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Corruption Control, Government Effectiveness and Banking Stability: Does Corruption Grease or Sand the Wheels?

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Abstract

The present study aimed to investigate the relationship between corruption control, government effectiveness and banking stability in 21 countries during the period of 2003–2019. The study used many estimators to overcome heterogeneity and endogeneity issues as well as diagnostic tests to increase robustness. The unit root test results showed that all variables were stationary. The Pedroni, Kao and Westerlund cointegration test results supported the rejection of the null hypothesis of no cointegration, confirming the long-run effects of corruption control and government effectiveness on banking stability. In addition, FMOLS and DOLS were used to control endogeneity. The dynamic panel data estimator results revealed a significant negative relationship between corruption control, government effectiveness and banking stability in high-income countries. The low-income country results indicated that the opposite scenario was true for most estimations. The middle- and high-income country results were the same for the corruption control, government effectiveness and banking stability nexus but different for government effectiveness and banking stability. The main conclusions of the study were that countries with high corruption control enhance banking stability growth by employing the grease the wheels hypothesis under high levels of government effectiveness and countries with low corruption control impede banking stability growth by applying the sands the wheels hypothesis under low levels of government effectiveness.

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Introduction

Corruption and government effectiveness (GE) play vital roles in the financial economies of emerging and developed countries. The World Bank and the United Nations Development Program have defined corruption as misuse of the public platform for the purposes of achieving personal benefits; in other words, corruption expresses the government's selling of property for private gain (World Bank, 1997). Corruption is a critical issue all over the world irrespective of the method of governance or social model (Banerjee, 2016; Habib et al., 2020; Sahnoun & Abdennadher, 2020).

Popova and Podolyakina (2014) and Azfar and Nelson (2007) indicated that the root of corruption lies in ineffective institutional management, which leads to an increase in faulty public relations, which, in turn, causes societal problems (Dreber et al., 2013). Over time, corrupt behaviour becomes the norm. Within this context, individuals believe that they will not receive services without paying bribes in return for those services; as such, the cost of corruption becomes less than the cost of controlling it, and countries become unable to deal with the corruption (Balboa & Medalla, 2006; Foresta, 2020). Corruption control (COR) is one of the criteria for effective governance (Baklouti & Boujelbene, 2018). Governance and corruption are opposing forces; governance works to achieve the interests of all members of society, while corruption centres on the achievement of the interests of one individual or a specific group of individuals (Apergis et al., 2010; Klitgaard, 1988). The rules of governance include transparency and accountability as well as the effectiveness of policies and their fair formulation and implementation. Meanwhile, corruption works to amend these rules to include serving a certain class of individuals with special interests (Johnson et al., 2011; Paldam, 2002).

The impact of corruption on aspects of economic growth and banking stability (RPOL) has been addressed from two opposing angles. From the first angle, in which corruption greases the wheels of the economic sector, economic sectors can circumvent administrative and legal system rules in order to achieve efficiency and speed up economic growth. According to this view, investments hamper RPOL and economic growth. Supporters of this theory believe that corruption works to address institutional deficiencies. If countries are unable to develop their institutional environment, corruption becomes a natural loophole that allows the system to achieve economic growth and RPOL, at least in the short and medium terms (Méon & Weil, 2010).

From the second angle, corruption is seen as kicking the wheels of economic growth; this view is prevalent in much of the theoretical and applied literature. Supporters believe that corruption negatively affects aspects of the social, economic and banking sectors, leading to negative effects on governance, private investment, public spending, human capital and institutional quality (Acemoglu, 2003).

Furthermore, corruption discourages local and foreign investment and increases uncertainty and competitiveness under weak government rules (Group, 2017).

Meanwhile, since banking is the sector, most affected by financial crises, the 2008 financial crisis led decision-makers and policymakers to become interested in increasing RPOL (Ben Ali & Saha, 2016). Banking performance does not solely depend on factors related to the banking system; it also depends on the quality of institutions. In this regard, the banking sector is interested in legal legislation, creation of policy and the mechanism for its transparent and credible implementation for all members of society (Ivashina & Scharfstein, 2010). Therefore, a high level of effective and efficient institutional environment must be established. The theory of institutional quality plays a vital role in this matter and is closely associated with corruption since institutional corruption can hinder the banking process (Beck et al., 2005).

