

CORRUPTION AND COMPETITION IN BUREAUCRACY: A Cross-Country Analysis

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Abstract. This study proposes a cross-country analysis of the relationship between corruption and bureaucratic competition. The results suggest that in addition to government regulations, bureaucratic competition is an important determinant of corruption after controlling level of education, democracy, level of information and income distribution. Government policies that reduce the dependence on corrupt officials by setting up multiple offices for their services such as police stations, passport offices and public utilities reduce corruption.

Key words. Corruption, Losers' perspective, Countervailing actions, Bureaucratic competition, Democracy, Sensitivity analysis.

I. INTRODUCTION

A corrupt transaction always creates winners and losers from the deal. The theoretical literature on causes of corruption looks at corruption from the winners' perspective: it emphasizes that variations in corruption are a function of the size of government, the extent of economic distortions and the internal structure of bureaucracies.¹ Some writers have also suggested that low/declining government real wages are an independent factor exacerbating corruption. Empirical studies have now been followed up by a cross-country estimation of the determinants of corruption.

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¹See Alam (1989), Shliefer and Vishney (1993), Ades and Di Tella (1996), Tanzi (1994, 1998) and Lambsdorff (1999).

In a departure from the existing theoretical literature on the determinants of corruption, Alam (1995) has proposed a theory of countervailing actions that incorporates the losers' perspective in the analysis of causes of corruption. The theory of countervailing actions explains corruption differentials in terms of differences in the ability to realize potential gains from corruption.

Systematic empirical analysis on the causes of corruption from the losers' perspective for a cross-section of countries has just begun to appear. Recently, Brunetti and Weder (1998), Fisman and Gatti (1999), Husted (1999), Paldam (1999) and Treisman (2000) have tested the theory of countervailing actions. However, because of the paucity of data on the measure of bureaucratic competition, these studies did not test the relationship between bureaucratic competition and corruption. The impact of bureaucratic competition on corruption has been emphasized in Rose-Ackerman (1978) and Alam (1995) who argue that if applicants are given the opportunity to avoid corrupt bureaucrats by reapplying to other departments, honest bureaucrats could eliminate bribes altogether. The main purpose of this study, therefore, is to test the relationship between bureaucratic competition and corruption.

The study is organized as follows. Section II reviews the theoretical and empirical literature. Section III describes the data and its sources. Section IV explains the methodology of this empirical investigation. Section V presents the empirical results and last section summarizes the empirical results.

II. REVIEW OF LITERATURE

A Theoretical Approach

Until recently, the theoretical literature analyzes the determinants of corruption only from the winners' point of view. Alam (1995) develops a theoretical model that incorporates the losers' perspective in the analysis of causes of corruption. The theoretical work on the causes of corruption from the winners' perspective has identified several factors. These factors encompass measures of government interventions (or government regulations), public sector wages, system of recruitment and promotion and size of the bureaucracy.

Rose-Ackerman (1978), Shliefer and Vishny (1993), Ades and Di Tella (1996) and others have recognized market competition as a possible deterrent to corruption. The argument that competition in the market place dampens corruption is as follows. In perfect competition, the profits of the firms are

zero because each firm operates where price equals marginal cost. The firms have no incentive to offer bribes for protection because the additional profit due to protection will soon be dissipated among new entrants. On the other hand, if a firm is enjoying monopoly power and reaping abnormal profits, the firm has incentives to keep this monopoly power intact and, thus, it is willing to offer bribes to protect its monopoly.

Kiser and Tong (1992) have employed a principal/agent framework to show that an increase in wages had a deterrence effect on corruption at lower levels of bureaucracy in late imperial China. This is because the opportunity cost of getting caught and punished in terms of loss of wages is high which in turn deters corruption among public officials. They argue that the variation in the ability of the principal to carefully monitor agents' actions actually determines corruption. Ul-Haque and Sahay (1995) later theoretically demonstrated that low government wages lead to a decline in productivity of public officials and a rise in corruption. They find that, under imperfect information, firms are more likely to bribe tax collectors to reduce their taxes. Tanzi (1998), on the other hand, criticizes the effectiveness of public sector wages in controlling corruption by arguing that high public sector wages might not always deter corrupt officials because "corruption due to greed" cannot be mitigated by merely increasing wages.

Contrary to the established theoretical literature, Alam (1995) contends that variations in most corrupt activities can be explained by the differences in people's ability to counteract corruption. This requires examining countervailing actions that losers can take to resist losses. Countervailing actions may take three forms: (i) evasive countervailing actions, (ii) direct countervailing actions and (iii) illicit countervailing actions.

Evasive countervailing actions seek to reduce dependence on corrupt officials and to reduce their potential gains from corruption. These actions include seeking another official who is not corrupt, substituting for goods and services that are available from the private sector, or finding alternative permission in another department, or going to another branch office where the same service can be delivered. Direct countervailing actions raise the costs to officials engaging in corruption. A wide range of instruments has been identified such as complains to superiors, protests and boycotts, filing lawsuits and speaking to the media about corrupt officials and corrupt deals. Finally, there are illicit countervailing actions that use one type of corruption as a means of avoiding losses from another type. All three types of actions are possible only if the corruption is visible to the victims.

The ability to engage in countervailing actions is a function of specific and global factors. Specific factors determine the effectiveness of countervailing actions in *specific* corrupt activities in a country. Specific factors encompass: (i) the types of corruption, (ii) the nature of losses from corruption, (iii) the nature of transactions between officials and private agents, (iv) the degree of access to corrupt officials and (v) the characteristics of losers. Alam (1995) has demonstrated how these specific factors explain the variations in corruption in postal services, passport offices, state-owned banks, college admissions, utility departments, irrigation department, the police department and a land consolidation programme. For example, the transaction that takes place in open and across the counter is less conducive to corruption simply because it is difficult to conceal. Purchasing of stamps at the post office or tickets at the railway station fall under this category. While transactions in enclosed spaces or under security such as transactions at airports and immigration offices are less vulnerable to countervailing actions because such transactions can be concealed easily.

