 whereas the Gini coefficient and the relative income share data are for the post-1980 period. The English language variable refers to 1988, but it would not be expected to vary substantially in the post-1988 period. The simple correlation coefficient between the corruption index (corruption 5) and each instrument is high and statistically significant. The correlation coefficient is estimated at -0.47 for the English language variable, -0.67 for latitude, and 0.43 for ethnicity. These estimates suggest that countries with low corruption tend to have a high proportion of their population who speak English at home, are farther away from the equator and are fairly ethnically homogenous. In

(continued...)

(corruption 5) on a constant and the three instruments produces an adjusted R-squared of 0.54 in which the three variables are individually significant at the 1 percent level with the same signs as found for correlation coefficients.

The results of the instrumental variable estimation of the Gini regression are shown in Table 2. The estimated coefficients are close to their OLS counterparts in Table 1; the estimated coefficients on the corruption index are significant at the conventional significance levels. Table 2 also shows that the chosen instruments are valid at the 1 percent significance level. In sum, these results provide evidence that corruption increases income inequality. The instrumental variable estimates using other corruption indices produce similar results.

The results also indicate that a worsening in the corruption index of a country by one standard deviation (2.52 points on a scale of 0 to 10) increases the Gini coefficient by 5.4 points (Table 2, Column 1).

D. Corruption and Poverty

The poverty equation is also estimated with the help of OLS, using the same data set for the right hand side variables as for the income inequality equation. A simple regression of the income growth of the poor on aggregate growth (plus a constant) produces a highly significant coefficient with a t-statistic of 2.94 and a R-squared of 0.213. The size of the coefficient on the aggregate growth variable (1.2) indicates that one percentage point increase in aggregate growth is associated with 1.2 percentage points of income growth of the poor. This finding is consistent with the view that, other things being equal, higher growth increases the rate of poverty alleviation.

Table 3 displays the results. All regressions contain the following variables: a constant, natural resource abundance, initial income of the poor, initial secondary schooling, and growth in corruption.[21] The three remaining variables (education inequality, initial Gini coefficient for land, and social spending) are entered one at a time and then all at once to see if the sign and significance of these variables—as well as that of corruption—change. In all these regressions, higher growth in corruption is associated with lower income growth of the

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[20](...continued)
the instrumental variable estimation, all three instruments are used jointly.

[21]Most of the variables included in the regression affect aggregate growth. Hence, aggregate growth is excluded in Table 3. Including it increases collinearity among the variables, which makes it difficult to distinguish the effect of each independent variable on the dependent variable. Nevertheless, these results are shown in Appendix II, Table 10. The overall results, particularly with respect to the impact of corruption, remain the same as in Table 3.

Table 2. Corruption and Income Inequality: Instrumental Variable Estimates
Dependent variable: the Gini Coefficient

Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	30.00 ***	34.90 ***	31.10 ***	29.60 ***	33.40 ***	30.00 ***
	(5.79)	(7.42)	(6.06)	(6.53)	(6.91)	(5.93)
Expenditure dummy	-3.36 *	-2.17	-3.10 *	-3.64 **	-2.87	-3.53 *
	(-1.43)	(-0.85)	(-1.26)	(-1.72)	(-1.15)	(-1.48)
Recipient dummy	1.43	1.65	1.14	1.01	1.35	0.98
	(0.52)	(0.53)	(0.39)	(0.39)	(0.48)	(0.37)
Net income dummy	-6.68 ***	-6.91 ***	-6.62 ***	-7.42 ***	-7.84 ***	-7.42 ***
	(-3.36)	(-3.31)	(-3.36)	(-4.32)	(-4.53)	(-4.36)
Natural resource abundance	39.40 ***	36.30 ***	38.40 ***	28.70 **	25.50 **	28.80 **
	(2.88)	(2.69)	(2.92)	(2.18)	(1.99)	(2.21)
Capital stock-GDP ratio	0.05 ***	0.04 **	0.05 **	0.05 ***	0.05 **	0.05 **
	(2.69)	(1.72)	(2.22)	(2.83)	(1.91)	(2.30)
Education inequality	1.95 **		1.72 **	1.53 **		1.48 *
	(1.88)		(1.68)	(1.55)		(1.40)
Secondary schooling		-1.62*	-0.66		-0.93	-0.20
		(1.31)	(-0.59)		(-0.62)	(-0.14)
Initial Gini coefficient for land	0.09 **	0.12 **	0.11 **	0.12 **	0.13 **	0.12 **
	(1.68)	(1.72)	(1.64)	(2.04)	(1.95)	(1.93)
Real per capita GDP ($x10^2$)				-0.07 **	-0.07 **	-0.06 *
				(-1.73)	(-1.70)	(-1.47)
Corruption	2.13 ***	1.93 ***	1.96 ***	0.99	0.94	1.01
	(3.82)	(2.67)	(3.00)	(1.12)	(1.03)	(1.15)
Adjusted generalized R^2	0.69	0.67	0.70	0.75	0.73	0.74
Number of observations	38	38	38	37	38	37
P-value for Sargan's misspecification test	0.46	0.75	0.52	0.74	0.97	0.74

