JOURNAL OF ECONOMIC DEVELOPMENT 161
Volume 27, Number 2, December 2002

A NOTE ON THE RELATIONSHIP BETWEEN CORRUPTION AND GOVERNMENT REVENUE

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This paper empirically traces out the impacts of corruption on government revenue. The total amount of government revenue decreases as corruption reduces tax revenues if it contributes to tax evasion, improper tax exemptions or weak tax administration. In addition, corruption may distort the composition of government revenue: that is, a country with a higher level of corruption increases the proportion of international tax revenue rather than domestic tax one as the source of government revenue. Using cross-national evidence, it is identified that several corruption indices are positively and significantly associated with the taxes on international trade over current government revenue. Moreover, corruption is negatively and significantly related to the domestic tax revenue as well as total amount of government revenue over GDP.

Keywords: Corruption, Government Revenue, Tax Revenue, International Tax
JEL classification: D73, E62, F13

1. INTRODUCTION

Corruption, defined as the misuse of public office for private gain, has attracted a great deal of attention in recent years. In particular, several empirical studies on corruption have shown that it is a big impediment to develop for certain developing countries. That is, higher perceived corruption lowers the private marginal product of capital, which inhibits to investment and growth (e.g., Mauro (1995)).

In addition to the impact of corruption on the real sector, it may also distort the fiscal policies because a corrupt politician (or corrupt public office) may be expected to use his or her authority on those activities on which it is easier to collect bribes. For example, Mauro (1998) examined the relationship between corruption and the composition of

* This work was supported by the Brain Korea 21 Project in 2002. The author is grateful to Professor Mario J. Crucini and an anonymous referee for valuable comments. All the remaining errors are, of course, the author's.

government expenditure, and further he showed that education spending is adversely affected by corruption. It is now possible to claim that another plausible distortion from corruption relates to the composition of government revenue. Indeed, corruption may alter the government revenue into two ways. The first one is the total amount of government revenue decreases as corruption reduces tax revenues if it contributes to tax evasion, improper tax exemptions or weak tax administration (e.g., Tanzi (1998) and Tanzi and Davoodi (1997)). While this paper considers the "size effect" of corruption on government revenue, it is not the main consideration. Instead, this paper focuses on the second issue, which may be regarded with the composition of government revenue or as a "distortion effect." That is, more corrupt countries tend to heavily depend on the taxes on international trade rather than domestic taxes as the source of government revenue.

A number of political international trade literature examined the linkage between rent-seeking and trade protection by imposing higher taxes on international trade (e.g., Helpman (1995) Mayer (1984) Mitra (1999) and Mueller (1989)). The seminal paper of Krueger (1974) addressed that it is the existence of rents to motivate rent-seeking behavior. Therefore, corrupt politicians (or corrupt public office) may use their authorities in the way to increase taxes on international trade to exploit for their private gains.

Using cross-country evidence, it is found that corruption does indeed affect the composition of government revenue as well as its total amount. The taxes on international trade over current government revenue is found to be significantly and positively affected by corruption. The impacts on total amount of government revenue and tax revenue over GDP are also consistent with a prior expectation: that is, counties with the higher levels of corruption may have smaller volumes of government revenue and domestic tax revenue.

The question whether corruption affects government revenue may have some important implications. First, recent empirical studies on corruption assumed that the amount of government revenue is exogenously given, which can be associated with the level of economic development or performance. Hence, we are able to observe an indirect impact of corruption on economic performances through government revenue as long as the government revenue is endogenous on corruption. Second, if the proposition that corruption distorts the composition of government revenue is true, the distortion may affect the income distribution that is a big issue of the fairness in economics. For example, Spilimbergo *et al.* (1999) examined the effects of several trade openness measures on income distribution. If corruption is positively associated with the taxes on international trade, then corruption and the composition of government revenue may both individually and jointly affect the income distribution through trade protection.[1]

[1] The question whether taxes on international trade can be an appropriate measure of trade protection has some problematic issues (see Rodriguez and Rodrik (1999)). However, let us put aside the issue since that is not the main consideration of this paper.

Third, the "distortion effect" of corruption on government revenue applies to the studies on corporate finance. For example, a firm with a low ratio of stockholder's equity to total assets may be managed by a corrupt manager (or entrepreneur). The corruption between corrupt managers and financial institutions who concern with private gains is to make overinvestment in unprofitable projects. For example, Hwang and Wang (2001) presented the financial collusion between an entrepreneur and a dishonest auditor, which leads to an over-lending to a firm by a bank.