Global factors influence the ability of losers to engage in countervailing actions across *most* corrupt activities. These global factors include: (i) the state of human, political and property rights, (ii) an efficient and impartial judiciary, (iii) media competition, (iv) the level and distribution of incomes, (v) the level of education, (vi) decentralization of the government and (vii) urbanization. These global factors are important determinants of corruption across countries and over time. Global factors such as the level of education and the distribution of income increase the ability of losers to engage in direct countervailing actions. Education gives more awareness to the people about their rights and enables them to fight for their rights. Similarly at higher levels of incomes, losers can use their resources to fight corrupt officials.

An inefficient judiciary may weaken the effectiveness of direct countervailing actions against corruption because losers may be reluctant to take corrupt officials to a court. Wei (1998) also emphasizes the critical role of an impartial and independent judiciary in controlling corruption because an effective judiciary increases the probability of being caught and punished and, hence, deters corruption.

Although victims can take evasive countervailing actions in multiple ways, the most common way is to avoid corrupt officials altogether. This notion of evasive countervailing actions is akin to the concept noted by Rose-Ackerman (1978). She analyzed the competitive pressure on a corrupt bureaucracy and argued that if applicants are given the opportunity to avoid

corrupt bureaucrats by reapplying to other departments, honest bureaucrats could eliminate bribes altogether.

Empirical Analysis of Causes of Corruption

The empirical literature on the determinants of corruption for a large sample of countries is still in its early stages. Systematic empirical analysis of the causes of corruption first emerged during late 1980s and early 1990s. Goel and Rich (1989), Meier and Holbrook (1992) and Goel and Michael (1998) have used regression analysis to study the determinants of corruption for the United States. There are several other studies such as those by Wedeman (1997) and Gray and Kaufmann (1998) that are based on investigative reports and present some sort of data analysis. Empirical studies conducted during that period relied heavily on actual data on corruption. For example, Goel and Rich (1989) used the “proportion of all government employees who are convicted of bribery” as a measure of corruption at federal, state and local levels in the United States for the period 1970-1983. Most studies were restricted to only one country. The statistical analysis of corruption for a cross-section of countries was made possible by the availability of corruption indices for a large number of countries.

Serious empirical studies for a large sample of countries on causes of corruption began to emerge during mid-1990s. Studies by Ades and Di Tella (1995a, 1995b, 1997), Rijckeghem and Weder (1997) and Rauch and Evans (2000) have focused exclusively on the winners’ perspective. Recently, Brunetti and Weder (1998), Fisman and Gatti (1999), Husted (1999), Paldam (1999) and Treisman (2000) have attempted to ascertain the role of the losers’ perspective in the determination of corruption for a cross-section of countries.

Ades and Di Tella (1997) have shown that active industrial policies are positively correlated with corruption. These tests were done for a sample of 32 countries for the period of 1989-1992. The authors first tested the effects of these policies on corruption by estimating the following model:

$$\text{CORR} = \beta_0 + \beta_1\text{INDPOL} + \beta_2\text{POL} + \beta_3\text{SECURE} + \beta_4\text{SCHOOL} + \beta_5\text{GDP} + \beta_6\text{OPEN}$$

where CORR are the corruption indices taken from the World Competitiveness Report (WCR) (1989-1992) and Neumann (1994) and his collaborations at *Impulse*, INDPOL are two indices of industrial policy taken from the WCR. A “procurement index” measures the extent to which public procurement is open to foreign bidders and a “fiscal index” measures the

extent to which there is equal fiscal treatment to all enterprises. A political rights index (POL) is employed as a measure of extent of political competition. The index is taken from Gastil (1996) who calculated an index of freedom by indexing political rights for 165 countries. Political rights involve the right of a person to take part in political process freely and without any restrictions. An index on general law enforcement in the country (SECURE) is taken from the WCR. This index measures the extent to which people and property are protected. SCHOOL is the average years of total schooling, GDP is the level of per capita income and OPEN is the total imports in GDP.

Ades and Di Tella (1997) found that active industrial policy induces corruption after controlling for the effects of other variables. A one standard deviation increase in the measure of industrial policy correspondingly increases the corruption index by 11.5%. After calculating the effect of active industrial policy on corruption, they calculated the effect of industrial policy on investment in the presence of corruption by estimating the following model:

$$\text{Investment} = f(\text{Industrial policy, Corruption, Level of education, Government consumption, GDP, Number of revolutions and Coups per year})$$

The coefficient of the measure of industrial policy is positive and significant after controlling for the effects of other variables. This demonstrates that industrial policy and investment are positively and significantly correlated. The negative coefficient of corruption indicates that corruption reduces investment. Thus, the total effect of industrial policy on investment is only slightly above 50% of what it would be if industrial policy did not induce corruption.

Ades and Di Tella (1995a) examined the effects of product market competition on corruption by controlling for the level of development and degree of political competition. They showed that corruption is higher in economies dominated by a small number of firms or where domestic firms are protected by high tariffs. However, Bliss and Di Tella (1997) subsequently argued that market competition reduces corruption only under an impartial judiciary and an honest police force. The corrupt officials can force some firms to exit and induce others to pay bribes for protection of high and abnormal profits.

Ades and Di Tella (1995b) tested the empirical relationship between openness and corruption in the presence of well-developed judicial system

for a sample of 55 countries for the period of 1981-1983. They ran the following regression:

$$\text{CORR} = \beta_0 + \beta_1\text{GDP} + \beta_2\text{SCHOOL} + \beta_3\text{POL} + \beta_4\text{OPEN} + \beta_5\text{JUD} + \beta_6\text{OPENJUD}$$

where CORR is the corruption index taken from Business International, GDP is GDP per capita, SCHOOL is the average years of total schooling, POL is an index of political rights, OPEN is the share of imports in GDP and JUD represents the independence of the judiciary system. The data on the independence of the judiciary system, taken from Business International, are used to create a dummy variable. The value of a dummy variable is one if the index of independence of judiciary system is greater than the mean of the sample and zero if the index is less than its mean. OPENJUD represents the interaction between OPEN and JUD or $\text{OPEN} \times \text{JUD}$. All these variables are the averages of their 1981-1983 observations.