Notes: Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. The adjusted generalized R^2 is the measure of adjusted R^2 for regressions estimated by instrumental variable technique; see Pesaran and Smith (1994). Sargan's misspecification test is a test of validity of instruments. The instruments are fraction of a country's population that speaks English at home, distance of a country from the equator, and an index of ethnolinguistic diversity. Social spending is sum of spending on education, health, social security, welfare, housing and community amenities. A high value of the corruption index indicates a low level of corruption.

*** Significant at 1 percent level; ** significant at 5 percent level; and * significant at 10 percent level.

Table 3. Corruption and Poverty: OLS Estimates
(Dependent variable: income growth of the bottom 20 percent)

Independent Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.02 (1.00)	0.03 (1.94)	0.08 (3.14)	0.05 1/ (0.27)	0.04 2/ (0.89) 2/
Natural resource abundance	-0.14 * (-1.60)	-0.12 * (-1.48)	-0.14 * (-1.61)	-0.15 * (-1.61)	-0.13 * (-1.34)
Initial income of the bottom 20 percent ($x10^3$)	-0.05 ** (-1.72)	-0.06 ** (-1.87)	-0.06 ** (-1.95)	-0.10 *** (-2.77)	-0.09 *** (-2.35)
Initial secondary schooling	0.02 * (1.50)	0.01 * (1.15)	0.02 * (1.60)	0.02 * (1.42)	0.02 * (1.52)
Education inequality (x10)		-0.08 *** (-2.94)			0.02 * (1.37)
Initial Gini coefficient for land ($x10^2$)			-0.09 ** (-2.02)		-0.04 (-0.74)
Social spending (x 10)				0.03 *** (2.69)	0.04 ** (2.39)
Growth in corruption	-0.01 * (-1.41)	-0.02 ** (-2.22)	-0.06 1/ (-0.50)	-0.02 *** (-2.65)	-0.02 ** (-2.06)
Adjusted R^2	0.11	0.17	0.16	0.33	0.28
Number of observations	42	42	38	35	31
F-statistic	2.32 *	2.70 **	2.41 *	4.30 ***	2.69 **

Notes: Estimation is by OLS. Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Corruption 1 is the corruption index used. Social spending is sum of spending on education, health, social security, welfare, housing and community amenities. The corruption index is multiplied by -1 so that a high value of growth in the index indicates a high growth rate of corruption.

1/ Multiplied by 10.
2/ Multiplied by 100.

*** Significant at 1 percent level; ** significant at 5 percent level; and * significant at 10 percent level.

poor, with the coefficient being significant in four regressions at the conventional statistical levels. The estimated coefficient on the corruption index is most significant (at the 1 percent level) when the regression includes social spending (Column 4). The latter regression also has a better fit than the regression reported previously when aggregate growth was the only regressor. The results also show that the impact of corruption on poverty is quantitatively important. A one-standard deviation increase in the growth rate of corruption (a deterioration of 0.78 percentage points) is associated with a decline in income growth of the bottom 20 percent of the population of 1.6 percentage points per year (Table 3, Column 4). A partial scatter plot based on regression in Column 4 is displayed in Figure 2.

The results also show that countries in which income of the poor has grown faster are those that tend to have fewer natural resources, and have started with lower levels of income and higher average schooling. Income growth of the poor is also higher with lower education inequality, lower initial Gini coefficient for land, and higher social spending (Columns 2, 3, and 4). When the latter three variables are entered simultaneously (Column 5), all variables continue to be statistically significant at the conventional levels, except for education inequality (which changes sign) and the initial Gini coefficient for land (which is no longer significant).[22]

E. Corruption and Poverty: Which Way is the Causality?

The above regression results establish the existence of a statistically significant *positive association* between corruption and poverty. However, high poverty can cause high corruption or the observed association between the two variables can be due to other factors. As in the previous analysis of corruption and income inequality, an instrumental variable estimation technique is used to address these issues.[23]

The results are shown in Table 4. The corruption index has the same sign as the OLS results of Table 3 and is significant at the conventional statistical levels. The estimated coefficients on the corruption index are higher than their OLS estimates. The results also provide evidence that the chosen instruments are valid at the conventional statistical levels. In sum, the evidence shows that corruption increases poverty.