Corruption can be costly from an economic point of view because it leads to increasing returns to scale. In other words, in countries where corruption is prevalent, activities that involve searching for returns become more attractive than productive activities, which indicates an increase in corrupt activities more than the impact on the gross domestic product. Thus, resources are distributed to those looking for bribes, while no similar benefit is provided to the rest of society. This type of resource redistribution diverts resources from the most productive investors to those with political relationships. Moreover, corruption serves as a source of frustration for investors, reduces investment and saving opportunities and is reflected in banking stability.

These situations can confuse the decision-making processes of the financial system by creating problems related to the negative selection of bank credit and increasing moral risks to the point where corruption encourages banking and moral risks and conflicts of interest. Furthermore, banks will impose high interest rates on borrowers to offset the high risks of corrupt individuals, which may increase the volume of non-performing loans and negatively affect the overall economy.

In addition, uncertainty in the application of banking contracts, asymmetric information, lack of transparency and unclear property rights that arise through a corrupt environment can reduce financial sector efficiency by increasing transaction costs and widening the margin difference between debit and credit interest and between lending and borrowing. As the quality of institutions plays a prominent role in regulating and controlling the institutional environment, a highly restrictive institutional environment in which the systems are corrupt may exaggerate the problems associated with the confidentiality of information and the lack of transparency and accountability because regulatory agencies fail to monitor financial activities. The poor quality of institutions and a failure to supervise and regulate banking businesses reduce transparency, decrease the credibility of the financial system and increase market volatility. As a result, it reduces investor confidence and increases saving and investment volatility. Under these circumstances, the state ownership of banks can lead to resource misallocations that harm the development of the financial sector. Therefore, if corruption exacerbates the negative effects of regulation and state ownership, the financial sector will be less developed and less stable in the

presence of corruption. In other words, corruption may sand the wheels of financial sector development.

The other alternative view is that corruption greases the wheels of economic activity. This hypothesis assumes that governance structures are weak in terms of the quality of the institutions that regulate their work. According to this theory, corruption accelerates economic activity in light of the payment of bribes through weak institutional organisations and ineffective policies. Thus, it greases the wheels of the financial sector.

To our knowledge, few studies have examined corruption as a behaviour in light of the quality of institutions in order to show its impact on banking stability and explore how those results could be used to build and manage the wealth of countries. The present study aimed to fill this gap by using this framework to propose a novel re-evaluation of the impact of corruption, government effectiveness and banking stability. Therefore, this study highlighted the importance of understanding how corruption affects banking stability so that policies can be formulated to deal with it. Following the theoretical arguments, we investigated whether corruption sands or greases the wheels of banking stability.

By adopting Miller's (2006) assertion that corruption is a multifaceted phenomenon, we were able to expand beyond a broad bilateral approach to understanding the positive and negative effects of corruption on banking stability. For example, we aimed to examine the complexity of the relationship between corruption and banking stability while taking into consideration the quality of institutions. Furthermore, we went beyond advanced statistical methods to show short- and long-run relationships by applying various dynamic panel data and casualty tests. In addition, we employed many diagnostic tests to increase robustness, and we compared high-, medium- and low-income countries to determine whether they sand or grease the wheels of banking stability.

Literature Review

In the literature, endogenous and exogenous factors are examined to explain the impact of corruption on banking systems. Under these factors, two hypotheses—grease the wheels and sand the wheels—demonstrate the effect of corruption on economies and RPOL.

First, regarding endogenous factors, internal corruption in banks takes place through supply and demand under bank officials and legal institutions. On the supply side, an offer is discussed by employees seeking bribes in order to accept risky credit operations that have insufficient guarantees. On the demand side, penalties are abandoned or eased for borrowers who default on loan payments. Levin and Satarov (2000) reported an example in which senior officials granted loans with risks in Russia in the 1990s.

