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Corruption and government revenue: Evidence of a non-linear relationship driven by crises

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ABSTRACT

A large body of literature studies the relationship between corruption and economic outcomes, including government revenue mobilization, but there is little evidence on how this relationship changes during times of crisis. Using a comprehensive panel dataset covering up to 194 countries in the period 1996 to 2020, we find evidence of a negative link between corruption and revenue that is amplified in times of crisis. The amplification appears to be driven by countries with lower average income levels, non-democratic governments, and higher natural resource dependency. Our findings are helpful in assessing different views of corruption offered in the literature. Overall, we find our results to be more consistent with a rent seeking view of corruption whereby, in times of crisis, corruption becomes more pervasive and government revenue declines. In contrast, we find no empirical support for the view that crises represent times of social improvement associated with increases in revenues.

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Corruption; crisis;
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seeking

1. Introduction

Much has been written about the relationship between corruption and economic outcomes in general, and between corruption and government revenue in particular. The empirical evidence overwhelmingly suggests that corruption is an obstacle to economic efficiency and development, and tends to divert government revenue (see our discussion below). At the same time, there is little evidence on how the relationship between corruption and revenue changes during times of crisis. This is particularly important, as economic theory offers different views on corruption, including theories that give rise to opposite predictions regarding the direction of change in the link between corruption and revenue during times of crisis.

On the one hand, an influential proposal of economic theory has been that crises are beneficial in facilitating economic reforms, including those aimed at reducing corruption and increasing government revenue (Drazen & Grilli, 1993). Thus, if the relation between

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beneficial reform and crises is present, governments should act beneficially to reduce corruption and increase government revenue when crises take hold, implying that the negative link between corruption and government revenue gets weakened during crises. For instance, this may be the case when diminished corruption expands the tax base, including via a reduction in tax evasion, so increasing government revenue. On the other hand, and contrary to the presumption of governments acting to reduce corruption, corruption may also increase in a crisis, through greater incentives for rent seeking as economic actors compete for a shrinking economic pie (Aidt, 2016; Hillman, 2019). In this case, crises would be predicted to amplify the negative link between corruption and government revenue.

Motivated by these opposite predictions arising from economic theory, this paper explores how crises affect the link between corruption and government revenue empirically. Using a comprehensive panel dataset covering up to 194 countries in the period 1996 to 2020,¹ we find evidence of a negative link between a broad-based measure of corruption and government revenue that is amplified during economic crises. The amplification appears to be driven by countries with lower average income levels, non-democratic governments, and higher natural resource dependency (the latter indicating another possible manifestation of the “resource curse”).² Overall, we find our results to be more in line with a rent seeking view of corruption whereby, in times of crisis, corruption becomes more pervasive and government revenue declines. In contrast, we find no empirical support for the view that crises represent times of social improvement associated with increases in economic or government efficiency leading to higher revenues (Drazen & Grilli, 1993).

Our findings are based on several sets of country-level panel regressions with revenue-to-GDP ratios as the dependent variable, and indicators of corruption and of crisis as well as an interaction term of corruption and crisis as the main regressors. The interaction term is included to explore whether crises affect the link between corruption and government revenue. The panel structure of our data allows us to control for both observable and unobservable, time-invariant country characteristics through the inclusion of country-fixed effects. In addition, we control for time-varying factors at the country level by including several such variables as controls, and for global shocks through the inclusion of year fixed effects. Nevertheless, we stress that the observational nature of our data limits our ability to identify causal effects. Our results should therefore be seen as providing a first step in investigating the dynamics between corruption, government revenue, and crises.

The rest of the paper is structured as follows. [Section 2](#) discusses related literature. [Section 3](#) explains our empirical strategy. [Section 4](#) describes the underlying data. [Section 5](#) presents the results. [Section 6](#) concludes.

¹The period of analysis is determined by data availability of our main variables of interest (see [Section 4](#)).

²For example, it has been argued that countries with great natural resource wealth tend to grow more slowly than resource-poor countries for a number of reasons, including because natural resource rents are concentrated and easily appropriable, thus facilitating rent-seeking and corruption by government officials (Deacon & Rode, 2015; Frankel, 2010).

2. Related literature

The empirical evidence overwhelmingly suggests that corruption is an obstacle to development (Abed & Gupta, 2002; Fisman & Svensson, 2007; Hillman, 2004; Le et al., 2012) and in particular diverts government revenue (Bogetic & Naeher, 2023; Gupta, 2007; Khwaja & Iyer, 2014). Government revenue is directly reduced by tax evasion and improper tax exemptions (Tanzi, 1998; Tanzi & Davoodi, 1997). In addition, government revenue is also lowered via more indirect channels; for instance when corruption lowers the private marginal product of capital and thus inhibits investments into taxable business activities (Mauro, 1995). Baldacci et al. (2004) find that for low-income countries reduced government spending increases economic growth, which they attribute to reduced opportunities for rent seeking from government revenue including reduced presence of “ghosts” (fictitious wage-receiving officials in government bureaucracies). Park et al. (2005) observe that rent seeking diminishes the socially desirable magnitude of the public sector. Moreover, corruption has been observed to be associated with lower overall efficiency in domestic revenue mobilization (Bogetic et al., 2022) which may also be linked to the compositions of sources of government revenue. For example, Mauro (1998) and Hwang (2002) show that governments in more corrupt countries tend to rely more heavily on revenues obtained from taxing international trade than on domestic taxes, although governments in general in low-income countries rely more on revenue from trade because of administrative feasibility (Hillman, 2019, chapter 2). De Jong and Bogmans (2011) find that bribes to customs officials increase imports but the bribes reduce government revenue from import taxes. They find, in addition to the revenue decline from diversion of revenue to bribes, that corruption increases waiting times at borders, reducing international trade, and thereby revenue from taxes on trade. Revenue diversion through bribes also depends on the level of a bureaucracy at which bribes are taken (Aidt et al., 2020) and on the tax administration’s willingness to accept (and request) bribes (Alm et al., 2016).