The remainder of this paper is organized as follows. Section 2 provides an empirical methodology, in which consists of the theoretical background, the data and cross-section estimations. Section 3 contains some conclusions and implications.

2. EMPIRICAL METHODOLOGY

A. Theoretical Background

Recently, the broad studies on corruption have attracted a great deal of attention. The first attempt was to find out the impacts of corruption on the real sector. As an influential work, Mauro (1995) provided that corruption lowers private investment with the view that it lowers the private marginal product of capital. In the meantime, Shelifer and Vishny (1993) and Tanzi and Davoodi (1997) showed that an increased corruption is associated with a higher level of public investment in a theoretical and an empirical manner, respectively. The overinvestment in the public sector resulted from secrecy (Shelifer and Vishny (1993)) and it is combined with a low level of productivity (Tanzi and Davoodi (1997)). Tanzi and Davoodi (1997) further suggested that corruption reduces the incentive to total investment since corruption must reduce private investment by more than it increases public investment.

After that, focuses move to the impacts of corruption on policy-making. Lack of transparency in policy-making can distort fiscal polices (e.g., Tanzi (1998)). For example, Mauro (1998) showed that predatory behaviors by corrupt politicians distort the composition of government expenditure. Tanzi and Davoodi (1997) presented the distortions of the entire decision-making process connected with public investment projects. More recently, Hindriks *et al*. (1999) examined the implications of corruptibility and the potential abuse of government authority for the tax collection schemes. However, few attempts have been made to analyze the linkage between corruption and the composition of government revenue, which serves the motivation of this paper. A smaller number of big potential gainers from international trade have much greater incentive to lobby in securing trade protection than a large number of small potential losers (e.g., Helpman (1995), Hwang and Jung (2002), Mayer (1984), and Mitra (1999)). In other word, small rich producers are a greater number of lobbies in

setting higher taxes on international trade than do large poor consumers.[2] Another motivation of this paper is that corruption may reduce tax revenue if it contributes to tax evasion, improper tax exemptions or weak tax administration (e.g., Tanzi and Davoodi (1997)). Therefore, corruption may contribute to not only the composition of government revenue but total amount of government revenue itself.

B. Data

The empirical analyses are based on cross-country data consisting of 41-66 countries for which were largely dictated by the availability of data, such as corruption indices and government revenue. Five alternative corruption indices (CI), which represent the degrees of corruption or questionable payments in business transactions, are used in this paper. It is worthwhile to note that the measurements of CI have significant drawbacks since the indices are based on the perceptions rather than objective and qualitative measures of actual corruption.[3]

A few different sources of CI follow. The first source of CI (denoted CI 1 throughout) is taken from Mauro (1995) who reported the index of *Business International*, covering 68 countries over the 1980-83 period. The second source of CI (CI 2) is from Levine-Loayza-Beck (1999) data set that is averaged over 1982-1995. The last three indices are the *Transparency International* (TI) measures of the corruption in 1996, 1997 and 1998, respectively (CI 3, CI 4 and CI 5, respectively). The TI measures can be acquired from Treisman (2000). All indices range from 0 (least corrupt) to 10 (most corrupt) and are based on the perceptions drawn from people in multinational firms and institutions and provided one observation per country. The summary of statistics for five alternative CI is provided in Table 1. It is possible to observe that five indices are highly correlated with correlation coefficients of 0.79 - 0.99, which means CI are very stationary over time and the units of CI are not really quantitative.

In estimating the relationship between CI and the components of government revenue, it is less likely to avoid an endogeneity bias because the corruption indices are subjective and based on the perceptions. Indeed, it is possible to claim that the components of government revenue or government revenue itself can cause corruption. Therefore, three instrumental variables are used to address any potential endogeneity bias. The first and second instruments are the percent of population professing protestant faith (PP) and the former British colony or UK (FBUK), which are drawn from

[2] The existence of corruption can be explained by the initial inequalities of income or wealth distributions. For instance, the relationship between inequality and the number of organized group, and between inequality and rent-seeking are examined by Mitra (1999) and Rodriguez (1999), respectively. On the contrary, the positive and significant impacts of corruption on income inequality and poverty are demonstrated on Gupta *et al.* (1998). Therefore, the causation problem between inequality and corruption remains as a controversial issue.

[3] This matter was highlighted in Tanzi (1998).