The above model was estimated using the ordinary least square technique. The coefficients of openness and independent judiciary were found negative suggesting that openness and independent judiciary deter corruption. The main objective of the study, however, was to test the significance of the coefficient of interaction term (OPENJUD). The positive sign of the interaction term suggests that the openness or degree of competition is more effective in abating corruption in countries where the judiciary system is not well developed. A one standard deviation increase in openness reduces corruption by 0.38 points if the judiciary system is independent (above the mean), but a one standard deviation increase in openness reduces corruption by 2.09 points if the judiciary system is relatively dependent (below the mean). A similar approach was used in World Development Report (1997: 104 and 168). The study shows that after controlling for other explanatory variables, an index of the predictability of the judiciary significantly influences the level of corruption in 59 countries.

In addition to the positive linear relationship between various measures of government regulations and corruption, Rijkeghem and Weder (1997) have estimated the impact of public-private wage differentials on corruption and found a significant negative relationship between public sector wages and corruption for a sample of 23 countries. Goel and Rich (1989) have found a negative and significant relationship between public sector wages and corruption at federal, state and local levels in the United States. While examining the significance of a system of recruitment and promotion, Rauch and Evans (2000) empirically demonstrated that a merit-based method of

recruitment and promotion of public officials increases the quality of bureaucracy and hence reduces corruption. Studies by Swamy *et al.* (1999) and Treisman (2000) have also investigated the relationship between corruption and average government wage as a multiple of per capita GDP after controlling for a variety of other influences. The results are ambiguous and mostly insignificant, depending on the indicator for corruption employed and the inclusion of control variables.

Although the empirical results on the impact of the size of bureaucracy on corruption are ambiguous, Husted (1999) concludes that there is no relationship between government size — measured as government consumption in total GDP — and corruption. However, LaPalombara (1994) confirms a weak positive relationship between the size of the public sector and corruption for a sample that excludes the Scandinavian countries. Meier and Holbrook (1992) also found a positive relationship between the size of the bureaucracy — measured as the number of government employees per thousand persons — and political corruption in the American States for the period of 1977-1987.

Unlike empirical studies that analyze corruption from the winners' point of view, the theory of countervailing actions that emphasize the positive effects of bureaucratic competition on corruption has been neglected in the empirical literature. However, several authors have analyzed corruption by including various global factors such as press freedom, distribution of income and democracy etc. for a cross-section of countries. Unfortunately, these empirical studies have failed to test the relationship between bureaucratic competition and corruption.

Husted (1999), for example, did not test the impact of global factors on corruption individually. He uses the level of economic development to proxy global factors that were identified by Alam (1995) because these global factors, according to him, are highly correlated with economic development. Nevertheless, Husted (1999) employed a measure of income distribution as a separate factor in his regression model and demonstrated that it does not affect corruption significantly. Like Husted (1999), Fisman and Gatti (1999) neglected several global factors in their analysis. By regressing various measures of corruption on indicators of press freedom, Brunetti and Weder (1998) show that a free press reduces corruption. Laws and regulations that influence media content, political influence over media content, economic influence over media content and repressive actions are used to measure press freedom. These variables are compiled by Freedom House. The four separate indices and an aggregate index of press freedom all impact

negatively on the level of corruption in various specifications. Paldam (1999) tests the relationship between democracy and corruption using Gastil index for democracy. Although the study finds a large value for a correlation coefficient between the two variables, the relationship does not hold in multivariate regressions as soon as GDP per head is included. Consequently, the author argues that the effect of democracy is ambiguous. The similar results were found in Treisman (2000). However, Treisman (2000) also found that the number of years a democracy has been in place is a more important factor than democracy *per se* for determining corruption.

There are several other determinants of corruption that are emphasized in the empirical literature. For example, La Porta *et al.* (1997) show that trust has a negative effect on corruption for a sample of 33 countries after controlling GDP per head. They used trust data from the World Value Service which surveyed 1000 randomly selected people in 40 countries. The question that measures the trust index is as follows: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?" The authors contend that trust can alleviate corruption. The impact of gender on corruption has also been investigated by Swamy *et al.* (1999) and Dollar *et al.* (1999). The authors determine the percentage of women in the labour force and in parliament. Both indicators negatively affect the level of corruption in a cross-section of up to 66 countries. The influence is large in magnitude, highly significant and robust throughout a large variety of regressions, controlling for various variables. These findings suggest that policies designed to increase the role of women may help in lowering the level of corruption.

Leite and Weidmann (1999) argue that abundance of natural resources creates opportunities for rent-seeking behaviour and gives rise to corruption. Exports of fuels and minerals as a share of GNP are used as a measure of natural resources. They find a significant and positive relationship between abundance of natural resources and corruption for a cross-section of 72 countries, controlling for income in 1970. The results appear to be robust for a variety of specifications.

Recently, Treisman (2000) tested the effects of colonialism and religion on corruption. He presented a detailed empirical analysis on the determinants of corruption using corruption indices from Transparency International and Business International. Treisman (2000) introduced two new factors as possible determinants of corruption, colonial heritage and religious affiliation. He finds a strong relationship between religion and corruption. He regresses corruption on the percentage of Protestants in the total population

in a sample of up to 64 countries and obtains a highly significant negative impact of this index on corruption, controlling for other variables such as GDP per head. The same relationship is also tested in La Porta *et al.* (1997, 1999).

Treisman (2000) found that economies with a British colonial heritage have a low level of corruption than other countries after controlling for the level of income per head and various other variables, for example, the existence of a common law legal system.

Although a number of studies propose a cross-country analysis of the determinants of corruption that have incorporated Alam's insights into the causes of corruption, the empirical literature has failed to test the relationship between bureaucratic competition and corruption. The main purpose of this paper is to fill this gap.

III. SOURCES OF CORRUPTION DATA

The empirical analysis of corruption for a large sample of countries has been constrained for almost two decades by lack of data. There are two reasons for this gap. First, it is difficult to define corruption in a way that is valid across countries. A transaction that is considered corrupt in one culture may be regarded as benign in another. Second, corrupt transactions are kept secret because they are illegal, so counting and estimating is hard.

Nevertheless, the empirical analysis of corruption is made possible by the availability of data on indices of corruption that were created mostly for business-related purposes. The two most common characteristics of these corruption indices are that they measure the perception of corruption from the perspective of foreign firms and are aggregate in nature. To overcome these limitations, the World Bank conducted a survey that measures the perception of corruption from domestic and foreign firms' point of view. Moreover, these indices are also available for individual categories such as the police, customs, public health care and the judiciary.