Much less is known about how the relationship between corruption and government revenue changes during times of crisis. Some authors propose that crises can have positive effects on economic outcomes and government efficiency because they facilitate economic reforms (Drazen & Grilli, 1993). In contrast, much of the evidence on rent seeking suggests that corruption and inefficiency will tend to increase in a crisis, as the incentives for rent seeking are higher when economic actors compete for a shrinking economic pie (Aidt, 2016; Hillman, 2019; Tullock, 1980).³ If crises are indeed beneficial for economic reforms and government efficiency, then any negative impacts of corruption on government revenue should be weakened during times of crisis. If, on the other hand, effects in the opposite direction dominate, then the negative effect of corruption on government revenue should become stronger during times of crisis. This contradicting prediction offers a possibility to assess the empirical validity of the different views of corruption, which motivates our empirical analysis below.

Previous studies investigating the role of corruption in determining government revenue have been impeded by limited data availability. For example, Tanzi and Davoodi (1997) show that higher corruption is associated with lower revenues in a

³It is generally the case that an increased value of a rent attracts more unproductive rent seeking (for an overview of the results of rent-seeking models, see Long, 2015).

sample of 95 countries over the period 1980 to 1995. Le et al. (2012) examine the roles of several structural factors for revenue collection in a sample of 110 countries for the period 1994 to 2009. Ajaz and Ahmad (2010) focus on the role of governance and a sample of 25 developing countries in the period 1990 to 2005. Khwaja and Iyer (2014) consider 61 countries during the period 2000 to 2010. We use a recent and more comprehensive panel dataset covering up to 194 countries (including 132 low- and middle- income countries) in the period 1996 to 2020 to provide new evidence on the empirical dynamics between corruption, revenue, and crises.

3. Methodology

Our estimation strategy is based on a country-level panel regression framework where the dependent variable (revenue-to-GDP ratio) is regressed on indicators of corruption and of crisis as well as an interaction term of corruption and crisis. The interaction term is included to address our main research question, whether and how crisis affects the link between corruption and revenue. The panel structure of our data allows us to control for both observable and unobservable, time-invariant country characteristics (e.g., geographical features, history, cultural traits) through the inclusion of country-fixed effects. In addition, we control for time-varying factors at the country level by including those variables as controls. We also account for global trends or shocks that affect revenue collection through the inclusion of year fixed effects. Formally, the main regression model can be written as:

$$Revenue_{it} = \beta_0 + \beta_1 Corruption_{it} + \beta_2 Crisis_{it} + \beta_3 (Cor \times Cri)_{it} + X_{it}\gamma + \delta_i + \theta_t + \varepsilon_{it}, \quad (1)$$

where $Revenue_{it}$ is the revenue-to-GDP ratio of country i in year t . The interaction term $(Cor \times Cri)_{it}$ of $Corruption_{it}$ and $Crisis_{it}$ is the main regressor of interest. The terms δ_i and θ_t denote country and year fixed effects (FE). X_{it} is a vector of control variables capturing time-varying factors at the country level such as GDP per capita, sectoral composition of GDP, natural resources rents, degree of trade openness, foreign aid, informal economy, and further institutional factors. Some regressions also include the lagged dependent variable, $Revenue_{it-1}$, as an explanatory variable. Standard errors are clustered at the country level.

4. Data

In identifying times of crisis in our dataset, we focus on using indicator variables that capture economic recessions at the country level. Since there is no generally accepted threshold of economic recession that defines a crisis, and to improve the robustness of our results, we work with two different thresholds.⁴ Specifically, we construct two binary indicators of crisis which take the value 1 for country-year observations with GDP growth rates below -1 percent and below -2 percent, respectively (and 0 otherwise).

⁴A recession is commonly defined as a period of economic contraction (negative GDP growth) lasting at least two consecutive quarters (although official definitions vary across countries). However, we perceive that not every recession will automatically constitute a crisis, so we adopt a slightly stricter measure when defining crisis.

Notice that this is a slightly stricter measure than the common definition of a recession (i.e., two or more consecutive quarters of negative GDP growth) so that not every recession will automatically be counted as a crisis in our analysis.

In measuring corruption, we rely on the “control of corruption” indicator from the Worldwide Governance Indicators database (Kaufmann & Kraay, 2021), which is used in many recent studies investigating differences in corruption at the country level.⁵ This indicator aggregates information on various aspects of corruption, and from different types of sources. Its values range from approximately -2.5 (low control of corruption) to $+2.5$ (high control of corruption). For better clarity, we construct our variable *Corruption* as the negative of the original indicator, so that higher values correspond to higher levels of corruption. One advantage of this indicator is that it is available for almost all countries globally, which is a necessary requirement for the purpose of this study. Data on this indicator are available since 1996, which thus defines the beginning of our sample.

