Openness and Corruption: A Time-Series Analysis

Muhammad Zakaria[1]

Abstract: The paper empirically examines the relationship between trade openness and the level of corruption in Pakistan using annual time-series data for the period 1984 to 2007. The analysis shows that trade openness negatively affects corruption in Pakistan. The results are robust to controlling for other corruption determining variables and various model specifications. Sensitivity analysis shows that economic development and political liberalization reduce corruption levels. Other explanatory variables i.e. human and physical capital, government expenditures, population, inflation and defense expenditures significantly affect corruption in the expected directions.

Keywords: openness, corruption, economic development, political institutions

JEL Classification: D73, F14, F41

Introduction

Economists, historians and political scientists have long been engaged in a debate as to whether, and to what extent trade openness affects economic activity. The prevailing view is that openness boosts economic activity by efficient allocation of resources in the economy. Theoretical literature has underlined several channels through which openness affect economic growth. Corruption is one such channel through which trade openness affects income. According to the World Bank (2000), corruption originates mainly for three reasons: (a) lack of meritocracy in the civil service; (b) absence of political rights and civil liberties; and (c) overly restrictive regulations and high degrees of state ownership. Trade restrictions (openness) form part of the third category of problems. In fact, the causal relationship between trade openness and corruption is not as simple as it seems to be. One strand of thought argues that chain of causality runs from corruption to trade. Lambsdorff (1998), Lee and Azfar (2003) and Anderson and Marcouiller (2005) describe how corruption

* Muhammad Zakaria is at Department of Economics, Quaid-i-Azam University, Islamabad, Pakistan.

reduces international trade, because exporters and importers are discouraged by a system of bribery, uncompetitive bidding, selective taxation and artificially created monopolies. According to this view, to increase international trade, one must reduce the level of corruption.[2]

The second strain of thought reverses the chain of causality and argues that it is trade openness that affects the level of corruption. According to Bonaglia et al. (2001) there are three identified channels through which trade openness affects corruption: (a) fewer and less stringent trade restrictions (Krueger, 1974; Gatti, 1999); (b) increased foreign competition (Ades and Di Tella, 1995, 1999); and increased foreign investment (Wei, 2000a, 2000b; Larraín and Tavares, 2004). Krueger (1974) argues that trade openness (e.g. removal of quotas) reduces the rent seeking activities in the country and thereby leads more trade. Similarly, Ades and Di Tella (1999) point that corruption tends to be higher if companies enjoy rents due to protection from competition from imports either on a natural (through large distance to other markets) or a political way (through trade policy). The monopolistic power of companies and officials is diminished through increased competition. In addition to direct effects, trade openness also affects corruption indirectly. For instance, trade openness affects growth, investment, poverty, income inequality, and democratic institutions – factors which in turn have an impact on corruption (Wei, 2000a; Treisman, 2000; Larraín and Tavares, 2004; Winters 2004; Uslaner, 2005). According to these views, trade openness reduces corruption. Authors like Leff (1964), Huntington (1968) and Lui (1985) viewed corruption as 'grease in the wheels' of commerce and trade, proposing scenarios where corruption may allow entrepreneurs to work around extensive bureaucratic procedures. Thus, according to this view trade openness increases the level of corruption. The grease theory, however, has now lost most proponents as more and more evidence come to light showing that corruption in fact is much more like sand than grease, leading to economic inefficiencies (Kaufmann and Wei, 1999).

In empirical literature, there is plenty of evidence to suggest that countries that are more open to trade are also less plagued by corruption (Krueger, 1974; Ades and Di Tella, 1999; Larrain and Tavares, 2004; Wei, 2000a; Bonaglia et al., 2001; World Bank, 2000; Sandholtz and Koetzle; 2000; Treisman, 2000; Giavazzi and Tabellini, 2004; Gatti, 2004; Chaudhary, 2005). However, Torrez (2002) argues that empirical evidence supporting negative relationship between corruption and openness does not hold for all the datasets available. In his study the results seem to depend on the choice of the corruption index. The same thing goes for Gerring and Thacker (2005) and Knack and Azfar (2003), but they underscore that this may be due to sample selection bias. To conclude, depending on the coverage in space and time, the choice of corruption measurement and the definition of openness, the scholars come to different conclusions.