The World Bank data provides measures of corruption from several perspectives. For example, one question asks respondents to rate on a scale of 1 to 6 how corruption is problematic in doing business. The other question asks respondents to rate on a scale of 1 to 6 whether these businesses accept bribes. Still another question asks about the pervasiveness of bribery. The importance of these indices was discussed by Brunetti, Gregory and Beatrice (1997), who argue that foreign firms can avoid corruption more easily than the small domestic firms because politicians and bureaucrats treat the foreign firms differently. Kaufmann and Wei (1999) also found that large firms with

foreign participation spend less time with the government officials to settle transactions. Thus, foreign firms have the advantage over domestic firms in overcoming government regulations.

This study uses four different indices of corruption to test the positive relationship between bureaucratic competition and corruption; three from the World Bank survey and one from the Transparency International. Question # 12n of section III of the questionnaire (survey)² measures total corruption. The question is as follows: "Please judge on a six point scale (1-6) how problematic corruption is for doing business." Question # 14 of section IV of the questionnaire (survey) measures the extent of bribery. The question is as follows: "It is common for firms in my line of business to have to pay some irregular 'additional payments' to get things done. Is this statement true?" Six answers listed afterwards are "always", "mostly", "frequently", "sometimes", "seldom" and "never". Similar to question # 14, question # 16 of the same section measures the extent of unorganized (unpredictability of) bribery. The question is as follows: "Even if a firm has to make an 'additional payment' it always has to fear that it will be asked for more, *e.g.* by another official. Is this statement true?" Six answers "always", "mostly", "frequently", "sometimes", "seldom" and "never" are listed at the end of the question. For each country the replies to the 6 categories are aggregated, yielding categorical data on bribery and unorganized bribery.

After re-scaling all original corruption indices from a 1 (high) to 6 (low) scale to a 1 (low) to 6 (high) scale, I have converted all corruption indices from a 1 (low) to 6 (high) scale to a 0 to 10 scale. An index of 0 means negligible corruption whereas an index of 10 means high corruption. The conversion of the corruption index from 1 to 6 to 0 to 10 makes the analysis more convenient in two ways. First, it is now easier to compare results with the Transparency International Index of corruption, which runs from 0 to 10. Second, it avoids confusion regarding both the positive and negative relationships with other independent variables. Thus, the indices always represent low corruption as 0 and high corruption as 10.

The empirical literature on the effects of the global factors on corruption has not investigated the role of bureaucratic competition in determining the level of corruption. I have included bureaucratic competition along with

²The questionnaire can be downloaded from <http://www.worldbank.org/research/growth/wdr97.htm>.

other global factors to test the positive relationship between bureaucratic competition and corruption. These global factors include bureaucratic competition, urbanization, level of education, level of information, level and distribution of incomes and democracy.

Question # 18 of section IV of the questionnaire measures an index of bureaucratic competition. The question is as follows: "If a government agent acts against the rules I can usually go to another official or to his superior and get the correct treatment." Six answers listed afterwards are "always", "mostly", "frequently", "sometimes", "seldom" and "never". For each country the replies to the 6 categories are aggregated, yielding categorical data on competition within bureaucracy. The index ranges from 1 (impossible to avoid corrupt official) to 6 (always possible to avoid corrupt officials). For maintaining consistency I have also converted the index from 1-6 scale to a 0-10 scale. Data on urbanization are taken from World Development Indicators that are available for more than 100 countries for 1996. Urbanization is defined as the share of urban population in the total population. The level of education is measured as average years of schooling at age 15 and above in the total population. The data are drawn from Barro and Lee (1993, 1996) and are available for 98 countries for 1990. Data on newspaper circulation per 1000 persons as a measure of level of information are taken from the World Development Report (WDR) for 1994. An appropriate measure of distribution of income is the Gini coefficient. There are two problems associated with such data. First, the data cover different time periods across countries. Second, the data are not available for many developing countries. I have utilized the ratio of the share of income of upper 20% of the population to the share of income of lowest 20% of the population as a measure of income distribution. The data on distribution of income are taken from the World Development Report. The advantage of using this measure is that it is available for large sample of countries. An index of political rights is used as a measure of democracy. The index is taken from Gastil (1996) and ranges from 1 (free) to 7 (not free). The index covers 153 countries for 1996.

Apart from the global factors, a measure of foreign competition, size of the government and the extent of the government regulations are also included in the model. The share of total imports in GDP measures the level of foreign competition in the country. The data on share of total imports in GDP are for 1996 and are taken from World Development Indicators. The share of government consumption in GDP measures the government size. The data on share of government consumption in GDP are for 1996 and are taken from World Development Indicators.

This study has utilized a more comprehensive and direct measure of government regulations; a composite index of government regulations. The index of government regulations measures the extent of regulations imposed by government regarding business operations, price controls, foreign trade (exports and imports), labour regulations, foreign currency regulations, tax regulations and safety and environmental regulations. This index is an average of seven indices with equal weights and is taken from the World Bank Survey (1996). All of these seven indices are available for 67 countries for 1996 and range from 1 (no regulation) to 6 (complete regulation).³ These seven indices are added with equal weights and converted to 0 to 10 scale.

IV. METHODOLOGY

I have estimated the following single equation model:

$$\text{Corruption Index} = \beta_0 + \beta_1 (\text{bureaucratic competition}) + \beta_2 (\text{controlled variables})$$

In the above model, corruption is the logistic transformation of various corruption indices that are taken from the World Bank (1996) and Transparency International (1998). On the right hand side of the above model, I have included, in addition to several global factors, factors that measure government interventions. The global factors include bureaucratic competition, level of information, rate of urbanization, levels of education, the distribution of income and democracy. In addition to the losers' perspective, I have included factors that represent winners' perspective. I have used two factors that measure the extent of government interventions: an index of regulations and government consumption as a percentage of the GDP. I have included the share of imports in GDP as a measure of foreign competition. The above model is estimated for a sample of 41 countries

³Question # 12a, 12b, 12c, 12e, 12f, 12g and 12j of the survey represent these seven indices on government regulations. q12a = Regulations for starting business/new operations, q12b = Price control, q12c = Regulations on foreign trade (exports, imports), q12e = Labour regulations, q12f = Foreign currency regulations, q12g = Tax regulations and/or high taxes, q12j = Safety or environmental regulations. Composite index = Average of seven indices (q12a, q12b, q12c, q12e, q12f, q12g and q12j).