One concern with this measure of corruption may be that it does not allow to distinguish between different forms of corruption, particularly those that directly reduce government revenues (such as fraud and tax evasion) and other forms of corruption that are only indirectly linked to lower revenues. However, given the various channels identified in the literature through which revenues can be negatively impacted (including indirect channels), it may in fact rather be appropriate to work with a broad-based measure of corruption. For instance, it has been argued (recall Section 2) that any form of corruption that lowers the private marginal product of capital will ultimately inhibit investments into taxable business activities. Thus, even if some forms of corruption do not directly decrease revenues, they may still be harmful to the overall investment climate and thereby lead to lower revenues via a reduction in taxable business activities.

The outcome variable we focus on is government revenue as a percentage of GDP from the IMF’s World Economic Outlook database, which contains information on general government revenue for up to 194 countries. In addition to the two key explanatory variables capturing crisis and corruption, the other considered variables controlling for time-varying factors at the country level are GDP per capita, natural resources rents (% of GDP), the sum of exports and imports as a share of GDP (trade openness), the share of agriculture in GDP (to partly capture the sectoral composition of output), foreign aid inflows as a share of GDP, informal output as a share of GDP (based on dynamic general equilibrium model estimates from the World Bank’s Informal Economy Database; Elgin et al., 2021), and measures of the degree of democracy and political stability.

All data used in this study are publicly available from the sources described in Table 1, which also provides information on the construction of each variable. For most of the considered variables, data are available annually for the years 1996 to 2020. The only exception is the variable *Informal Economy*, for which data are only available up to 2018. Since this variable tends to change slowly over time, we impute the missing values in 2019

⁵The Worldwide Governance Indicators (WGI) are a research dataset summarizing the views on the quality of governance provided by a large number of enterprises, citizen and expert survey respondents in industrial and developing countries. These data are gathered from a number of survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms. The WGI do not reflect the official views of the World Bank, its Executive Directors, or the countries they represent. The WGI are not used by the World Bank Group to allocate resources.

Table 1. List of variables and data sources.

Indicator	Description	Source
Revenue	General government revenue (% of GDP)	IMF (2021), World Economic Outlook
Corruption	Negative of the ‘Control of corruption’ indicator score (so that values range from approx. –2.5=low corruption to +2.5=high corruption)	Kaufmann and Kraay (2021), Worldwide Governance Indicators
Crisis	Dummy equal to 1 if annual GDP growth rate below –1/-2/-3 percent, respectively	IMF (2021), World Economic Outlook
GDP per capita	GDP per capita, PPP (in 1000 constant 2017 international \$)	World Bank (2023), World Development Indicators
Natural resources	Total natural resources rents (% of GDP), including oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents.	World Bank (2023), World Development Indicators
Agriculture	Agriculture, forestry, and fishing, value added (% of GDP)	World Bank (2023), World Development Indicators
Trade	Trade (% of GDP): Sum of exports and imports of goods and services measured as a share of GDP	World Bank (2023), World Development Indicators
Foreign aid	Net ODA received (% of GNI)	World Bank (2023), World Development Indicators
Informal economy	Informal output (% of GDP), based on dynamic general equilibrium model estimates	Elgin et al. (2021), Informal Economy Database
Democracy	Polity2 Score (values from –10=autocracy to +10=democracy). The cutoff for democratic/non-democratic countries is 5.	Center for Systemic Peace (2023), Polity5 Project
Political stability	Political stability and absence of violence/terrorism (values from approx. –2.5=low stability to +2.5=high stability)	Kaufmann and Kraay (2021), Worldwide Governance Indicators

Source: Authors’ compilation.

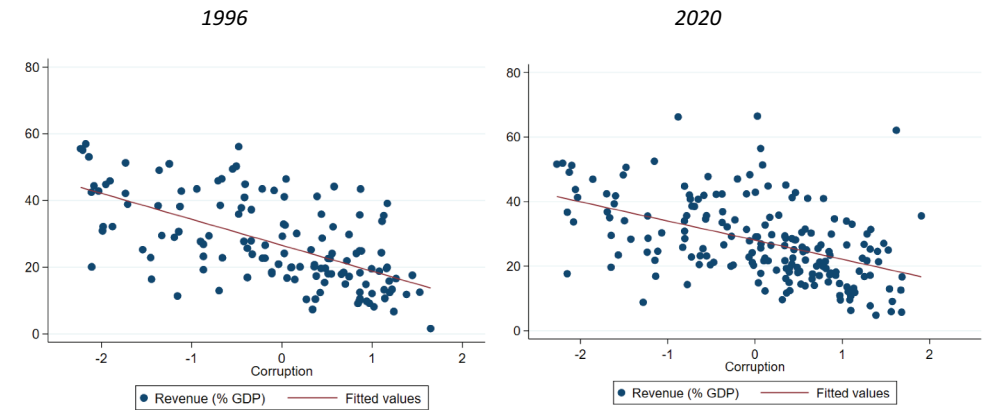


Figure 1. Relationship between corruption and revenue in 1996 and 2020. The fitted values (red line) are based on a bivariate linear regression. Countries with revenue-to-GDP ratios greater than one are excluded. Source: Authors’ analysis.

and 2020 using the values from 2018 (if available). In addition, the data on corruption is not available for the years 1997, 1999, and 2001, since initially the Worldwide Governance Indicators were only reported biennially. To still be able to include these years in the analysis, we impute the missing values in these three years using the values from the previous year, respectively (if available).⁶ The total sample consists of up to 194

⁶Our main regression results remain qualitatively the same when these three years are excluded (see Section 5).