The impact of corruption on poverty is quantitatively important. A one-standard deviation increase in the growth rate of corruption (a deterioration of 0.78 percentage points) reduces income growth of the bottom 20 percent of the population by 7.8 percentage points per year (Table 4, Column 4).

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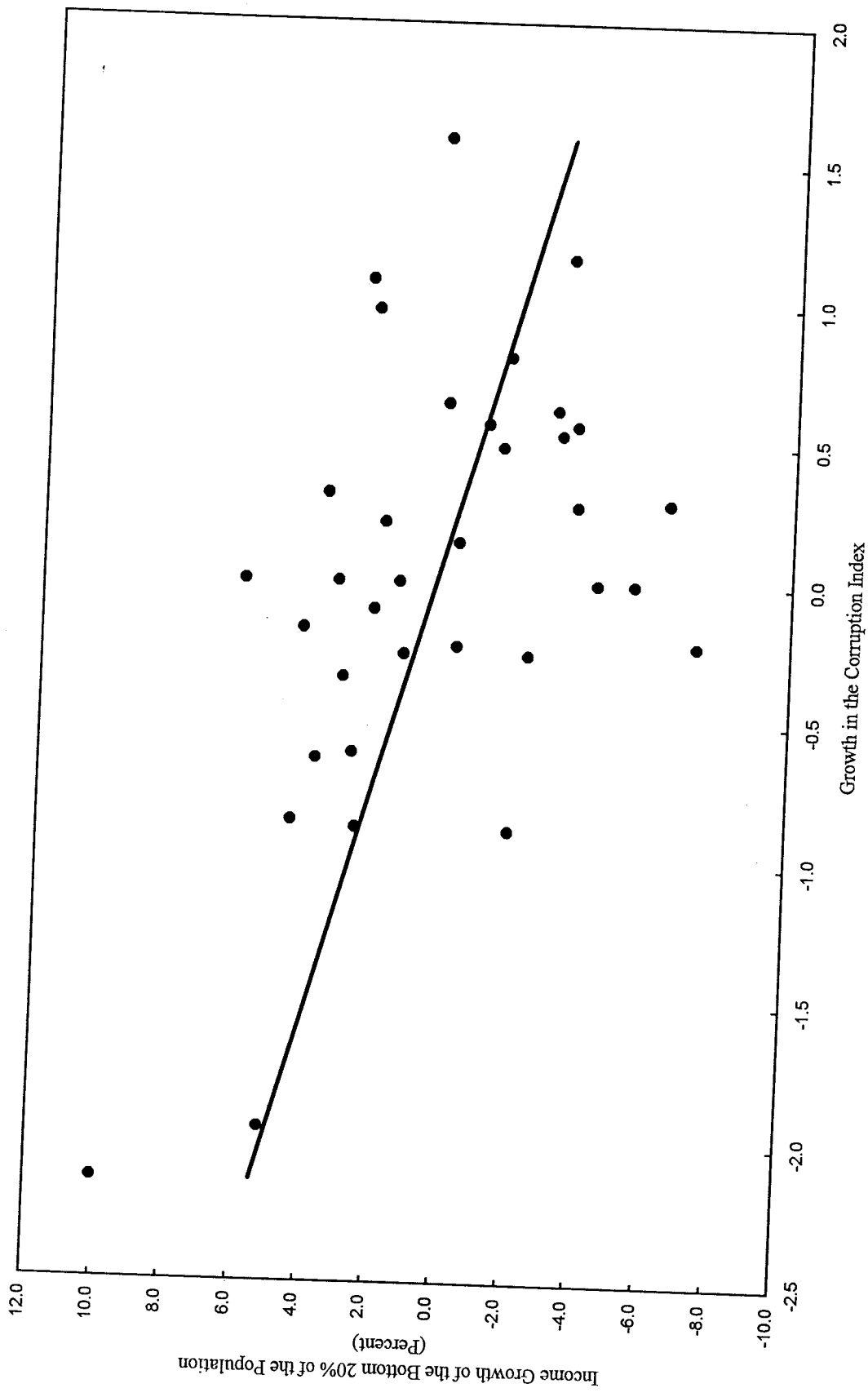
[22]When these two variables are dropped, the adjusted R-squared increases as does the significance of the remaining variables. This regression is given in Column 4.

[23]The technique uses the same instruments as the income inequality regression.

Figure 2. Corruption and Income Growth of the Poor



The figure is based on the regression in Table 4, Column 4. A higher growth in the corruption index means the country has a higher growth rate of corruption.