An important reason for getting muddled results regarding the effect of trade openness on corruption may be that the existing studies are limited only to cross section and panel data analysis, while individual country studies may give clear picture. This is what the present paper attempts to do. Pakistan initiated the strategy of trade openness in 1980s, which generally remained successful. Thus, there is a possibility that in the short to medium term, corruption may be significantly affected by successful trade liberalization policies is Pakistan. This stimulates us to empirically examine the effect of trade openness on corruption in Pakistan. For this purpose, the paper utilizes annual time series data for the period 1984 to 2007. To my knowledge this study is going to be the first study to address this issue in a rigorous way in Pakistan.

Analytical Framework

This section explores the link between trade openness and corruption using regression analysis. The approach followed here is to add trade openness variable to the right-hand-side explanatory variables in a standard corruption equation as an explanatory variable. Here the hypothesis is that trade openness variable is likely to significantly negatively affect corruption. In order to be consistent with previous studies, I utilize a conventional model. In what follows we estimated the model given by:

$$COR_t = \alpha_1 + \alpha_2\, open_t + \alpha_3\, hc + \alpha_4\, g_t$$
$$+ \alpha_5\, pop_t + \alpha_6\, INF_t + \alpha_7\, k_t + \alpha_8\, def_t + \mu_t$$

where the lowercase letters denote that the underlying variables are in natural log form. Various variables are defined as follows:

COR_t = Corruption Index
$open_t$ = Trade openness
hc_t = Human capital
g_t = Government consumption
pop_t = Population
INF_t = Inflation rate
k_t = Capital stock per worker
def_t = Defense Expenditures
μ_t = White-noise error term

where α's are the parameters to be estimated, and μ_t is the stochastic disturbance term such that $\mu_t \sim N(0, \sigma^2)$.

Corruption is posited to be function of a set of control variables. These control variables include human capital, physical capital, government expenditures, population, inflation, and defense expenditures. Changes in any of these control variables would be expected to alter corruption.[3]

Data and Empirical Results

Overview of the Data

Annual time-series data is collected for Pakistan for the period 1984 to 2007. Some variables are directly taken from the data source. These variables include corruption, population, inflation, democracy, political constraints and government stability. Corruption is measured as an index ranging from 0 to 6, with higher values indicating more corruption and the data is taken from International Country Risk Guide (ICRG). Democracy is proxied by Polity2 score, which is taken from Polity IV dataset described by Marshall and Jaggers (2009), Polity2 is an index ranging from -10 (full autocracy) to +10 (complete democracy). Political constraint is proxied by POLCONV score, which is taken from POLCON dataset described by Henisz. POLCONV is an index ranging from 0 (no constraints on executive's powers) to 1 (full constraints on executive's powers). Government stability is measured as an index ranging from 0 to 12, with higher values indicating high government stability and the data source is ICRG. The remaining variables are constructed using secondary data. For openness measure, I use the share of total trade (exports plus import) in GDP. Per capita income is real GDP per capita; human capital is defined as secondary school enrollment rate; physical capital is proxied by gross fixed capital formation as a share of GDP; government expenditure excludes defense and education expenditures and is taken as share of GDP; while defense expenditure is calculated as share of military spending in GDP. The data is taken from International Financial Statistics, Pakistan Economic Survey and Pakistan Demographic Survey.