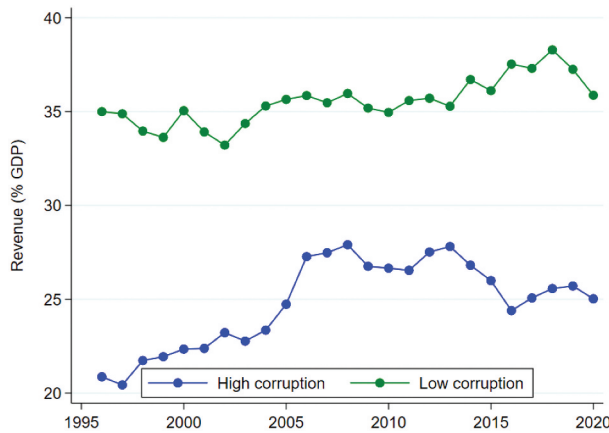


Figure 2. Revenues in high/low corruption countries over time. High corruption countries are defined as those with a negative value of the “Control of Corruption” indicator from the Worldwide Governance Indicators (WGI) database (all others are considered low corruption countries). *Source:* Authors’ analysis.

countries, comprising 28 low-income countries, 104 middle-income countries, and 62 high-income countries (according to World Bank classification).⁷

5. Results

5.1. Descriptive analysis

Figure 1 shows the (unconditional) relationship between corruption and revenue in 1996 and 2020. In both years, there is a clear negative relationship between corruption and revenue: higher levels of corruption are associated with lower revenue-to-GDP ratios. As can be seen in Figure 2, the negative relationship between corruption and revenue does not only apply to the two years considered in Figure 1, but also across time. Moreover, Figure 3 shows that the negative relationship between corruption and revenue applies across different groups of countries according to income level, political regime type, and natural resource dependency, albeit with different magnitudes (as indicated by the slope of the fitted values shown in Figure 3).⁸

⁷We sometimes exclude countries with revenue-to-GDP ratios greater than one as outliers (as indicated in the notes to each table and figure). This affects the following countries: Kiribati, Nauru, Tuvalu, São Tomé and Príncipe, Timor-Leste.

⁸There is no universal definition of what constitutes a resource-rich country, though many recent studies use classifications based on natural resource rents as a percentage of GDP (Collier & Hoeffler, 2009; Venables, 2016). Following this notion, we define resource-poor countries as those with total natural resources rents below 5 percent of GDP (all others are considered resource-rich). In 2020 (Figure 3), there were 53 resource-rich countries: Algeria, Angola, Australia, Azerbaijan, Bahrain, Brunei Darussalam, Burkina Faso, Burundi, Cape Verde, Central African Republic, Chad, Chile, Congo, Congo (DR), Equatorial Guinea, Eritrea, Ethiopia, Gabon, Ghana, Guinea-Bissau, Guyana, Iran, Iraq, Kazakhstan, Kuwait, Kyrgyzstan, Liberia, Libya, Madagascar, Mali, Mongolia, Mozambique, Niger, Nigeria, Oman, Papua New Guinea, Qatar, Russia, Saudi Arabia, Sierra Leone, Solomon Islands, Somalia, South Sudan, Sudan, Tajikistan, Trinidad and Tobago, Turkmenistan, Uganda, United Arab Emirates, Uzbekistan, Venezuela, Yemen, Zambia.