Treisman (2000). Data on FBUK is a dummy variable related to whether the country ever was a colony of British or UK. Both instrumental variables are highly correlated with CI, perhaps because countries that have high proportion of religious beliefs and have been colonized of British or UK have found it is easy to develop efficient institutions. The final instrument is an index of ethnolinguistic fractionalization (ELF) drawn from Taylor and Hudson (1972), which means a measure of the probability that two randomly selected persons from a given country will not belong to the same ethnolinguistic group. In accordance with Shleifer and Vishny (1993)'s argument, more fractionalized countries tend to have more dishonest bureaucracies, and hence ELF can be a good instrument. The simple correlation coefficients with CI are 0.29 (CI 2) through 0.37 (CI 4) and statistically significant at the conventional levels.

Table 1. Statistics for Corruption Indices (CI)

	CI 1	CI 2	CI 3	CI 4	CI 5
Mean	2.86	4.06	4.53	4.16	4.72
Median	2.63	4.70	4.98	4.10	5.10
Maximum	8.50	9.82	9.00	7.95	8.60
Minimum	0.00	0.00	0.57	0.06	0.00
Standard Deviation	2.41	2.72	2.64	2.56	2.49
Sample Size	52	66	45	41	59
Correlation Coefficient:					
CI 1	1	0.81	0.86	0.84	0.79
CI 2	0.81	1	0.91	0.90	0.89
CI 3	0.86	0.91	1	0.97	0.97
CI 4	0.84	0.90	0.97	1	0.99
CI 5	0.79	0.89	0.97	0.99	1

Sources: CI 1 is the Corruption Index provided by *Business International*, average 1980-83 (from Mauro (1995)). CI 2 is the Corruption Index from Levine-Loayza-Beck (1999) data set that is averaged over 1982-1995. CI 3, CI 4 and CI 5 are the Corruption Indices provided by *Transparency International* in 1996, 1997 and 1998, respectively (from Treisman (2000)).

The first purpose of this paper is to consider how the level of corruption may affect the total amount of government revenue. Data on government revenue excluding grants as a fraction of GDP is used as the measure of total government revenue, which comes from the World Bank's (2000) *World Development Indicators* (WDI), and four years (1980, 1985, 1990 and 1995) are considered for the analysis. In addition, two components of government revenue are considered to see how they are affected by the corruption indices. The first component is taxes on international trade over current government revenue, which is used the four years (1980, 1985, 1990 and 1995). Taxes on international trade include import duties, export duties, profits of export or import

monopolies exchange profits, and exchange taxes (see WDI table 4. 15). Another component is the tax revenue over GDP[4] and four years as in the first component are used in the analysis. The World Bank (2000) published both data. Table 2 provides the summary of statistics for the government revenue and its components' shares. It can be seen that there is a wide variation of the data across countries. For example, taxes on international trade over government revenue (provided in Column 3) ranges from 0 to 51.62 percents. In addition, it is possible to observe that both "government revenue over GDP" and "tax revenue over GDP" are negatively related to the CI; however, "taxes on international trade over current government revenue" is positively associated with CI.

Table 2. Statistics for Government Revenue and Its Components

	(1) GREV	(2) TR	(3) ITR
Mean	25.34	21.09	12.95
Median	23.67	19.44	9.24
Maximum	54.52	44.89	51.62
Minimum	4.04	3.85	0.00
Standard Deviation	10.46	9.12	12.56
Sample Size	277	279	276
Correlation Coefficient:			
CI 1	–0.53	–0.58	0.45
CI 2	-0.56	-0.61	0.67
CI 3	-0.64	-0.64	0.63
CI 4	-0.68	-0.65	0.59
CI 5	-0.55	-0.59	0.48

Notes: All data in Table 2 are pooled for four years (1980, 1985, 1990 and 1995).

The variables are defined as follows:

GREV: Government Revenue excluding Grants over GDP.

TR: Tax Revenue over GDP.

ITR: Taxes on International Trade over Government Revenue.

Source: World Bank (2000), "World Development Indicators on CD-Rom."

To represent the proxy for the initial stage of an economy, real GDP per capita in 1979-80 (denoted as GDP80), import volume in 1979-80 and government consumption in 1980 are also used as independent variables. The GDP80 is used as a determinant of the government revenue since it represents the initial level of economic development, which is the average for the period 1979-80. The different levels of development may

[4] Since every country has different governmental and tax system, we use the data on "tax revenue over GDP" rather than "tax revenue over central government revenue."

require different needs for government revenue. Import volume is defined as the ratio of imports to GDP and used in the estimations on the ratio of international taxes over current government revenue on the belief that an elevated import volume may increase the international tax revenue. Moreover, the initial level of government consumption may affect the collection of domestic tax revenue, and hence government consumption over GDP in 1980 is used as an independent variable in determining the tax revenue over GDP. General government consumption includes all current spending for purchases of goods and services (including wages and salaries) as well as most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation (see WDI table 4. 9). The above three independent variables are also drawn from the World Bank (2000).