Table 4. Corruption and Poverty: Instrumental Variable Estimates
(Dependent variable: income growth of the bottom 20 percent)

Independent Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.92 1/	0.02	0.08 *	-0.04	-0.10
	(0.48)	(0.77)	(1.59)	(-1.10)	(-0.99)
Natural resource abundance	-0.13 *	-0.10	-0.13 *	-0.18 **	-0.12 *
	(-1.48)	(-1.01)	(-1.65)	(-1.70)	(-1.38)
Initial income of the bottom 20 percent ($x10^4$)	-0.48 **	-0.54 *	-0.60 **	-0.11 ** 2/	-0.77
	(-1.79)	(-1.50)	(-1.91)	(-2.42)	(-2.08) **
Initial secondary schooling	0.02 *	0.02 *	0.02 **	0.03 **	0.02 **
	(1.61)	(1.58)	(1.79)	(2.04)	(2.06)
Education inequality		-0.02 **			0.02 *
		(-1.73)			(1.63)
Initial Gini coefficient for land ($x10^3$)			-0.99 *		0.55
			(-1.47)		(0.57)
Social spending ($x\ 10^2$) ***				0.54 **	0.46
				(2.34)	(2.51)
Growth in corruption	-0.02	-0.08	-0.25 1/	-0.10 **	-0.06 **
	(-0.72)	(-1.16)	(-0.10)	(-2.21)	(-1.85)
Adjusted generalized R^2	0.05	0.07	0.13	0.30	0.35
Number of observations	41	41	37	35	31
P-value for Sargan's misspecification test	0.39	0.74	0.91	0.73	0.28

Notes: Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. The adjusted generalized R^2 is the measure of adjusted R^2 for regressions estimated by instrumental variable technique; see Pesaran and Smith (1994). Sargan's misspecification test is a test of validity of instruments. The instruments are fraction of a country's population that speaks English at home, distance of a country from the equator, and an index of ethnolinguistic diversity. The corruption index is multiplied by -1 so that a high value of growth in the index indicates a high growth rate of corruption.

1/ Multiplied by 100.
2/ Multiplied by 1000.

*** Significant at 1 percent level; ** significant at 5 percent level; and * significant at 10 percent level.

V. How Does Corruption Affect Income Inequality and Poverty?

The regressions in the previous sections have shown that factor endowments, ownership structure of factors of production and corruption, among others, affect both income inequality and poverty. This could be labeled as the direct impact of corruption on income inequality and poverty. However, as argued previously, corruption may also affect poverty and income distribution indirectly through its impact on variables such as factor endowments and factor ownership.

A. Relationship Between Corruption, Factor Endowments, and Factor Ownership

At the outset, each of the five variables representing factor endowments and factor ownership are regressed on a constant and a corruption index. To control for the stage of economic development, real per capita GDP is added to each regression to verify if the simple correlation changes sign or significance.[24]

The results are shown in Table 5. The correlations show that countries with higher corruption tend to have abundant natural resources, higher education inequality, lower mean years of secondary schooling, and more unequal land distribution. Of the five correlations, corruption is statistically significant at the 1 percent level in two regressions (education inequality and secondary schooling); at the 5 percent level in one regression (natural resource abundance); and at the 10 percent level in another (initial Gini coefficient for land). There is no systematic correlation between corruption and the ratio of capital stock to GDP.[25] Once the impact of real per capita GDP is controlled, corruption continues to have the same sign as before in three of the five regressions (education inequality, secondary schooling, and initial Gini coefficient for land); but at a lower level of statistical significance (10 percent) in two regressions (education inequality and initial Gini coefficient for land).

Although not all the correlations survive after controlling for real per capita GDP, the data are consistent with the view that corruption tends to increase inequality in the structure of factor ownership (that is, education inequality and initial Gini coefficient for land). The results in the previous sections showed that higher education inequality and higher land inequality increase income inequality (Tables 1 and 2) and reduce income growth of the poor (Tables 3 and 4). The results of this section show that corruption not only increases income inequality and poverty directly, it also affects these variables indirectly through higher inequality in education and land distribution.

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[24]These regressions should not be viewed as structural models of factor endowments and factor ownership. Such an analysis goes beyond the scope of this paper.

[25]Lack of a correlation here does not mean there is no correlation between corruption and the investment-to-GDP ratio. See Mauro (1995 and 1997).

Table 5. Relationship Between Corruption, Factor Endowments, and Factor Ownership