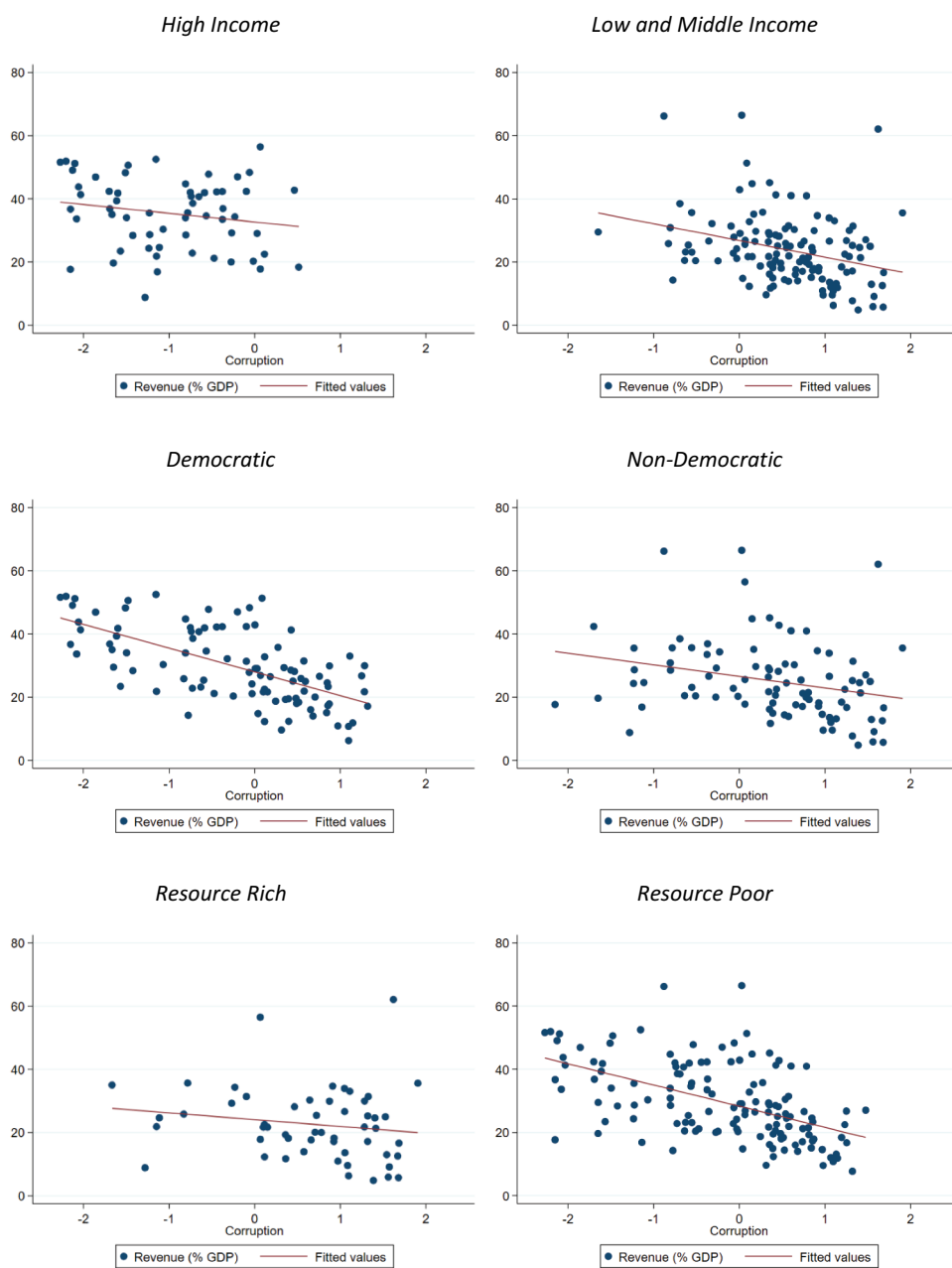


Figure 3. Relationship between corruption and revenue in different country groups, 2020. Income groups are defined according to World Bank classification. Democratic countries are defined as those with a Polity score above 5 (all others are considered non-democratic). Resource-poor countries are defined as those with total natural resources rents below 5 percent of GDP (all others are considered resource-rich). The fitted values (red lines) are based on bivariate linear regressions. Countries with revenue-to-GDP ratios greater than one are excluded. Data are for the year 2020. *Source:* Authors' analysis.

Table 2. Regression results—dependent variable: revenue (% GDP).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corruption*Crisis	-1.037*** (0.008)	-0.612** (0.019)	-0.657*** (0.001)	-0.543*** (0.000)	-1.295*** (0.004)	-0.730** (0.012)	-0.905*** (0.000)	-0.695*** (0.000)
Corruption	-2.047** (0.038)	-1.066* (0.080)	-0.288 (0.354)	0.030 (0.920)	-2.067** (0.035)	-1.114* (0.065)	-0.304 (0.325)	0.020 (0.945)
Crisis (<-1%)	-1.172*** (0.004)	-1.208*** (0.001)	-0.833*** (0.001)	-0.572** (0.013)				
Crisis (<-2%)					-1.049** (0.027)	-1.038** (0.020)	-0.754** (0.023)	-0.617** (0.023)
GDP per capita		-0.114** (0.033)	-0.028 (0.283)	-0.043* (0.072)		-0.113** (0.035)	(0.023)	(0.044*) (0.068)
Natural resources		0.327*** (0.000)	0.209*** (0.000)	0.190*** (0.000)		0.326*** (0.000)	(0.286) (0.000)	(0.189***) (0.000)
Agriculture		-0.236*** (0.000)	-0.099*** (0.001)	-0.102*** (0.000)		-0.236*** (0.000)	-0.097*** (0.001)	-0.099*** (0.000)
Trade		0.015 (0.182)	0.006 (0.223)	0.006 (0.251)		0.015 (0.179)	0.006 (0.211)	0.006 (0.240)
Foreign aid		0.111* (0.095)	0.078* (0.062)	0.045 (0.267)		0.113* (0.090)	0.078* (0.061)	0.045 (0.261)
Revenue (<i>t</i> -1)			0.599*** (0.000)	0.588*** (0.000)			0.601*** (0.000)	0.589*** (0.000)
Informal economy				0.002 (0.974)			-0.001 (0.991)	-0.001 (0.991)
Democracy				0.026 (0.420)			0.026 (0.432)	0.026 (0.432)
Political stability				0.664*** (0.000)			0.669*** (0.000)	0.669*** (0.000)
Country FE	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	4,442	3,871	3,726	3,115	4,442	3,871	3,726	3,115
Countries	188	172	172	140	188	172	172	140
R-squared (within)	0.093	0.233	0.533	0.542	0.093	0.230	0.534	0.542
R-squared (overall)	0.203	0.090	0.887	0.898	0.205	0.095	0.889	0.899

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. *p*-values in parentheses. Standard errors are clustered at the country level. Countries with revenue-to-GDP ratios greater than one are excluded.
Source: Authors' analysis.