C. Empirical Equations and Results

The first empirical task is to identify the effectiveness of instrumental variables for CI using the OLS method. The CI function estimated takes the following form:

$$(CI)_i = c + a_j X_i + error\ \ term. \tag{1}$$

Here, the subscript i denotes countries; c is a constant; a_j $(j = 1 \ldots 3)$ are the estimated coefficients of the corresponding independent variables; and X is a set of instrumental variables. We expect that the estimated coefficients of ELF are positive and those of PP and FBUK are negative signs. The estimation results on the determinants of corruption are provided in Table 3.

Table 3. Determinants of Corruption
Dependent Variable: Corruption Indices (CI)

Independent Variables	(1) CI 1	(2) CI 2	(3) CI 3	(4) CI 4	(5) CI 5
Constant	2.87***	3.88***	4.75***	4.43***	4.97***
	(6.07)	(7.17)	(8.91)	(9.65)	(11.05)
PP	-0.04***	-0.04***	-0.05***	-0.05***	-0.05***
	(-4.99)	(-5.13)	(-6.55)	(-7.34)	(-8.39)
ELF	0.03**	0.03**	0.03***	0.04***	0.03***
	(2.54)	(2.15)	(3.28)	(-5.16)	(3.54)
FBUK	-1.61**	-1.35	-1.70**	-2.74***	-1.72***
	(-2.27)	(-1.62)	(-2.41)	(-5.75)	(-2.88)

Table 3. (Continued)

Independent Variables	(1) CI 1	(2) CI 2	(3) CI 3	(4) CI 4	(5) CI 5
R^2	0.37	0.34	0.51	0.66	0.55
Sample Size	51	57	43	40	55

Notes: 1) The variables are defined as follows:

CI: Corruption Indices (see Table 1).

PP: Percentage of Protestant Faith (Treisman (2000)).

ELF: Ethnolinguistic Fractionalization (Taylor and Hudson (1972)).

FBUK: Former British Colony or UK (Treisman (2000)).

2) Column numbers refer to different regressions using different corruption indices. 3) *t*-statistics are in parentheses based on the White's heteroskedasticity-consistent standard errors and covariance. 4) $^{*}(^{**}, ^{***})$ indicates significance at 10% (5%, 1%) level.

The regression results indicate that a higher level of corruption is positively associated with ELF and negatively associated with PP and FBUK.[5] Except the estimated coefficient of FBUK on CI 2, all estimated coefficients are statistically significant at the conventional levels. Therefore, it is possible to conclude that countries with protestant traditions and histories of former colony or UK were less corrupt. On the country, more ethnolinguistically-fractionalized countries were more corrupt.

To identify the impacts of corruption on the ratio of government revenue excluding grants to GDP (GREV), four years of GREV are separately regressed on the CI and GDP80 using the OLS method. The GREV regression takes the following form:

$$(GREV)_{it} = c + a(GDP80)_i + b(CI)_i + error\ \ term\ . \tag{2}$$

Here, subscripts i and t denote countries and time periods (1980, 1985, 1990 and 1995), respectively; c is a constant; a and b are the estimated coefficients of the corresponding independent variables. Of particular interest in (2) is the estimated coefficient of b, which shows whether government revenue is affected by the indices of corruption. The expectation is a negative sign, implying that a country with a higher level of corruption has a smaller volume of government revenue. The estimated coefficient a suggests how the initial level of GDP per capita affects the total amount of government revenue.

[5] Mauro (1998) and Treisman (2000) provided a number of determinants of corruption index beyond the instruments provided in this paper.