without the measure of income distribution.⁴ The sample size is constrained by the inclusion of measure of income distribution.⁵

None of the empirical studies on the causes of corruption address the econometric issue regarding the upper and lower limits of the corruption index. The most appropriate technique for estimating the regression parameter is the logistic model if the dependent variable has upper and lower limits. These models satisfy two conditions. First, as the independent variables increase, corruption increases or decreases, but never moves outside the limits, 0 and 10.⁶ Second, the relationship between independent variables and corruption is non-linear. The relationship can also be expressed as a S-shaped curve. I estimate the parameters by adopting the following functional form, commonly known as a logistic curve.

$$\ln \left[\frac{X_i}{10 - X_i} \right] = f(\text{Independent Variables}) \quad (1)$$

where \ln is the natural log and X_i is the value of the corruption index between zero and ten. Taking exponential on both sides of the equation (1) yields

$$\left[\frac{X_i}{10 - X_i} \right] = \exp(\text{RHS}) \quad (2)$$

where $\text{RHS} = \beta_0 + \beta_1 (\text{competition in bureaucracy}) + \beta_2 (\text{control variables})$. Solving equation (2) for X_i yields

⁴The 41 countries are Africa (Benin, Cameroon, Congo, Ghana, Kenya, Malawi, Mali, Mauritius, Mozambique, Senegal, South-Africa, Tanzania, Togo, Uganda, Zambia, Zimbabwe), Asia-Pacific Region (Malaysia), USSR, Caribbean (Jamaica), Central America (Costa Rica), Europe (Austria, France, Germany, Hungary, Ireland, Italy, Poland, Portugal, Spain, Switzerland, Turkey), UK, Middle East (Jordan), North America (Canada, Mexico, USA), South America (Bolivia, Colombia, Ecuador, Guyana, Venezuela).

⁵I have used case-wise deletion method. The countries that are deleted in my study due to non-availability of data on income distribution includes Austria, Benin, Cameroon, Congo, Ireland, Malawi, Mali, Mauritius, Mozambique, Portugal, Togo and Turkey. The corruption rankings for these economies range from 2 (Ireland) to 8.14 (Congo) on a 0 (low corruption) to 10 (high corruption) scale.

⁶In my sample no country has either a 0 score or a 10 score. Moreover, the multinomial logit model cannot be applied here because the values for corruption indices can certainly lie in between any two integers.

$$Xi = \frac{10 \exp(RHS)}{1 + \exp(RHS)} \quad (3)$$

Equation (3) can also be written as

$$Xi = \frac{10}{(1 + e^{-RHS})} \quad (4)$$

The variables on the RHS in (4) approach ∞ , the value of dependent variable (corruption index) approaches 0. If the variables on the RHS approach $-\infty$, the value of the dependent variable (corruption index) approaches 10. This suggests that the value of the corruption index must be within the limits of 0 and 10.

From equation (1), the value of $\frac{\partial x}{\partial y}$, the partial relationship between the independent variables and the corruption index, can be calculated as follows:

$$\text{Equation (1)} \Rightarrow \ln \left[\frac{Xi}{10 - Xi} \right] = \beta_0 + \beta_1 Y_i$$

where Y_i is an independent variable and Xi is the corruption index. The derivative of equation (1) is calculated with respect to Y_i as follows:

$$\begin{aligned} \frac{\partial \ln \left[\frac{Xi}{10 - Xi} \right]}{\partial Y_i} &= \beta_1 \\ \Rightarrow \left[\frac{10 - Xi}{Xi} \right] * \frac{\left[(10 - Xi) \frac{\partial Xi}{\partial Y_i} + Xi \frac{\partial Xi}{\partial Y_i} \right]}{(10 - Xi)^2} &= \beta_1 \end{aligned} \quad (5)$$

Equation (5) can be simplified as follows:

$$\begin{aligned} \Rightarrow \left[\frac{10 - Xi}{Xi} \right] * \frac{\left[(10 - Xi + Xi) \frac{\partial Xi}{\partial Y_i} \right]}{(10 - Xi)^2} &= \beta_1 \\ \Rightarrow \frac{\left[10 \frac{\partial Xi}{\partial Y_i} \right]}{(10 - Xi) * Xi} &= \beta_1 \end{aligned}$$

$$\Rightarrow \frac{\partial Xi}{\partial Y_i} = \frac{(10 - Xi)Xi}{10} * \beta_1$$

where Xi is the corruption index, Y_i is any independent variables and β_1 is the parameter in equation (1).

The model is estimated using ordinary least square method on the transformed variables. Each model is corrected for heteroskedasticity. I have excluded outliers from each model. I plot residuals from each regression and exclude those countries for which the error term is greater than its mean \pm two standard deviations. The sensitivity of the coefficient of bureaucratic competition has also been tested using extreme bound analysis.

V. ESTIMATION AND RESULTS

The model is estimated with and without logistic transformation for the same set of countries. The overall results from the logistic models are better than the results from the conventional models. The results show that the magnitude of the coefficients is slightly higher in logistic models. However, the sign of the coefficients, their levels of significance and the overall explanatory power of the two models are more or less the same.

The regression results are presented in Table 1. The overall explanatory power of the models ranges from 64 percent to 88 percent indicating high explanatory power. In each model, the value of the F-statistic is significant. The number of observations in each model changes, depending upon the number of outliers in each model. The overall F-statistic remains significant at 1 percent level. The magnitude of the coefficients does not represent the relationship between corruption and the independent variables because I used transformed dependent variables. The sign and significance of the coefficients have not been altered as a result of this logistic transformation. I have calculated the slope coefficient — the relationships between corruption and the independent variables — by calculating $\frac{dy}{dx}$, where y is the corruption index and x is any independent variables.

The results confirm, for each measure of corruption, that the coefficient of bureaucratic competition is negative with 1 or 5 percent level of significance. A unit increase in the index of bureaucratic competition reduces corruption by an average of one-half point. The results hold when I use TI 98 corruption index.