5.2. Regression analysis

Table 2 presents the results of estimating the regression model specified in Equation (1). In columns (1)-(4), the variable *Crisis* is a dummy that equals one for negative GDP growth rates below -1 percent. The *Crisis* variable in columns (5)-(8) is defined analogously for growth rates below -2 percent. In each case, we report regression results for four different specifications featuring different sets of control variables (all regressions include country and year fixed effects). Most of the included variables either do not cover all 194 countries in our sample or, if they do, feature missing values for some country-year observations. This applies particularly to the variables *Informal economy*, *Democracy*, and *Political stability*. As including either of these variables considerably reduces the number of observations with non-missing data that are included in a given regression, we report our regressions both when including these three variables (columns (4) and (8) in Table 2) and when excluding them.

In line with the negative association between corruption and revenue observed in Figures 1 and 2, the results in Table 2 show that *Corruption* is negatively related to revenues, even when controlling for time-invariant country characteristics in a panel regression framework with country and year fixed effects (columns 1 and 5). In addition, the interaction term of *Corruption* and *Crisis* is negative and highly significant in all specifications. This suggests that the negative link between corruption and revenue is amplified during times of crisis; that is, the negative effect of corruption on revenue is larger in magnitude when a country is facing a recession. This result is robust to the inclusion of additional controls (columns 2 and 6). Adding also the lagged dependent variable, *Revenue* ($t-1$), decreases the number of country-year observations which renders the negative coefficient of *Corruption* statistically insignificant, while the interaction term remains highly significant (columns 3 and 7). Finally, in columns (4) and (8), a second set of controls is added which considerably reduces the number of countries (due to missing data for these variables). Nevertheless, the interaction term of *Corruption* and *Crisis* remains negative and significant.⁹

Overall, the results in Table 2 indicate that corruption tends to be associated with lower revenue-to-GDP ratios and that this link is stronger in magnitude when a county is going through a crisis. We now investigate whether this finding applies universally or is driven by specific groups of countries, focusing on income level, political regime type, and natural resource dependency (as defined in Figure 3). Each of these characteristics has been argued in the literature to play an important role for governments' ability to mobilize revenues, and it is conceivable that these factors may also matter in determining how the link between corruption and revenue changes during times of crisis. For example, democratic governments may have stronger institutions, including tax institutions, which can better deal with crises compared to authoritarian governments (Acemoglu & Robinson, 2019). In addition, the literature points to important linkages between natural resources, type of political regime, and income level in determining public capital and revenues (Bhattacharyya & Collier, 2014; Collier & Hoeffler, 2009).¹⁰

⁹We also verified that these results are robust to excluding the years without data on corruption (i.e., 1997, 1999, and 2001), and to including the five countries with revenue-to-GDP ratios greater than one (which were previously excluded as outliers).

Table 3. Results for high/low and middle-income countries—dependent variable: revenue (% GDP).

	High Income			Low and Middle Income				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corruption*Crisis	0.363 (0.281)	0.215 (0.534)	0.244 (0.520)	0.136 (0.713)	-1.527** (0.025)	-0.924* (0.056)	-2.244*** (0.004)	-1.159** (0.013)
Corruption	-0.422 (0.426)	-0.657 (0.274)	-0.442 (0.398)	-0.632 (0.302)	-0.359 (0.333)	0.266 (0.435)	-0.338 (0.347)	0.263 (0.429)
Crisis (<-1%)	0.966* (0.066)	0.680 (0.290)			-0.209 (0.721)	-0.324 (0.340)		
Crisis (<-2%)			1.271* (0.052)	0.734 (0.314)			0.263 (0.705)	-0.308 (0.346)
Revenue (t-1)	0.479*** (0.000)	0.499*** (0.000)	0.480*** (0.000)	0.499*** (0.000)	0.616*** (0.000)	0.605*** (0.000)	0.618*** (0.000)	0.606*** (0.000)
Natural resources	0.431*** (0.000)	0.357*** (0.000)	0.430*** (0.000)	0.354*** (0.001)	0.166*** (0.000)	0.154*** (0.000)	0.164*** (0.000)	0.154*** (0.000)
Agriculture	-0.211* (0.064)	-0.256** (0.038)	-0.204* (0.071)	-0.249** (0.044)	-0.088*** (0.004)	-0.087*** (0.001)	-0.083*** (0.007)	-0.083*** (0.001)
Trade	-0.005 (0.480)	-0.006 (0.486)	-0.004 (0.532)	-0.006 (0.509)	0.019*** (0.023)	0.012 (0.158)	0.020*** (0.021)	0.012 (0.153)
Foreign aid	0.223 (0.143)	-0.259 (0.300)	0.244 (0.121)	-0.253 (0.316)	0.088*** (0.038)	0.039 (0.308)	0.088*** (0.040)	0.039 (0.304)
Informal economy		0.158 (0.147)		0.155 (0.153)		0.003 (0.953)		0.001 (0.982)
Democracy		-0.126** (0.043)		-0.122** (0.049)		0.037 (0.263)		0.037 (0.257)
Political stability		-0.049 (0.913)		-0.039 (0.932)		0.690*** (0.000)		0.693*** (0.000)
Country FE	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1,272	1,065	1,272	1,065	2,509	2,088	2,509	2,088
Countries	56	46	56	46	121	97	121	97
R-squared (within)	0.486	0.533	0.488	0.533	0.564	0.562	0.566	0.562
R-squared (overall)	0.639	0.606	0.642	0.610	0.882	0.844	0.884	0.845

Income groups are defined according to World Bank classification. Countries with revenue-to-GDP ratios greater than one are excluded. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses. Standard errors are clustered at the country level.