Dependent Variable	Constant	Corruption	Real Per Capita GDP in 1980	Adjusted R^2	N	F-Statistic
Capital stock-GDP ratio	270.00 ***	-4.43		0.05 1/	62	1.32
	(10.90)	(-1.21)				
Capital stock-GDP ratio	274.00 ***	1.12	0.30 1/	0.63 3/	61	1.02
	(11.2)	(0.21)	(1.14)			
Natural resource abundance	0.16 ***	0.96 ** 1/		0.05	59	4.10 ***
	(5.86)	(2.29)				
Natural resource abundance	0.15 ***	-0.18 1/	-0.63 2/	0.06	58	2.88 *
	(5.57)	(-0.25)	(-1.71)			
Education inequality	3.44 ***	0.44 ***		0.18	66	15.80 ***
	(4.25)	(3.70)				
Education inequality	3.80 ***	0.16 *	-0.17 *** 3/	0.21	64	9.41 ***
	(4.41)	(1.65)	(-2.48)			
Secondary schooling	0.41 **	-0.25 ***		0.34	66	43.70 ***
	(2.13)	(-5.55)				
Secondary schooling	0.52 ***	-0.05	0.13 *** 3/	0.57	64	43.00 ***
	(3.15)	(-0.72)	(3.65)			
Gini coefficient for land	68.60 ***	1.14 *		0.01	55	1.73
	(14.10)	(1.38)				
Gini coefficient for land	70.00 ***	2.56 **	0.80 3/	0.01	53	1.37
	(14.00)	(1.62)	(1.18)			

Notes: Estimation is by OLS. Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. The Gini coefficient for land refers to the average over the 1980-95 period. N is the number of observations. The corruption index used in this table corresponds to "Corruption 5" in the Appendix II, Table 9. It has been multiplied by -1 so that a high value of the index indicates a high level of corruption.

1/ Multiplied by 100.
2/ Multiplied by 100,000.
3/ Multiplied by 1,000.

*** Significant at 1 percent level; ** significant at 5 percent level; and * significant at 10 percent level.

B. Relationship Between Corruption and Social Spending

The discussion in Section II of this paper underscores the role of social spending in alleviating poverty and reducing income inequality and how corruption can affect these variables through social spending. To determine whether the data support this indirect channel, social spending is regressed on a constant and a corruption index. As in the analysis contained in the previous section, real per capita GDP is added to control for the stage of economic development.[26]

The results are shown in Table 6 for three measures of social spending. The correlations show that countries with higher corruption tend to have lower levels of social spending. Of the three simple correlations, two are statistically significant at the 1 percent level (social security and welfare, and total social spending), and one at the 5 percent level (education and health spending). Corruption is statistically significant at the 10 percent level (social security and welfare, education and health spending) and 5 percent level (total social spending) when the impact of real per capita GDP is controlled for.

The data are consistent, therefore, with the view that corruption reduces social spending whether or not real per capita GDP is held constant. The results in the previous section showed that higher social spending increases the income growth of the poor (Tables 3 and 4). Together these results show that corruption not only reduces income growth of the poor directly, but also indirectly through lower social spending.

C. Impact of Corruption on Growth

It was argued previously that corruption can perpetuate poverty by reducing growth. To test this hypothesis, the real per capita GDP growth rate is regressed on the same set of variables as the income growth of the bottom 20 percent of population.[27] As noted earlier, higher growth is found to increase the rate of poverty alleviation. The results in Table 7 show that corruption reduces the overall growth rate of the economy. Together, these results indicate that corruption leads to higher poverty by reducing economic growth.[28]

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[26]Mauro (1997) provides similar evidence.

[27]Using a different set of regressors, Mauro (1995) provided the first evidence on the negative impact of corruption on growth.

[28]The results are similar when the same corruption index as in Table 3 is used or when a Mauro-type (Mauro, 1995) specification for the growth regression is tried. Under the latter specification, determinants of growth are initial income, a measure of schooling, population growth rate, investment-to-GDP ratio, and corruption.

Table 6. Relationship Between Corruption and Social Spending

Dependent Variable	Constant	Corruption	Real Per Capita GDP in 1980	Adjusted R^2	N	F-Statistic
Social security and welfare spending	-1.85 ** (-1.71)	-1.82 *** (-7.50)		0.45	61	50.30 ***
Social security and welfare spending	-1.18 (-1.10)	-0.82 * (-1.61)	0.59 ** 1/ (2.02)	0.50	59	30.30 ***
Education and health spending	3.88 *** (4.95)	-0.34 ** (-2.20)		0.07	63	5.60 ***
Education and health spending	3.71 *** (4.57)	-0.45 * (-1.61)	-0.62 2/ (-0.44)	0.06	61	2.99 *
Social spending	2.73 ** (1.74)	-2.19 *** (-6.59)		0.42	60	44.5 ***
Social spending	3.24 ** (2.06)	-1.32 ** (-1.98)	0.52 * 1/ (1.35)	0.45	58	24.5 ***

Notes: Estimation is by OLS. Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. All components pf social spending data are expressed as fractions of GDP. Social spending is sum of spending on education, health, social security, welfare, and housing and community amenities. N is the number of observations. The corruption index used in this table corresponds to "Corruption 5" in the Appendix II, Table 9. It has been multiplied by -1 so that a high value of the index indicates a high level of corruption.