Table 1 contains summary statistics for the variables used in this study, which will help us in the interpretation of the coefficient estimates by providing the scale of the relevant variables. Table 2 presents the correlation matrix for the variables. Column (1) of Table 2 correlates corruption with all independent variables. The value of correlation coefficient -0.40 indicates that corruption is negatively correlated with trade openness. This suggests that trade openness is an important determinant to deter corruption. Figure 1 plots the simple regression between corruption and trade openness. The figure displays an apparent negative relationship between corruption and trade openness for Pakistan. The simple regression exercises, being essentially

bivariate and simplistic, calls for exploration in a more rigorous framework. This is what the next section of the paper attempts to do.
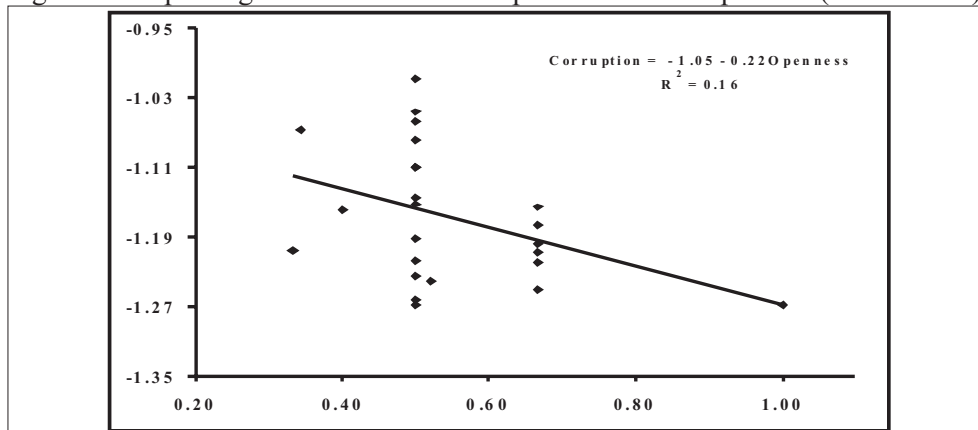
Table 1: Summary Statistics for the Variables (1984 – 2007)

	Mean	Median	Std. Dev.	Minimum	Maximum	Count
Corruption	0.55	0.50	0.14	0.33	1.00	24
Openness (% of GDP)	31.19	30.60	2.42	28.12	36.46	24
Per Capita Income (log)	10.13	10.16	0.11	9.88	10.30	24
Human Capital (log)	0.31	0.30	0.05	0.21	0.41	24
Govt. Exp. (% of GDP)	0.05	0.05	0.01	0.03	0.07	24
Population (log)	4.84	4.84	0.18	4.52	5.13	24
Inflation (%)	6.70	5.97	3.00	2.88	11.66	24
Physical Capital (% of GDP)	16.84	17.02	1.28	13.93	19.24	24
Defense Exp. (% of GDP)	5.79	6.21	1.74	3.46	7.86	24
Democracy	0.79	-4.00	6.64	-7.00	8.00	24
Political Constraints	0.22	0.14	0.26	0.00	0.76	24
Govt. Stability	7.45	8.13	2.49	2.17	10.83	24

Table 2: Correlation Table for the Variables Included in the Regressions (1984 – 2007)

	(1)	(2)	(3)	(4)	(5)	(6)
Openness	-0.40					
Per Capita Income	-0.04	0.20				
Human Capital	-0.02	0.36	0.91			
Govt. Exp.	-0.04	0.19	0.45	0.49		
Population	0.08	-0.02	0.97	0.84	0.43	
Inflation	-0.34	0.74	-0.10	0.09	0.02	-0.32
Physical Capital	0.11	0.46	-0.03	0.22	0.13	-0.18
Defense Exp.	-0.25	0.34	-0.82	-0.62	-0.30	-0.93
Democracy	-0.54	0.74	-0.11	0.08	0.22	-0.32
Political Constraints	-0.53	0.80	0.04	0.18	0.02	-0.18
Govt. Stability	-0.01	-0.41	0.56	0.38	-0.10	0.68

Figure 1: Simple Regression between Corruption and Trade Openness (1984 – 2007)

3.2. Empirical Analysis

In this section we present estimates of the impact of trade openness on the level of corruption, after controlling for several other indicators. If corruption and openness are jointly determined, then one cannot provide a causal interpretation to the OLS estimates. Moreover, since corruption is only imperfectly measured, the OLS estimates suffer from attenuation bias as well as simultaneously bias. Both biases can be addressed if we use an appropriate instrumental variable estimator like Generalized Method of Moments (GMM).