TABLE 1
Regression Results

Variables	Total Corruption	Total Corruption	TI 98	TI 98
Constant	1.617942 (1.156)	0.79561 (0.556)	4.708153 (3.124)***	3.692124 (2.203)**
Regulations	1.232051 (4.117)***	0.997833 (4.055)***	0.695998 (2.65)**	0.915393 (3.557)***
Bureaucratic Competition	-0.37045 (-2.884)***	-0.39784 (-2.862)***	-0.29244 (-1.794)*	-0.35682 (-1.915)*
Total Years of Schooling	-0.2908 (-0.00953)	-0.17884 (-1.549)	-0.42078 (-5.979)	-0.45153 (-4.819)***
Imports as % of GDP	-0.00953 (-0.991)	-0.00804 (-1.205)	-0.00686 (-0.855)	-0.00296 (-0.403)
Government Consumption	-0.02908 (-0.797)	-0.00534 (-0.149)	-0.15303 (-4.446)***	-0.13023 (-3.523)***
Urbanization	0.021709 (2.058)*	0.010749 (0.777)	0.037689 (4.041)***	0.02582 (2.514)**
Income Distribution	-0.02673 (-0.727)		-0.01736 (-0.571)	
Political Liberty	-0.42156 (-3.743)***	-0.23354 (-1.991)*	-0.41682 (-4.231)***	-0.43111 (-5.066)***
Dummy for Transitional Economies	1.261315 (1.955)*	1.186559 (1.717)*	2.669321 (4.586)***	2.777542 (5.226)***
Newspaper Circulation	-0.00704 (-2.74)**	-0.00697 (-4.162)***	-0.00879 (-4.388)***	-0.005 (-3.333)***
Adjusted R ²	0.84	0.71	0.88	0.87
F-Statistic	15.92***	12.15***	19.61***	24.56***
Number of Countries	28	41	26	33

TABLE 1 (cont'd)
Regression Results

Variables	Bribery	Bribery	Unorganized Bribery	Unorganized Bribery
Constant	2.379402 (1.177)	-0.15119 (-0.104)	1.259157 (0.546)	-0.80387 (-0.547)
Regulations	0.845776 (2.834)**	0.975499 (4.585)***	0.986771 (2.638)**	0.99377 (4.569)***
Bureaucratic Competition	-0.35731 (-2.245)**	-0.54401 (-3.241)***	-0.48314 (-3.061)***	-0.61029 (-4.19)***
Total Years of Schooling	-0.16295 (-1.777)*	-0.15687 (-1.82)*	-0.14935 (-1.264)	-0.1325 (-1.474)
Imports as % of GDP	-0.00338 (-0.376)	-0.00464 (-0.844)	-0.00409 (-0.421)	-0.0063 (-1.261)

Government Consumption	-0.12682 (-2.931)***	-0.06449 (-1.617)	-0.11151 (-2.521)	-0.05768 (-1.61)
Urbanization	-0.01041 (-0.716)	-0.00252 (-0.279)	0.007372 (0.383)	0.008964 (0.788)
Income Distribution	-0.09399 (-3.091)***		-0.08943 (-2.627)**	
Political Liberty	-0.29921 (-2.9921)	-0.17421 (-2.008)*	-0.36263 (-2.125)**	-0.2199 (-2.207)**
Dummy for Transitional Economies	1.257536 (2.286)**	1.594121 (3.485)***	0.737032 (1.37)	0.916845 (1.83)*
Newspaper Circulation	-0.00069 (-0.234)	-0.00333 (-2.364)**	-0.003 (-0.803)	-0.00385 (-2.236)**
Adjusted R ²	0.64	0.75	0.65	0.75
F-Statistic	5.93***	13.60***	6.23***	13.94***
Number of Countries	28	39	29	40

* 10% level of significance

** 5% level of significance

*** 1% level of significance

Results are adjusted for heteroskedasticity. Figures in parentheses are t-values.

Three measures that determine the amount of rent in the economy have been included:⁷ (i) an index of government regulations, (ii) the share of imports in GDP and (iii) the government size. The results show a significant positive relationship between the index of government regulations and corruption for each measure of corruption. The coefficient is significant at 1 or 5 percent level. Virtually in all cases, the coefficient is close to one. In other words, a unit increase in the index of government regulations would increase corruption index by one point. The coefficient remains close to one and is significant at 1 percent level when I drop the measure of income distribution. The results hold when I use the TI 98 corruption index. Thus, my results support the hypothesis that government regulations are conducive to corruption. These results confirm the findings of Ades and Di Tella (1997), who have demonstrated that pervasive government regulations create illicit rents and induce public officials to misuse their power for illegal payments.

⁷I have also included GDP per capita in the regressions. The inclusion of GDP per capita did not improve the results because it is correlated with other independent variables such as level of education, urbanization and size of the government. The correlation between GDP and urbanization is 0.62 and the correlation between GDP and level of education is 0.74. All these coefficients are significant at 5% level of significance.

I do not find a significant negative effect of the share of imports in GDP on corruption albeit. The coefficient remains insignificant when I drop the measure of income distribution, although it has the expected negative sign. The value of the coefficient is also very small, ranging from -0.009 to -0.003 . The results may be due to the fact that I have already included a comprehensive measure of regulations that include regulations on foreign trade in the regression model.

The coefficient of the size of the government has the wrong sign. Although the size of the government is negatively related to corruption, suggesting that larger government size deters corruption, the coefficient is very small (0.005) in the case of total corruption with income distribution. One reason for this negative relationship is that corruption might also affect government size. If corruption is pervasive this will reduce government revenue earnings which is one proxy to measure the size of the public sector. This suggests that large government size and low levels of corruption are compatible with each other. Husted (1999) concludes that there is no relationship between the size of the government and corruption. He argues that the relationship between the size of the government and corruption may be valid within some specific set of countries.

The coefficient of the level of education is significant except for unorganized bribery. The results become less significant when I drop the measure of income distribution, although all of them have the expected signs. The coefficients vary from -0.29 to -0.14 . The negative relationship between the level of education and corruption remains significant when I use the TI 98 corruption index.

The coefficient of democracy is negative and significant in all cases. The value of the coefficient fluctuates between -0.42 and -0.29 across different measures of corruption. The results support the argument made by Wei (1998) that democracy helps reduce corrupt activities. The results hold when I use the TI 98 corruption index.