Table 4. Corruption and Government Revenue
Dependent Variable: Ratio of Government Revenue Excluding Grants to GDP (GREV)

	Dependent Variable	Constant	GDP80	CI 1	CI 2	CI 5	R^2	Sample Size
(1)	GREV80	26.19***	5.84	-1.50**			0.26	51
		(6.50)	(1.11)	(-2.09)				
		32.12***	-0.94		-1.96**		0.20	62
		(5.21)	(-0.14)		(-2.16)			
		37.31***	-2.85			-2.33***	0.26	54
		(6.69)	(-0.49)			(-3.21)		
(2)	GREV85	30.11***	4.55	-2.13***			0.32	51
		(7.17)	(0.80)	(-3.02)				
		36.02***	-1.52		-2.48**		0.26	55
		(5.02)	(-0.20)		(-2.22)			
		43.29***	-5.98			-2.88***	0.28	54
		(6.32)	(-0.86)			(-3.36)		
(3)	GREV90	24.70***	10.11*	-1.39**			0.37	50
		(5.87)	(1.72)	(-2.28)				
		39.40***	-3.64		-3.56***		0.49	51
		(6.53)	(-0.52)		(-3.92)			
		40.71***	-2.61			-2.80***	0.34	57
		(5.54)	(-0.35)			(-3.10)		
(4)	GREV 95	26.81***	7.75	-1.39**			0.33	47
		(6.64)	(1.37)	(-2.22)				
		38.44***	-4.02		-2.94***		0.37	47
		(5.96)	(-0.55)		(-3.01)			
		37.56***	-0.53			-2.28***	0.33	51
		(5.46)	(-0.07)			(-2.74)		

Notes: 1) GREV 80, 85, 90 and 95 are government revenue in 1980, 1985, 1990 and 1995, respectively. 2) GDP80 is the average of GDP per capita (PPP estimated) in 1979 and 1980, and the coefficients of GDP80 are multiplied by 10000. 3) *t*-statistics are in parentheses based on the White's heteroskedasticity-consistent standard errors and covariance. 4) *(**, ***) indicates significance at 10% (5%, 1%) level.

Table 4 contains the results on the relationship between CI and government revenue. It shows that GREV is negatively and significantly associated with CI.[6] The magnitude

[6] It is not provided the results using CI 3 and CI 4 to beautify the Tables 4, 5 and 7. However, the results using CI 3 and CI 4, which have smaller sample sizes than others, are not different from those using CI 1, CI 2 and CI 5, which are available upon request from the author.

of the coefficient is considerable; that is, a worsening in transparency (i.e., an increasing in CI 1) of a country by one standard deviation (2.41 points on a scale of 0 to 10) would lead to decrease in the GREV of about 3.35 (1990 and 1995) through 5.13 (1985) percentage points. The results remain for other corruption indices at the conventional significance levels and are robust to the inclusion of GDP80. However, the impacts of GDP per capita in 1979-80 on GREV provide little evidence. Therefore, GREV is determined by political motivations such as rent-seeking rather than the level of economic development.

It is worthwhile to note that corruption is not the only determinant on the government revenue. For example, in most developing countries, nonbudgetary funds are a common feature due to earmarking and underdeveloped government accounting system, which are basically hard to observe and differentiate across countries.

Now, the analysis will determine whether CI influences the components of government revenue, such as taxes on international trade over current government revenue (ITR) and tax revenue over GDP (TR). Specifically, ITR regression takes the following form:

$$ITR_{it} = c + a(CI)_i + b(IMV)_i + error\ \ term. \tag{3}$$

Here, subscripts i and t denote countries and time periods, respectively; c is a constant; a and b are the estimated coefficients of the corresponding independent variables; and IMV is the import volume that is the average for the period 1979-80. In estimating (3), two econometric methods will be used, those being OLS and Two-Stage Least Square (TSLS).

It is natural to assume that error terms in each period in (3) are correlated to each other. For example, a shock affecting ITR for the year 1980 may spill over and affect ITR for the year 1985 or other years. Hence, the regression proceeds in the SURE (Seemingly Unrelated Regression Estimation) method by combining all periods, and all regressions are based on a fixed-effect regression model. The ITR regression for the panel estimation takes the following form:

$$\begin{aligned} ITR_i = {} & c_1 DY80 + c_2 DY85 + c_3 DY90 + c_4 DY95 \\ & + a_1(CI \cdot DY80)_i + a_2(CI \cdot DY85)_i + a_3(CI \cdot DY90)_i + a_4(CI \cdot DY95)_i \\ & + b(IMS)_i + error\ \ term. \end{aligned} \tag{4}$$

Here, the subscript i denotes countries; c is a constant; DY80 (85, 90 and 95)

represents a time dummy for the year 1980 (1985, 1990 and 1995);[7] $a_j (j = 1 \ldots 4)$ are the estimated coefficients of corruption indices and b is that of import volume in 1979-80.