Table 3 presents the estimates for the effect of trade openness on corruption using GMM estimator.[4] The most parsimonious specification includes just the openness variable. However, we have added a broad set of controls suggested in the literature on the determinants of corruption. The regressions show that trade openness has significant negative effect on corruption or that the more liberal the trade regime, the lower is the level of corruption. It can be reasonably hypothesized that lower tariff and non-tariff barriers lead to fewer opportunities for rent seeking (in terms of taking bribes for lower tax payments or exemptions). Not only do the opportunities for rent-seeking decrease, but the increased competitiveness of the economy that results from trade liberalization leads to lower available rents. The effect is also economically significant: a one standard deviation increase in openness (2.42) leads to a decrease in corruption of about 0.49 points as of column (1). The coefficient on corruption is also robust as suggested by various equation specifications. In sum, there is robust evidence of a beneficial impact of trade openness on the level of corruption. As to the general fit of the regression, our different specifications explain between 25 and 75 percent of the total variation in corruption.

Other variables also turn out to be important determinants of corruption level. More educated population is predicted to have lower levels of perceived corruption. It is seen that corruption is significantly affected by the size of the government. The results imply that an economy with larger government has a tendency to be more susceptible to corruption. This is because a larger government implies an increased number of rules and regulations, including licenses, permits and authorizations of various types. The resulting monopoly power of the state enables it to extract illegal rents or to engage in other acts of corruption. Corruption also increases with the increase in population level, while an increase in inflation reduces corruption. Further, we observe that physical capital accumulation breeds corruption in the country. It indicates that capital formation in the country provides opportunities for corruption. Moreover, corruption increases with military spending. However, this result is not robust with alternative equation specifications.

Table 3: Relationship between Corruption and Openness [1984 to 2007]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Constant	-2.529 (-2.533)*	2.162 (2.723)*	-0.401 (-1.770)**	-0.852 (-1.589)	-1.524 (-1.680)**	0.582 (6.148)*	0.053 (0.372)	-0.214 (-2.914)*	0.500 (1.456)	-1.512 (-12.033)*	0.127 (1.109)	0.658 (2.582)*	-0.130 (-5.604)*
Openness	-0.204 (-1.840)**	-0.604 (-2.335)*	-0.171 (-4.056)*	-0.501 (-3.081)*	-0.097 (-1.502)	-0.626 (-5.271)*	-0.542 (-7.174)*	-0.352 (-5.570)*	-0.439 (-3.876)*	-0.236 (-5.651)*	-0.526 (-4.889)*	-0.378 (-3.737)*	-0.044 (-1.858)**
Human Capital	-3.681 (-3.519)*	-2.694 (-6.075)*	-1.099 (-12.882)*					1.154 (8.161)*					
Govt. Expenditure	0.430 (1.981)**	0.149 (1.549)		-0.064 (-1.343)					0.043 (1.783)**				
Population	2.276 (4.106)*	0.426 (4.109)*		0.378 (2.229)*						0.370 (15.527)*			
Inflation	-0.074 (-0.091)		-0.377 (-2.187)*		0.001 (0.007)								
Physical Capital	1.308 (3.885)*		0.116 (2.345)*			0.779 (14.055)*					-1.564 (-6.643)*	0.302 (2.836)*	
Defense Expenditure	0.513 (2.422)*		-0.332 (-5.324)*			-0.205 (-8.996)*							-0.224 (-6.361)*
AR(1)	0.329 (1.789)**		0.941 (16.751)*	0.577 (23.352)*	0.940 (21.254)*		0.869 (18.795)*	0.661 (10.533)*	0.855 (15.147)*	0.641 (23.979)*	0.793 (28.607)*	0.880 (28.536)*	
R²	0.655	0.309	0.744	0.589	0.722	0.512	0.623	0.647	0.654	0.699	0.558	0.696	0.258
Adjusted R²	0.542	0.257	0.652	0.492	0.657	0.431	0.584	0.588	0.597	0.649	0.485	0.646	0.201
DW	1.851	1.790	1.730	1.737	1.825	1.777	1.798	1.786	1.745	1.733	1.755	1.784	1.795

Note: Values in parentheses denote underlying student-t values. The t statistics significant at 5 % and 10 % levels of significance are indicated by * and ** respectively.