1/ Multiplied by 1,000.
2/ Multiplied by 10,000.

***Significant at 1 percent level; **significant at 5 percent level; and *significant at 10 percent level.

Table 7. Corruption and Growth
(Dependent variable: real per capita GDP growth)

Independent Variable	(1)	(2)	(3)	(4)	(5)
Constant	1.87 ***	1.78 **	5.32 ***	2.06 **	5.12 **
	(2.59)	(1.85)	(4.05)	(2.25)	(2.06)
Natural resource abundance	-11.10 ***	-11.10 ***	-2.10	-11.10 ***	-2.24
	(-3.19)	(-3.19)	(-0.55)	(-2.69)	(-0.46)
Initial real per capita GDP ($x10^3$)	-0.30 ***	-0.29 ***	-0.16 **	-0.24 **	-0.14
	(-2.85)	(-2.75)	(-2.15)	(-1.88)	(-1.35)
Initial secondary schooling	0.43	0.45	0.53*	0.11	0.11
	(1.19)	(1.25)	(1.67)	(0.26)	(0.34)
Education inequality		0.03			-0.26
		(0.14)			(-0.55)
Initial Gini coefficient for land			-0.06 ***		-0.05 **
			(-3.58)		(-2.33)
Social spending				-0.03	-0.01
				(-0.70)	(-0.27)
Corruption	-0.47 ***	-0.47 ***	-0.12	-0.53 ***	-0.16
	(-3.83)	(-3.87)	(-0.96)	(-3.30)	(-1.11)
Adjusted R^2	0.28	0.27	0.27	0.26	0.09
Number of observations	56	56	47	46	38
F-Statistic	6.35 ***	4.99 ***	4.46 ***	4.11 ***	1.53

Notes: Estimation is by OLS. Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Social spending is sum of spending on education, health, social security and welfare, and housing and community amenities. The corruption index used in this table corresponds to "Corruption 5" in the Appendix II, Table 9. It has been multiplied by -1 so that a high value of the index indicates a high level of corruption.

*** Significant at 1 percent level; ** significant at 5 percent level; and * significant at 10 percent level.

D. Corruption and Progressivity of Taxes

Does corruption increase income inequality by reducing the progressivity of the tax system? To answer this question, the net income dummy is dropped from the Gini regression (Table 1, Column 1) and an interaction term between this dummy and the corruption index is added to the same regression. The coefficient on the interaction variable (0.66) has a t-statistic of 2.39, which is statistically significant at 5 percent level.[29] This finding indicates that the impact of corruption on income inequality depends on whether income is measured before or after tax. More important, the positive coefficient on the interaction term shows that the impact of corruption on income inequality is higher when using the after-tax measure of inequality, suggesting that corruption increases income inequality by reducing the progressivity of the tax system.

VI. Conclusions and Policy Implications

Corruption interferes with the traditional core functions of government: allocation of resources, stabilization of the economy, and redistribution of income. These functions influence income distribution and poverty in varying degrees, both directly and indirectly.

The budget is the principal vehicle through which any government conducts its core functions. The empirical evidence presented in this paper shows that corruption has significant distributional consequences by affecting both budgetary revenues and expenditures. High and rising corruption increases income inequality and poverty by reducing economic growth, the progressivity of the tax system, the level and effectiveness of social spending, and the formation of human capital. Corruption also increases income inequality and poverty by perpetuating an unequal distribution of asset ownership and unequal access to education. These findings are valid for countries at different stages of economic development, with different growth experiences, and using various indices of corruption. These results hold even when controlling for other factors that affect income inequality and poverty: (1) natural resource endowment; (2) capital productivity; (3) educational attainment; (4) unequal access to education; and (5) distribution of land.

The impact of corruption on income inequality and poverty is considerable. A worsening in the corruption index of a country by one standard deviation (2.52 points on a scale of 0 to 10) increases the Gini coefficient by 5.4 points. A one-standard deviation increase in the growth rate of corruption (a deterioration of 0.78 percentage points) reduces income growth of the poor by 7.8 percentage points per year.

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[29]All the other variables continue to have the same sign and significance as in Table 1, Column 1. The interaction term is also significant and positive in other formulations of Table 1. A high value of the index indicates a high level of corruption.

This paper's findings suggest that the adverse distributional consequences of corruption can be mitigated by: (1) sound management of natural resources; (2) broad-based, labor-intensive growth; (3) efficient spending on education and health; (4) effective targeting of social programs; and (5) a low level of inequality in the access to education.

A central message of this paper is that corruption has significant distributional implications and, given its negative efficiency implications, should be considered harmful to both growth and equity. Therefore, policies that reduce corruption will also reduce income inequality and poverty.