The effect of newspaper circulation is negative in all regressions. However, it is significant only when total corruption is considered. The value of the coefficient is -0.007 when total corruption is used as a measure of corruption. The coefficient of newspaper circulation is highly significant when TI 98 corruption index is used. The results confirm the hypothesis that corrupt officials are reluctant to involve in corrupt activities if losers are well informed. This confirms the finding of Brunetti and Weder (1998).

The coefficient of urbanization has expected negative sign though insignificant only when bribery was used to measure corruption. The coefficient is insignificant with wrong sign for all other corruption indices. The coefficient becomes significant at 1 percent level with positive sign when TI 98 corruption index is used.

The coefficient of the dummy variable for transitional economies is found insignificant when bribery and unorganized bribery are used to measure corruption. The coefficient, however, becomes significant with the expected positive sign in all cases when measure of income distribution is excluded. The results suggest that countries with socialist heritage are more prone to corruption.

To sum up, corruption is determined not only by government regulations but bureaucratic competition, level of education, democracy and newspaper circulation. The results of this study clearly demonstrate the positive effects of bureaucratic competition on corruption for a cross-section of countries.

Sensitivity Analysis

The potential problem pertaining to the empirical analysis of the causes of corruption is the choice of relevant explanatory variables. Various empirical studies have focused on different sets of explanatory variables. In this section, I intend to test the robustness (consistency) of bureaucratic competition used in the above equation that is found to be significant. The following regression equation has been used for the analysis:

$$Y = \beta_0 + \beta_1 I + \beta_m M + \beta_z Z + u$$

where, Y = measure of corruption; I = variables that are always included in the regression; M = variable of interest and Z = a subset of all potentially relevant variables that have been used in the empirical literature.

In extreme bound analysis, I have first estimated the above regression equation with all possible linear combinations of three z variables out of nine.⁸ After calculating all possible linear combinations of the three z -variables, the value of upper and lower bounds has been calculated, defined

⁸The nine variables are (i) imports as a share of GDP, (ii) income distribution, (iii) urban population as a percentage of total population, (iv) inflation measured as consumer price index, (v) annual growth in GDP per capita, (vi) total population, (vii) newspaper circulation, (viii) government consumption and (ix) a dummy variable for transitional economies.

as $\beta_m \pm$ two standard deviations. If the coefficient of β_m is significant with the expected sign at the extreme bounds, then one can confidently accept the partial correlation between y and m variables. If the coefficient of m variable becomes insignificant or changes sign at these extreme bounds, the partial relationship between y and m is not robust. In this case, the variable is fragile. A total of 84 regressions have been estimated. Those regressions where some z variables are perfectly collinear have been dropped.

The results are presented in Table 2. The measure of bureaucratic competition has been found robust in all cases except TI 98.

TABLE 2
Extreme Bound Analysis
(Total Corruption, Bribery, Unorganized
Bribery, Transparency International 1998)

Variables	Total Corruption	Bribery	Unorganized Bribery	TI 98
Bureaucratic Competition	Robust	Robust	Robust	Fragile

VI. CONCLUSIONS

This study empirically examines the relationship between bureaucratic competition and corruption for a cross section of countries by using the World Bank (1996) data on various corruption indices. The results show that the bureaucratic competition has a negative and significant effect on all types of corruption after controlling other variables such as level of education, measure of democracy and newspaper circulation. The bureaucratic competition has also been found robust in most cases.

The results reveal that the extent of government regulations has a significant positive effect on corruption for each measure of corruption. I did not find a significant effect of the share of imports in GDP on corruption. However, the coefficient has the expected negative sign but not significant. Moreover, the results do not support the argument that the size of the government is conducive to corruption. The coefficient has negative sign, suggesting that large government size reduces corruption; the coefficient is significant in some cases albeit.

The World Bank (1996) data set on corruption includes several transitional economies: making in transition to markets from a planned socialist economy. The coefficient of dummy for transitional economies is

positive and significant suggesting the fact that countries with socialist heritage are more prone to corruption. This may be because these economies are lacking in clear, well-reformed property rights that may worsen society's capacity to fight corruption.

In sum, this empirical exercise has improved the existing empirical literature in several respects. First, the causes of corruption from the perspectives of losers and winners have been probed. Second, a logistic transformation is employed to estimate the models. Third, a measure of bureaucratic competition is introduced that has been emphasized in the theoretical literature. Finally, extreme bound analysis (EBA) is performed to test the robustness of bureaucratic competition.

Policy Recommendations

This empirical analysis has suggested policies that may help in controlling corruption. This study confirms that bureaucratic competition is an important determinant of corruption. Government policies that reduce the dependence on corrupt officials by setting up multiple offices for their services such as police stations, passport offices and public utilities reduce corruption. The analysis suggests that policies should be designed to reduce the discretionary power of the officials and provide transparent rules and regulations that increase the probability of detection and reduce the ability of corrupt officials to contrive bribes. Thus, policies relating to the reduction of excessive government regulations are helpful in limiting corruption.

This study suggests that long-term policies should be designed to increase the quantity and quality of education, thus, increasing the ability of losers to realize their losses from corruption. Moreover, spending on education is itself less susceptible to corruption. The level of information must also be broadened to limit corruption. Finally, all policies that lead to equal distribution of income may be helpful controlling corruption as these policies provide more resources to mount countervailing actions against corrupt officials.

In sum, government should adopt prudent policies that strengthen the community's ability to resist corruption whether by enabling losers to avoid their losses or limiting the discretionary power of the winners.

Proposals for Future Research

This paper, however, left several unresolved issues that require attention. First, in this study, the effects of the government size on corruption have been tested, but did not test how corruption might affect the government size.

In the future, a simultaneous equation model can be used to determine the effects of government size on corruption. Second, the study presents a static approach to the causes of corruption. The causality between global factors and corruption can also be a topic for future research when appropriate time series data become available. Third, as Transparency International is including additional countries in their sample, future research should also test the significance of the global factors for a larger sample of countries. Fourth, at the disaggregated level, future research should also compare the effectiveness of the global factors for different types of corruption, for example, coercive and collusive.