Sensitivity Analysis

The Role of Economic Development

Generally, it is argued that corruption decreases with the level of economic development (Treisman, 2000; Ades and Di Tella; 1999). The intuition is that corruption is a symptom of a strong economy and that economies that are growing faster are indicating that they have greater institutional strengths, which in turn should be reflected by lower levels of corruption. To check this hypothesis we include per capita income in our benchmark specification as a proxy measure for economic development.

The simple correlation coefficient between per capita income and corruption show that higher level of income is associated with lower level of corruption (see Table 2). However, the negative correlation is stronger between openness and corruption than between the latter and per capita income – respectively -0.40 and -0.04. Table 4 provides the estimated results of per capita income. The results in column (2)[5] show that the effect of economic development on corruption is negative. Although this result is statistically significant but economically it is weak. A one standard deviation increase in per capita income (0.11) decreases corruption by 0.01 points. This is a very minute effect. A comparison of the effect of a standard deviation increase in openness and in income per capita is illuminating: they lead to a decrease of 0.49 and 0.01 points in corruption, respectively. Given the difficulty of increasing the average level of country's GDP per capita compared with the relatively straightforward policy of opening trade, this bodes well for the use of openness to fight corruption. Including income per capita, however, has increased the size and significance level of trade openness coefficient.

Table 4: Relationship Between Corruption and Openness: Inclusion of Per Capita Income and Political Institutions (1984 to 2007)

	(1)	(2)	(3)	(4)	(5)
Constant	-2.529	-2.743	-4.691	-4.632	-4.871
	(-2.533)*	(-1.691)**	(-2.480)*	(-2.473)*	(-2.257)*
Openness	-0.204	-0.290	-0.133	-0.091	-0.137
	(-1.840)**	-(2.458)*	-(2.335)*	-(2.170)*	(-1.349)
Per Capita Income		-0.062			
		(-2.019)*			

	(1)	(2)	(3)	(4)	(5)
Human Capital	-3.681	-5.193	-4.083	-3.921	-3.860
	(-3.519)*	(-2.732)*	(-2.632)*	(-2.850)*	(-2.756)*
Govt. Exp.	0.430	0.483	0.368	0.356	0.352
	(1.981)**	(3.475)*	(3.457)*	(2.721)*	(2.383)*
Population	2.276		2.735	2.651	2.642
	(4.106)*		(3.512)*	(3.894)*	(3.898)*
Inflation	-0.074	1.418	0.819	0.672	0.685
	-(0.091)	(0.999)	(0.557)	(0.539)	(0.553)
Physical Capital	1.308	1.232	1.256	1.211	1.165
	(3.885)*	(4.672)*	(6.320)*	(5.654)*	(3.095)*
Defense Exp.	0.513	-0.076	0.682	0.620	0.580
	(2.422)*	(-0.275)	(1.720)**	(3.193)*	(2.305)*
Democracy			-0.003		
			(-2.197)*		
Political Constraints				-0.032	
				(-2.224)*	
Govt. Stability					-0.004
					(-2.208)*
AR(1)	0.329				
	(1.789)**				
R^2	0.655	0.462	0.679	0.681	0.698
Adjusted R^2	0.542	0.348	0.545	0.550	0.578
DW	1.751	2.336	1.775	1.773	1.786

Note: Values in parentheses denote underlying student-t values. The t statistics significant at 5 % and 10 % levels of significance are indicated by * and ** respectively.