The Gini coefficient and quintile income shares

Data on the Gini coefficient and quintile income shares are taken from Deininger and Squire's (1996) "high quality" data set. This data set includes observations on the Gini coefficient that fulfill three key requirements for reliability: they must be based on household survey data, the survey coverage must be national, and the surveys must include all income sources.

Natural resource endowment

The proxy for natural resource endowment is the share of natural resource exports in total exports in 1970 (Sachs and Warner, 1997).

Physical capital endowment

The physical capital endowment is the average ratio of the stock of physical capital to GDP, both measured in constant 1987 prices in local currency, between 1980 and 1990 (Nehru and Dhareshwar, 1993).

Human capital endowment

The proxy for human capital endowment is the average years of secondary education in the population aged 15 and over between 1980 and 1995 (Barro and Lee, 1996).

Land distribution

The proxy for the distribution of land is the Gini coefficient for land (circa 1980). It is based on the land rental market and was used by Deininger and Squire (1996).[30]

Education inequality

Education inequality is proxied by the 1980–95 average ratio of the percent of population, aged 15 and over, with no schooling expressed as a fraction of percent of population, aged 15 and over, with completed secondary and higher education (Barro and Lee, 1996).

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[30]Klaus Deininger kindly provided the data.

Corruption

Six indices of corruption are used. The first (Corruption 1) is from the *International Country Risk Guide (ICRG)* and the Business International (*BI*) (as used by Tanzi and Davoodi, 1997), averaged between 1980 and 1995. The ICRG index reflects the assessment of foreign investors on the degree of corruption in an economy. Investors are asked whether high government officials are likely to demand special payments and whether illegal payments are generally expected throughout lower levels of government as bribes connected with import and export licenses, exchange controls, tax assessment, police protection, or loans. The ICRG index has been rescaled and spliced with the BI index so that the combined index ranges from 0 (most corrupt) to 10 (least corrupt).

Proxies two through six are the *Transparency International* corruption perception indices for 1995 (Corruption 2), 1996 (Corruption 3), 1997 (Corruption 4), an expanded 1997 index (Corruption 5), and a historical corruption index averaged over the 1988–92 period (Corruption 6). The expanded 1997 corruption index was constructed by Johann Lambsdorff (forthcoming) by applying the same technique as *Transparency International,* but includes countries for which a minimum of two survey sources were available. The rationale for their exclusion from the *Transparency International* index (Corruption 4) was the requirement of a minimum of four survey sources on every country to enhance the reliability of the data. By enlarging the number of observations available (from 52 to 101), however, the expanded 1997 corruption perception index compensates for the increased margin of error incurred by using data based on fewer surveys.

Real per capita GDP

The data on nominal purchasing power parity per capita GDP denominated in U.S. dollars have been converted to real data using the U.S. GDP deflator (International Monetary Fund, *World Economic Outlook,* 1997).

Social spending

Three measures of social spending are used; these are government spending on: (1) social security and welfare, (2) education and health, and (3) the sum of spending items (1) and (2) plus housing and community amenities. These data have been expressed as fractions of GDP, both in local currency, and are from the same source (International Monetary Fund, *Government Finance Statistics,* 1997).

English language

The proxy for English language is fraction of a country's population that speaks English at home (Hall and Jones, forthcoming).

Latitude

Latitude is a country's distance from the equator (Hall and Jones, forthcoming). This variable is measured as the absolute value of latitude in degrees divided by 90 to place it on a 0-to-1 scale.

Ethnicity

The proxy for ethnicity is an index of ethnolinguistic fractionalization for 1960 (Taylor and Hudson, 1972). It measures the probability that two randomly selected persons from a given country will not belong to the same ethnolinguistic group.

Table 8. Corruption Indices

	Correlation Coefficients						Number of Observ-ations	Mean	Median	Minimum	Maximum	Standard Deviation
	Corruption 1	Corruption 2	Corruption 3	Corruption 4	Corruption 5	Corruption 6						
Corruption 1	1.00 *** (87)						87	6.09	5.83	1.64	10	2.17
Corruption 2	0.88 *** (38)	1.00 (38)					38	5.84	5.59	1.94	9.55	2.6
Corruption 3	0.90 *** (49)	0.98 *** (38)	1.00 (50)				50	5.23	5	0.69	9.43	2.6
Corruption 4	0.91 *** (46)	0.95 *** (38)	0.97 *** (43)	1.00 (47)			47	5.61	5.2	1.76	9.94	2.54
Corruption 5	0.89 *** (72)	0.95 *** (38)	0.97 *** (50)	1.00 *** (47)	1.00 (77)		77	4.64	3.87	1.67	9.94	2.41
Corruption 6	0.97 *** (49)	0.94 *** (38)	0.95 *** (50)	0.95 *** (43)	0.94 *** (50)	1.00 (50)	50	5.11	5.12	0	9.3	2.73

Sources: See Appendix I.