The empirical results on the impacts of CI on ITR, which are provided in Tables 5 and 6, are consistent with a prior expectation. In Table 5, the estimated coefficients of CI are positive and statistically significant at one percent significance level, which implies that more corrupt countries tend to heavily depend on the taxes on international trade for their source of government revenue. In Columns (2), (4) and (6), PP, ELF and FBUK are used as the instrumental variables for CI. The estimated coefficients of the CI remain broadly unchanged when using a number of different sources of the indices and instrumental variables. In addition, it is found that import volume in 1979-80 is positively and significantly related to the ITR at the conventional levels. This result implies that a country with a larger volume of imports collects significantly greater revenue from the taxes on international trade.

Table 5. International Tax Revenue and Corruption

Dependent Variable: Taxes on International Trade Over Current Government Revenue (ITR)

Independent Variables	(1) OLS	(2) TSLS	(3) OLS	(4) TSLS	(5) OLS	(6) TSLS
Constant	2.89***	-0.10	-1.86	-1.99	-3.62***	-1.54
	(2.71)	(-0.08)	(-1.20)	(-1.09)	(-2.65)	(-0.90)
CI 1	2.10***	2.95***				
	(8.04)	(7.12)				
CI 2			3.00***	3.03***		
			(12.21)	(8.36)		
CI 5					2.56***	2.18***
					(12.75)	(7.67)
Import Volume	0.04*	0.06**	0.08*	0.08*	0.08***	0.07**
	(1.72)	(2.36)	(1.72)	(1.74)	(2.61)	(2.29)
R^2	0.20	0.17	0.45	0.44	0.30	0.29
Sample Size	196	196	191	191	210	210

Notes: 1) Instrumental variables in TSLS are constant, import volume (1979-80), PP, ELF and FBUK (refer to the bottom of Table 3 for notations). 2) *t*-statistics are in parenthesis based on the White's heteroskedasticity-consistent standard errors and covariance. 3) *(**, ***) indicates significance at 10% (5%, 1%) level.

[7] Note that CI*DY80 (85, 90 and 95) is the product of CI and the time dummy for the year 1980 (1985, 1990 and 1995).

It is possible to suspect that the above results are generally derived from the fact that the level of economic development affects the degree of corruption. To reduce such a serious causation problem, an attempt is made to estimate the same regressions using a small sample of developing countries.[8] The results on CI 2, CI 3 and CI 4 are very similar to those of the full sample with a bit reduced significances, whereas the estimated coefficients of CI 1 and CI 5 are statistically insignificant. The different impacts among corruption indices in developing countries may be derived from relatively great variations among corruption indices and a small sample size. That is, the correlation coefficient between CI 1 and CI 2 is 0.81 in the full sample (see Table 1), but that in the small sample of developing countries is 0.53 (N = 23). Therefore, it is able to roughly observe that CI are positively associated with ITR in developing countries. Particularly, the results using CI 2, CI 3 and CI 4 are robust to those using the full sample.

The results of the panel estimation on ITR using the SURE method are illustrated in Table 6. All estimated coefficients of CI are positive and significant, which is consistent with the results using the OLS and TSLS methods. That is, the results certify the positive association between CI and ITR. In other words, a worsening in the corruption (i.e., an increasing in CI 5) of a country by one standard deviation (2.49 points on a scale of 0 to 10) is associated with an increase in the ITR of about 4.83 (CI·DY85) through 6.05 (CI·DY80) percentage points per year (Column (5) in Table 6). The estimated coefficients of import volume are now statistically insignificant,[9] which implies that ITR can be determined by corruption rather than import volume.

Table 6. Panel Estimation for International Tax Revenue and Corruption

Dependent Variable: Taxes on International Trade Over Current Government Revenue (ITR)

Independent Variables	(1) CI 1	(2) CI 2	(3) CI 3	(4) CI 4	(5) CI 5
DY80	3.81	3.59	-4.14	-1.16	-0.17
DY85	2.58	3.03	-4.97	-2.09	-0.21
DY90	1.78	2.29	-5.46	-2.81	-1.63
DY95	2.12	0.44	-5.21	-2.57	-3.50
CI · DY80	2.92***	3.15***	3.08***	2.04***	2.43***
	(4.48)	(6.74)	(5.79)	(4.36)	(4.24)
CI · DY85	2.71***	2.67***	2.98***	2.17***	1.94***
	(5.28)	(8.05)	(6.83)	(5.58)	(4.28)

[8] It is not provided the results using a small sample of developing countries as any form of table. The reason is that the results are derived from a quite small sample size, which dissuades to believe them.

[9] In Table 6, the estimated coefficient of import volume (1979-80) is statistically significant at ten percent significance level only when CI 5 is used.