The Role of Political Institutions

It is also hypothesized that only countries that undertake trade liberalization in close conjunction with political liberalization experience a reduction in corruption, since free press, free speech and protection of civil liberties allows for more transparency, making corrupt politicians accountable to voters (Treisman, 2000; Giavazzi and Tabellini, 2004; Tavares, 2005). It seems as if the two processes are complementary then trade reforms are not useful to reduce corruption unless there is some political accountability as well. To check the effect of political liberalization on the level of corruption democracy variable is used.

   The simple correlation coefficient between corruption and democracy (-0.54) shows that corruption decreases with political liberalization. A similar relationship holds between corruption and other political variables (i.e. political constraint and government stability) as the correlation coefficients of -0.53 and -0.01 indicate. The empirical results also specify that political freedom reduces corruption. The results in column (3) of Table 4 show that a one standard deviation increase in democracy (6.64) reduces corruption by 0.02 points. This result is statistically significant but economically it is very weak. See that, the effect of openness on corruption has decreased from -0.204 to -0.133 with the inclusion of democracy variable. It supports the findings of Lederman et al. (2005) that the effect of openness on corruption diminishes when controlling for political institutions such as democracy, parliamentary systems, freedom of the press, etc. Lederman et al. interpret this as evidence that the institutions are determinants of both trade outcomes and corruption levels. A similar interpretation holds for political constraints and government stability variables. Putting high constraints on executive powers reduce corruption levels and that a stable government reduces the opportunities for corruption as well.

Conclusion

This paper makes a systematic attempt to estimate the effects of trade openness on the level of corruption for Pakistan using annual time-series data for the period 1984 to 2007. The results of this paper strongly point to a beneficial effect of country openness on corruption. The evidence shows that higher levels of openness reduce corruption, thus adding another argument for trade liberalization policies. The association is statistically significant and economically important. These findings are robust as the results do not depend on the addition of a number of other relevant variables. The results imply that the most potent tools of trade liberalization in combating corruption are the policies of lowering tariff and non-tariff barriers across product categories. In this regard custom reforms are effective in combating

corruption in the country. Increased level of education reduces corruption, which indicates more resources needs to be devoted for human capital accumulation. Similarly, government size needs to be curtailed to reduce opportunities for corruption. Moreover, government needs to check its physical capital accumulation and military spending to combat corruption.

Corruption also decreases with the level of economic development. However, the effect of openness on corruption is greater as that of income per capita on corruption. This is important since a policy of trade openness is more easily pursued than a general policy of raising the economy's average income. Corruption is reduced by good democratic institutions as well. In this regard consideration should be given to transparent institution building to deter corruption. Since relations between trade and corruption are complex and ambiguous, the fight against corruption ought therefore to be mainstreamed into all policy areas. Trade reform could not be a cure for corruption as a stand-alone, only if it is supported by other economic, social and political reforms.

In fact, corruption is a pervasive phenomenon, which is very difficult to extricate. Therefore, the problem of corruption must be addressed in a wide framework. In this regard, a promising avenue for future research may be analyzing the different channels through which openness decreases corruption levels. Further, exchange rate policies may have a substantial effect on corruption because they usually reduce the black market premium, which should reduce corruption in the foreign exchange market. These policies also promote trade, which in turn makes the economy more competitive and reduces the level of illegal rents available. Some work needs to be done on this issue as well.

NOTES

[1] Author is graduate student at the Department of Economics, Quaid-i-Azam University, Islamabad, Pakistan. The views expressed in the paper are those of author and cannot be attributed to the university.

[2] For details, see Bandyopadhyay and Roy (2007) and the articles there in.

[3] For theoretically expected signs of these variables on corruption reader is referred to Seldadyo and De Haan (2005).

[4] Lagged values of the variables are used as instruments

[5] Results in column (1) of Table 4 are basically the results of our benchmark equation as shown in column (1) of Table 3. Here they are reproduced only for comparison purpose.

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