Notes: Number of observations for each correlation coefficient is given in parenthesis.

*** Significant at 1 percent level; ** significant at 5 percent level; and * significant at 10 percent level.

Table 9. Impact of Various Corruption Indices on the Gini Coefficient

Specification	Estimated Coefficient and Associated T-Statistic	Corruption 1	Corruption 2	Corruption 3	Corruption 4	Corruption 5	Corruption 6
(1)	Coefficient	0.90 *	2.23 ***	2.23 ***	2.27 ***	1.74 ***	2.12 ***
	(T-statistic)	(1.46)	(3.19)	(3.14)	(3.13)	(3.01)	(3.50)
(2)	Coefficient	0.52	2.33 ***	2.17 ***	2.35 ***	1.72 ***	2.05 ***
	(T-statistic)	(0.86)	(2.87)	(2.86)	(3.52)	(2.74)	(2.48)
(3)	Coefficient	0.28	2.18 **	2.03 **	2.17 ***	1.53 ***	1.89 **
	(T-statistic)	(0.48)	(2.41)	(2.38)	(2.73)	(2.61)	(1.96)
(4)	Coefficient	-0.53	1.22 **	1.12 *	1.29 **	0.93 *	0.92
	(T-statistic)	(-0.67)	(1.91)	(1.56)	(2.07)	(1.49)	(0.91)
(5)	Coefficient	-0.05	1.41 **	1.21 **	1.41 ***	1.00 *	0.95
	(T-statistic)	(-0.07)	(2.04)	(1.60)	(2.60)	(1.43)	(0.90)
(6)	Coefficient	-0.41	1.43 **	1.36 **	1.48 ***	0.92 *	1.03
	(T-statistic)	(-0.57)	(2.03)	(1.72)	(2.50)	(1.41)	(0.94)

Sources: See Appendix I.

Notes: Estimation is by OLS and includes the same regressors as Table 1. The t-statistics are based on White heteroscedasticity-consistent standard errors. Specifications 1 through 6 are the same as in Table 1. Each corruption index is multiplied by -1 so that a high value of the index indicates a high level of corruption. The adjusted R^2 ranges from 0.76 to 0.54, and the number of observations ranges from 44 to 27. The F-statistics range from 13.8 to 7.19, which are significant at the 1 percent level.

*** Significant at 1 percent level; ** significant at 5 percent level; and * significant at 10 percent level.

Table 10. Corruption, Poverty and Growth
(Dependent variable: income growth of the bottom 20 percent)

Independent Variable	(1)	(2)	(3)	(4)	(5)
Constant	0.02	0.03 **	0.05 **	0.001	-0.002
	(0.77)	(1.95)	(1.87)	(0.08)	(-0.05)
Aggregate growth ($x10^2$)	0.38	0.41	0.63 *	0.41 *	0.72 *
	(1.64)	(1.05)	(1.23)	(1.46)	(1.61)
Natural resource abundance	-0.14 **	-0.12 **	-0.17 **	-0.15 **	-0.18 **
	(-2.00)	(-1.71)	(-1.67)	(-2.21)	(-1.81)
Initial income of the bottom 20 percent ($x10^2$)	-0.03	-0.03	-0.03	-0.07 **	-0.06 *
	(-1.54)	(-0.93)	(-1.10)	(-1.11)	(-1.97)
Initial secondary schooling ($x10^2$)	0.77	0.23	0.69	0.68	0.71
	(0.76)	(0.89)	(0.29)	(0.85)	(0.78)
Education inequality (x10)		-0.09 ***			0.05
		(-3.66)			(0.63)
Initial Gini coefficient for land ($x10^2$)			-0.06 *		-0.01
			(-1.38)		(-0.23)
Social spending (x10)				0.03 ***	0.03 **
				(2.46)	(1.89)
Growth in corruption	-0.01 *	-0.02 **	-0.005	-0.02 ***	-0.02 ***
	(-1.34)	(-2.34)	(-0.50)	(-2.94)	(-2.53)
Adjusted R^2	0.08	0.18	0.16	0.34	0.33
Number of observations	41	41	37	34	30
F-Statistic	1.66	2.49 **	2.17 **	3.84 ***	2.80 **

Sources: See Appendix I.

Notes: Estimation is by OLS. Numbers in parentheses are t-statistics based on White heteroscedasticity-consistent standard errors. Social spending is sum of spending on education, health, social security, welfare, and housing and community amenities. Corruption 1 is the corruption index used. It has been multiplied by -1 so that a high value of growth in the index indicates a higher growth rate of corruption.

*** Significant at 1 percent level; ** significant at 5 percent level; and * significant at 10 percent level.

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