Source: Authors' analysis.

Table 4. Results for democratic/Non-democratic countries—dependent variable: revenue (% GDP).

	Democratic			Non-democratic				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corruption*Crisis	-0.124 (0.407)	-0.114 (0.477)	-0.224 (0.193)	-0.212 (0.248)	-0.809** (0.021)	-0.532* (0.084)	-1.218*** (0.005)	-0.853** (0.042)
Corruption	-0.095 (0.786)	-0.232 (0.502)	-0.100 (0.775)	-0.234 (0.502)	-0.481 (0.377)	0.035 (0.956)	-0.476 (0.376)	0.052 (0.933)
Crisis (<1%)	-0.129 (0.496)	-0.081 (0.681)			-1.142*** (0.002)	-1.038** (0.015)		
Crisis (<2%)			-0.061 (0.784)	-0.010 (0.965)			-1.020** (0.048)	-1.077 (0.108)
Revenue (t-1)	0.559*** (0.000)	0.544*** (0.000)	0.560*** (0.000)	0.545*** (0.000)	0.558*** (0.000)	0.546*** (0.000)	0.560*** (0.000)	0.546*** (0.000)
GDP per capita	-0.150*** (0.000)	-0.142*** (0.001)	-0.149*** (0.000)	-0.141*** (0.001)	0.033 (0.382)	0.017 (0.654)	0.034 (0.376)	0.018 (0.650)
Natural resources	0.160*** (0.002)	0.140*** (0.004)	0.160*** (0.002)	0.140*** (0.004)	0.221*** (0.000)	0.222*** (0.000)	0.219*** (0.000)	0.221*** (0.000)
Agriculture	-0.086** (0.028)	-0.063 (0.121)	-0.087** (0.026)	-0.064 (0.116)	-0.122*** (0.003)	-0.128*** (0.006)	-0.116*** (0.004)	-0.121*** (0.008)
Trade	0.019*** (0.008)	0.017** (0.023)	0.019*** (0.007)	0.017** (0.021)	0.004 (0.587)	-0.003 (0.668)	0.004 (0.577)	-0.003 (0.669)
Foreign aid	0.217*** (0.000)	0.146** (0.048)	0.217*** (0.000)	0.146** (0.048)	0.033 (0.434)	0.009 (0.835)	0.034 (0.425)	0.011 (0.801)
Informal economy		0.076 (0.227)		0.075 (0.235)		-0.046 (0.495)		-0.053 (0.428)
Political stability		0.317 (0.257)		0.321 (0.249)		0.800*** (0.003)		0.811*** (0.003)
Country FE	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1,979	1,900	1,979	1,900	1,747	1,401	1,747	1,401
Countries	106	99	106	99	106	84	106	84
R-squared (within)	0.486	0.440	0.487	0.440	0.499	0.527	0.500	0.528
R-squared (overall)	0.743	0.721	0.747	0.727	0.828	0.833	0.831	0.833

Democratic countries are defined as those with a Polity score above 5 (all others are considered non-democratic). Countries with revenue-to-GDP ratios greater than one are excluded. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses. Standard errors are clustered at the country level.

Source: Authors' analysis.

Table 5. Results for resource-rich/Resource-poor countries—dependent variable: revenue (% GDP).

	Resource Rich			Resource Poor				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Corruption*Crisis	-1.179* (0.059)	-0.656 (0.249)	-1.828* (0.054)	-0.757 (0.376)	-0.105 (0.410)	-0.144 (0.280)	-0.163 (0.296)	-0.214 (0.173)
Corruption	0.883 (0.248)	0.999 (0.147)	0.906 (0.232)	1.000 (0.142)	-0.501** (0.027)	-0.123 (0.599)	-0.515** (0.023)	-0.123 (0.597)
Crisis (<-1%)	-1.304* (0.066)	-1.484* (0.055)			-0.310 (0.159)	-0.063 (0.705)		
Crisis (<-2%)			-0.961 (0.418)	-1.683 (0.131)			-0.183 (0.427)	-0.052 (0.792)
Revenue (t-1)	0.517*** (0.000)	0.472*** (0.000)	0.519*** (0.000)	0.474*** (0.000)	0.719*** (0.000)	0.753*** (0.000)	0.720*** (0.000)	0.753*** (0.000)
GDP per capita	0.147* (0.072)	0.083 (0.128)	0.146* (0.071)	0.081 (0.137)	-0.083*** (0.002)	-0.061** (0.017)	-0.082*** (0.002)	-0.061** (0.016)
Agriculture	-0.112** (0.021)	-0.130*** (0.002)	-0.105** (0.034)	-0.124*** (0.002)	-0.012 (0.719)	-0.046* (0.072)	-0.013 (0.707)	-0.046* (0.072)
Trade	0.055*** (0.000)	0.049*** (0.001)	0.055*** (0.000)	0.049*** (0.001)	0.006 (0.205)	0.004 (0.390)	0.006 (0.199)	0.004 (0.377)
Foreign aid	0.108* (0.053)	0.059 (0.231)	0.108* (0.052)	0.060 (0.225)	0.048 (0.319)	0.038 (0.495)	0.048 (0.322)	0.037 (0.499)
Informal economy		-0.104 (0.198)		-0.106 (0.196)		0.068 (0.117)		0.067 (0.124)
Democracy		0.094 (0.182)		0.093 (0.183)		0.006 (0.814)		0.005 (0.823)
Political stability		1.236*** (0.000)		1.237*** (0.000)		0.169 (0.232)		0.170 (0.226)
Country FE	yes	yes	yes	yes	yes		yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1,279	1,130	1,279	1,130	2,447	1,985	2,447	1,985
Countries	88	79	88	79	137	112	137	112
R-squared (within)	0.507	0.490	0.508	0.491	0.618	0.681	0.617	0.681
R-squared (overall)	0.806	0.800	0.808	0.802	0.957	0.957	0.958	0.957