Table 6. (Continued)

Independent Variables	(1) CI 1	(2) CI 2	(3) CI 3	(4) CI 4	(5) CI 5
CI · DY90	2.69***	3.69***	2.69***	2.15***	2.09***
	(5.52)	(7.26)	(7.32)	(5.38)	(4.73)
CI · DY95	2.10***	2.48***	2.38***	1.66***	2.13***
	(3.90)	(6.56)	(6.35)	(4.55)	(5.28)
Import Volume	0.01	-0.12	0.04	0.03	0.06*
	(0.38)	(-0.36)	(1.28)	(1.05)	(1.76)
R^2	0.22	0.46	0.44	0.37	0.28
Panel Observations	198	216	168	155	219

Notes: 1) SURE (Seemingly Unrelated Regression Estimation) method is used for estimations. 2) Column numbers refer to different regressions using different corruption indices denoted in the first row. 3) DY80 (85, 90 and 95) and CI · DY80 (85, 90 and 95) denote the multiplication between constant and time dummy, and between corruption index and time dummy for the year 1980 (1985, 1990 and 1995, respectively). 4) Import Volume is the average of two years in parenthesis. 5) *t*-statistics are provided in parentheses. 6) *(**, ***) indicates significance at 10% (5%, 1%) level.

Finally, the TR function estimated takes the following form, which is basically very similar to (3) and (4).

$$TR_{it} = c + a(CI)_i + b(GC)_i + error\ \ term. \tag{5}$$

Here, GC denotes the government consumption in 1980. We expect a negative impact of CI on the TR, meaning that a country with a higher level of corruption has a relatively lower volume of domestic tax revenue. Moreover, a positive impact of the initial level of government consumption on the TR can be anticipated.

In the same way, the panel estimation for TR using the SURE method with a fixed-effect is represented as follows:

$$\begin{aligned} TR_i = {} & c_1 DY80 + c_2 DY85 + c_3 DY90 + c_4 DY95 \\ & + a_1(CI \cdot DY80)_i + a_2(CI \cdot DY85)_i + a_3(CI \cdot DY90)_i + a_4(CI \cdot DY95)_i \\ & + b(GC)_i + error\ \ term. \end{aligned} \tag{6}$$

Tables 7 and 8 provide the empirical results on the impacts of CI on TR. It is found that there exists a negative and significant association between CI and TR. This implies that more corrupt countries tend to have smaller domestic tax revenues as the source of government revenue. In other words, corruption may contribute to tax evasion, improper

tax exemptions or weak tax administration. The results are robust for various corruption indices, to two different econometric methods (OLS and TSLS) and to the inclusion of government consumption in 1980. It is worthwhile to note that if corruption increases tax evasion and tax collection costs, government can rely on the inflation tax as a source of the government revenue. The positive and significant relationship between corruption and inflation was provided in Al-Marhubi (2000). Moreover, the estimated coefficients of government consumption show that it is positively and significantly (at one percent significance level) associated with TR. It means that a country with a greater volume of government consumption collects a larger volume of tax revenue. In Table 7, an increase in government consumption over GDP in 1980 of a country by one standard deviation (6.08 points) would lead to an increase in the TR of about 3.10 percentage points (Column (2)) through 4.26 percentage points (Column (4)) per year after accounting the effect of corruption.

Table 7. Tax Revenue and Corruption
Dependent Variable: Tax Revenue Over GDP (TR)

Independent Variables	(1) OLS	(2) TSLS	(3) OLS	(4) TSLS	(5) OLS	(6) TSLS
Constant	18.45***	19.32***	18.34***	15.76***	20.42***	15.79***
	(9.35)	(6.74)	(9.49)	(5.53)	(9.01)	(5.46)
CI 1	-1.65***	-1.81***				
	(-6.47)	(-3.95)				
CI 2			-1.64***	-1.26***		
			(-7.25)	(-3.37)		
CI 5					-1.49***	-0.91***
					(-6.84)	(-2.85)
Government Consumption	0.54***	0.51***	0.61***	0.70***	0.55***	0.67***
	(5.96)	(4.41)	(7.66)	(6.06)	(6.06)	(6.09)
R^2	0.44	0.44	0.52	0.51	0.46	0.44
Sample Size	193	193	193	193	206	206

Notes: 1) Instrumental variables in TSLS are constant, government consumption (1980), PP, ELF and FBUK (refer to the bottom of Table 3 for notations). 2) *t*-statistics are in parentheses based on the White's heteroskedasticity-consistent standard errors and covariance. 3) * (**, ***) indicates significance at 10% (5%, 1%) level.