BIBLIOGRAPHY

- Ades, Alberto and Rafael Di Tella (1995a), Competition and corruption. *Applied Economics Discussion Paper Series* No. 169, Oxford University.
- Ades, Alberto and Rafael Di Tella (1995b), *The New Economics of Corruption: A Survey and Some New Results*. Mimeo. Oxford: Oxford University.
- Ades, Alberto and Rafael Di Tella (1996), The causes and consequences of corruption: A review of recent empirical contributions. *IDS Bulletin*, Volume 27, No. 2, pp. 6-11.
- Ades, Alberto and Rafael Di Tella (1997), National champions and corruption: Some unpleasant interventionist arithmetic. *The Economic Journal*, Volume 107 (July), pp. 1023-1042.
- Alam, M. Shahid (1989), Anatomy of corruption: An approach to the political economy of underdevelopment. *American Journal of Economics and Sociology*, Volume 48, No. 4 (October), pp. 441-456.
- Alam, M. Shahid (1995), A theory of limits on corruption and some application. *Kyklos*, Volume 48, No. 3, pp. 419-435.
- Barro, Robert J. and Jong-Wha Lee (1993), International comparisons of educational attainment. *Journal of Monetary Economics*, Volume 32, No. 3 (December), pp. 363-394.
- Barro, Robert J. and Jong-Wha Lee (1996), International measures of schooling years and schooling quality. *American Economic Review, Papers and Proceedings*, Volume 86, No. 2 (May), pp. 218-223.
- Brunetti, A. and B. Weder (1998), A free press is bad news for corruption. *Wirtschaftswissenschaftliches Zentrum der Universität Basel Discussion Paper*, No. 9809.
- Brunetti, Aymo, Gregory Kisunko and Beatrice Weder (1997), Credibility of rules and economic growth: Evidence from a worldwide survey of the private sector. *Policy Research Working Paper*, Volume 1860 (April).
- Dollar, D., R. Fisman and R. Gatti (1999), Are women really the 'fairer' sex? Corruption and women in government. *Policy Research Report on Gender and Development, Working Paper Series*, No. 4 (October). Washington, DC: The World Bank.

- Fisman, Raymond and Roberta Gatti (1999), Decentralization and Corruption: Cross-Country and Cross-State Evidence. Unpublished manuscript. Washington, DC: World Bank.
- Gastil, Raymond D. (1996), *Freedom in the World*. Westport, Connecticut: Greenwood Press.
- Goel, Rajeev K. and Daniel P. Rich (1989), On the economic incentives for taking bribes. *Public Choice*, Volume 61, No. 3, pp. 269-275.
- Goel, Rajeev K. and Michael A. Nelson (1998), Corruption and government size: A disaggregated analysis. *Public Choice*, Volume 97, pp. 107-120.
- Gray, Cheryl W. and Daniel Kaufmann (1998), Corruption and development. *Finance and Development*, pp. 7-10 (March).
- Husted, W. Bryan (1999), Wealth, culture and corruption. *Journal of International Business Studies*, Volume 30, No. 2 (Second Quarter), pp. 339-360.
- Kiser, Edgar and Xiaoxi Tong (1992), Determinants of the amount and type of corruption in state fiscal bureaucracies: An analysis of late imperial China. *Comparative Political Studies*, Volume 25, No. 3, pp. 300-331.
- Lambsdorff, J. Graf (1999), Corruption in empirical research — A review. *TI Working Paper*, Transparency International, November.
- LaPalombara, Joseph (1994), Structural and institutional aspect of corruption. *Social Research*, Volume 61, No. 2, pp. 325-350.
- Leite, C. and J. Weidmann (1999), Does mother nature corrupt? Natural resources, corruption and economic growth. *International Monetary Fund Working Paper*, 99/85 (July).
- Meier, Kenneth J. and Thomas M. Holbrook (1992), I seen my opportunities and I took 'Em: Political corruption in the American states. *The Journal of Politics*, Volume 54, No. 1 (February), pp. 135-155.
- Neumann, P. (1994), *Böse: Fast Alle Bestechen*. Impulse 4//1994, Hamburg, Gruner + Jahr AG and Co.
- Paldam, M. (1999), The big pattern of corruption, economics, culture and the seesaw dynamics. Unpublished manuscript. Aarhus University, Denmark, June.
- Rauch, James E. and Peter B. Evans (2000), Bureaucratic structure and bureaucratic performance in less developed countries. *Journal of Public Economics*, Volume 75, pp. 49-71.

- Rijkeghem, C. Van and Beatrice Weder (1997), Corruption and the rate of temptation: Do low wages in the civil service cause corruption? *IMF Working Paper*, No. 73, Washington, DC: IMF.
- Rose-Ackerman, Susan (1978), *Corruption: A Study in Political Economy*. New York: Academic Press.
- Shleifer, Andrei and Robert W. Vishny (1993), Corruption. *Quarterly Journal of Economics*, pp. 599-617 (August).
- Swamy, A., St. Knack, Y. Lee and O. Azfar (1999), Gender and corruption. *Draft Papers*, IRIS Centre, University of Maryland, July.
- Tanzi, Vito (1994), Corruption, government activities and markets. *IMF Working Papers*, No. 99. Washington, DC: IMF.
- Tanzi, Vito (1998), Corruption around the world: Causes, consequences, scope and cures. *IMF Staff Papers*, Volume 45, No. 4 (December).
- Tirole, Jean (1996), A theory of collective reputations. *Review of Economic Studies*, Volume 63, pp. 1-22.
- Treisman, Daniel (2000), The causes of corruption: A cross-national study. *Journal of Public Economics*, Volume 76, pp. 399-457.
- Ul-Haque, Nadeem and Ratna Sahay (1995), Do government wage cuts close budget deficits? A conceptual framework for developing countries and transition economies. *IMF Working Paper*, No. 11, Washington, DC: IMF.
- WCR (1989-1992), *World Competitiveness Report*. International Institute for Management Development, World Economic Forum, Geneva.
- Wedeman, Andrew (1997), Looters, rent-scrappers and dividend-collectors: Corruption and growth in Zaire, South Korea and the Philippines. *The Journal of Developing Areas*, Volume 31 (Summer), pp. 457-478.
- Wei, Chang-Jin (1998), Corruption in economic development: Beneficial grease, minor annoyance or major obstacle? Paper presented at the *Workshop on Integrity in Governance in Asia* held in Bangkok, June 29-July 1.
- World Bank (1996), *World Development Report*. New York: Oxford University Press.
- World Bank (1999), *World Development Indicators (1999)*. Washington, DC: The World Bank.