Resource-poor countries are defined as those with total natural resources rents below 5 percent of GDP (all others are considered resource-rich). Countries with revenue-to-GDP ratios greater than one are excluded. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. p-values in parentheses. Standard errors are clustered at the country level.

Source: Authors' analysis.

Table 3 shows the results of estimating Equation (1) separately for high-income countries (columns 1 to 4) and lower-income countries (columns 5 to 8), with the latter group comprising both low-income and middle-income countries (according to World Bank classification). Across all specifications in Table 3, the interaction term of *Corruption* and *Crisis* is only statistically significantly negative within the set of lower-income countries, whereas it is never statistically different from zero in high-income countries. This suggests that the role of crises in affecting the link between corruption and revenue tends to matter more in less-developed economies.

Table 4 repeats the same exercise when splitting the sample into democratic countries (columns 1 to 4) and non-democratic countries (columns 5 to 8) based on the Polity score (recall Table 1). The interaction term of *Corruption* and *Crisis* is always negative and statistically significant within the set of non-democratic countries, whereas it is never statistically different from zero in democratic countries. This finding suggests that the type of political regime also matters for the dynamics between corruption, government revenue, and crises, with the role of crises being primarily present in non-democratic countries.

Finally, Table 5 shows the results when the sample is split between resource-rich countries (columns 1 to 4) and resource-poor countries (columns 5 to 8). The interaction term of *Corruption* and *Crisis* is only statistically significantly negative within the set of resource-rich countries (in columns 1 and 3),¹¹ whereas it is never statistically different from zero for the resource-poor countries. This suggests that the role of crises in affecting the link between corruption and revenue tends to matter more in countries with high natural resource dependency.

Overall, our findings suggest that (a) there is a negative link between corruption and revenue, (b) the absolute size of this link increases during times of crisis, and (c) this effect is driven by countries with lower average income levels, non-democratic governments, and higher natural resource dependency.

6. Conclusion

We study the empirical relationship between corruption and government revenue during times of crisis. Our study is based on a comprehensive panel dataset covering up to 194 countries in the period 1996 to 2020. We find evidence of a negative link between corruption and government revenue, with the absolute size of the link increasing during times of crisis, particularly in countries with lower average income levels, non-democratic governments, and higher natural resource dependency.

The theoretical literature offers different views on corruption, including theories that give rise to opposite predictions regarding the direction of change in the link between corruption and revenue during times of crisis. By examining empirically whether the negative link between corruption and revenue is reduced or magnified during times of

¹⁰For instance, Collier and Hoeffler (2009) argue that politicians are subject to checks based on citizen scrutiny which is provoked by taxation. Since resource rents can provide revenues without the need to tax citizens, politicians in resource-rich countries tend to face weaker checks, and this may be further aggravated during times of crisis.

¹¹The negative but statistically insignificant coefficients of the interaction term in columns (2) and (4) in Table 5 may be due to statistical power issues caused by the reduction in country-year observations when including the additional control variables in these specifications.

crisis, we provide insights that can help in assessing the empirical validity of different theories. Overall, we find our results to be more consistent with a rent seeking view of corruption whereby corruption becomes more pervasive when the economic pie declines and the relative value of rents increases during a crisis. This complements the finding of Pop-Eleches (2008) that governments did use crises to implement IMF-proposed reforms. Moreover, we find no empirical support for the view that crises represent times of social improvement associated with increases in economic or government efficiency leading to higher revenues (Drazen & Grilli, 1993). Rather, given the social cost attendant on rent seeking (Long, 2015; Tullock, 1980), inefficiency appears to increase during crises, as the link between corruption and revenue is amplified particularly in less developed, non-democratic, and more natural resource-dependent economies.

The main policy implication is that increasing government revenue requires addressing corruption, and that it is better not to wait for a crisis as an opportunity for reform. At the same time, we once more stress that the observational nature of our data limits our ability to identify causal effects. Our results should therefore be seen as providing only a first step in investigating the dynamics between corruption, government revenue, and crises. More research to analyze the existence and quantitative magnitude of a non-linear relationship between corruption and government revenue, driven by crises, and inform policymaking, is clearly warranted.

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No potential conflict of interest was reported by the author(s).

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