The panel estimation using the SURE method, provided in Table 8, presents very similar results as in the Table 7. That is, the signs are exactly the same, and the sizes of coefficients and the significances of those are very close to each other, which provides another piece of evidence on the linkage between CI and TR. Certainly, corruption significantly reduces TR and the result is robust to the inclusion of the initial level of

government consumption. A worsening in the corruption (i.e., an increasing in CI 2) of a country by one standard deviation (2.72 points on a scale of 0 to 10) is associated with a decrease in the TR of about 3.37 (in 1980) through 4.98 (in 1990) percentage points (Column (2) in Table 8) per year after accounting the effect of government consumption in 1980. The estimated coefficients of government consumption in 1980 are also robust to the results of the OLS and TSLS methods: that is, it is positively and significantly associated with the TR.

Table 8. Panel Estimation for Tax Revenue and Corruption
Dependent Variable: Tax Revenue Over GDP (TR)

Independent Variables	(1) CI 1	(2) CI 2	(3) CI 3	(4) CI 4	(5) CI 5
DY80	14.21	16.82	20.45	21.37	23.30
DY85	16.24	18.27	22.28	23.64	24.63
DY90	15.32	19.10	21.63	23.06	25.09
DY95	15.85	19.25	21.08	22.59	24.52
CI · DY80	-1.23***	-1.24***	-1.73***	-1.88***	-1.78***
	(2.93)	(-4.35)	(-4.17)	(-4.56)	(-4.92)
CI · DY85	-1.55***	-1.41***	-1.98***	-2.25***	-1.88***
	(-3.70)	(-4.90)	(-4.69)	(-5.46)	(-4.93)
CI · DY90	-1.40***	-1.83***	-1.95***	-2.16***	-1.91***
	(-3.25)	(-6.50)	(-4.74)	(-4.90)	(-4.77)
CI · DY95	-1.42***	-1.53***	-1.80***	-2.04***	-1.76***
	(-3.39)	(-4.92)	(-4.29)	(-4.61)	(-4.46)
Government Consumption	0.68***	0.57***	0.60***	0.58***	0.41***
	(4.96)	(5.59)	(3.95)	(3.25)	(2.91)
R^2	0.45	0.49	0.47	0.48	0.41
Panel Observations	195	218	164	151	215

Notes: 1) SURE (Seemingly Unrelated Regression Estimation) method is used for estimations. 2) Column numbers refer to different regressions using different corruption indices denoted in the first row. 3) DY80 (85, 90 and 95) and CI · DY80 (85, 90 and 95) denotes the multiplication between constant and time dummy, and between corruption index and time dummy for the year 1980 (1985, 1990 and 1995, respectively). 4) *t*-statistics are provided in parentheses. 5) *(**, ***) indicates significance at 10% (5%, 1%) level.

In short, it is possible to conclude that corruption may reduce the government revenue as it contributes to reduce the tax revenue over GDP. In addition, a country with a higher level of corruption imposes greater taxes on international trade as a source of the government revenue. The distortions may be derived from the fact that corrupt politicians (or corrupt public office) use their authorities to the activities on which it is

easier to levy bribes (or side-payments). The results are robust to the inclusions of real GDP per capita, government consumption and import volume for several estimations.

3. CONCLUDING REMARKS

Since most empirical studies on corruption assumed that the amount of government revenue is exogenously given, it is difficult to find out the impacts of corruption on economic performances through government revenue. Using cross-country evidence, this paper examines the relationship between corruption and government revenue. It is found that corruption inversely affects both (i) total amount of government revenue excluding grants over GDP and (ii) tax revenue over GDP, and it is significantly and positively associated with the taxes on international trade over current government revenue. A possible interpretation of the observed association between corruption and the distortion of government revenue is that corrupt governments find it is easier to collect bribes on some activities than on others.

A number of issues remain for future study. This paper is focused on the distortions from corruption and not on solutions. It will be an interesting subject to find out the solutions of the problems derived from corruption for future study. Another plausible extension of this paper is to trace out the individual and joint effects of corruption and government revenue on income distribution in the same regression. Although the causation between corruption and income inequality is a controversial issue, corruption may change income distribution since rent-seeking is accompanied by well-organized interest groups. Moreover, we can apply the analysis of this paper to the corporate finance. As corruption affects the composition of government revenue, corrupt managers (or entrepreneurs) may heavily depend on an external finance (e.g., borrowing) rather than an internal one (e.g., equity) because the external finance provides more lucrative opportunities.

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