In state-owned banks, corruption may manifest as government pressure on the banks to grant loans to borrowers who have a political relationship or common interests with them (Beck et al., 2006). Thus, a large amount of financing can be directed to the projects of these borrowers, ignoring the interests of society as a whole

(Houston et al., 2011). These cases are presented in many countries when companies participate in electoral and political campaigns, which later allows them to obtain loans with fewer guarantees despite their high risk (La Porta et al., 2002). Corruption in all its forms impedes industry growth, capital allocation and production efficiency when bank officials make decisions from a political point of view, granting loans to inefficient companies that have political ties and refusing to grant loans to companies that can allocate capital and operate efficiently (Houston et al., 2011).

In a study by Batra et al. (2004), 30% of the respondents only considered bank management officials to pose a medium or large obstacle to obtaining bank credit. Meanwhile, Beck et al. (2006) found a negative relationship between corruption and bank lending, and bank officials indicated that there was a slight hurdle in lending policy. Furthermore, in a study by Dreher and Gassebner (2013), most bankers did not find that internal corruption in banking operations led to any lending obstacles; this view is supported by the grease the wheels hypothesis and the deficient institutional banking framework. In addition, to reduce costs caused by redundant bureaucratic activities, banks may follow the greasing the wheels approach (Méon & Sekkat, 2005; Onody et al., 2022) by increasing banking lending and investments.

When banks have a strict risk, policy related to granting bank credit, an increase in corruption can occur in the form of granting loans to borrowers whose loan transactions were not approved (Weill, 2011). However, this trend does not mean those engaged in corruption are not doing it solely for personal gain and welfare alone (Ahmad, 2013). There is a society perception that corruption increases the supply of bank credit by supporting banks, which, in turn, increases the positive trend of profitability of the banks (Stiglitz and Weiss 1981). Svensson (2005) indicated that there is a negative relationship between corruption and gross domestic product (GDP), which contributes to the strengthening of poverty in society.

Many studies have proven that corruption indirectly reduces RPOL and the reputation of banks through a number of channels. According to Swaleheen (2008), corruption reduces incentives and the ability to save, which leads to a decrease in national savings. Additionally, it is indicated that corruption is inversely related to the real interest rate. Weill (2011) pointed out that corruption is more prevalent in corporate loans than government loans. Meanwhile, Boudriga et al. (2009) indicated that a decrease in credit dues in loans reduces corruption and strengthens laws and accountability.

Second, regarding exogenous factors, defective institutions affect the banking system. According to Beck et al. (2005), corrupt legal institutions impede lending operations, while strong legal institutions help increase lending because this policy are confident that, if borrowers' default, those strong institutions will work to seize guarantees or control the borrowers, increasing economic growth by increasing bank loans and easing bad debt and risk.

Meanwhile, Djankov et al. (2007) found that the availability of data on bank credit and the existence of legal protection for banks lead to an increase in lending and a reduction in bad debts. This observation supports the findings of Balboa and Medalla (2006), who indicated that a strong legal system enhances competition between companies and reduces the number of bad loans granted through

corruption. Huang and Wei (2006) indicated that the legal determinants of a strong loan contract put creditors with protection, which leads to lower interest rates.

Goel and Hasan (2011) indicated that institutional corruption has a positive effect on non-performing loans, as a weak legal system and modern governance help weaken RPOL. Fernandez and Gonzalez (2005) indicated that the potential for crises in the banking system is positively correlated with weak legal institutions. Furthermore, Bolgorian (2012) suggested that the relationship between corruption and the development of financial markets is relatively weak. However, the relationship between corruption and economic change is not completely clear and depends on the quality and efficiency of institutions (Voors et al., 2011). Özkan-Günay et al. (2013) indicated that the 2008 financial crisis was primarily caused by issues related to legal institutions and the supervision of financial systems at the local and international levels.

More recently, Swaleheen et al. (2019) showed that corruption affects bank lending, destabilises RPOL and may lead to financial crises. Despite the influence of institutional quality on financial institution performance, studies have placed importance on conducting an analysis of financial institutions, especially related to microfinance (Alraheb et al., 2019; Awdeh & El-Moussawi, 2021; Canh et al., 2021; El Hourani & Mondello, 2019). Meanwhile, Beekman et al. (2014) identified weaknesses in the institutional environment that negatively affected financial sector performance, which, in turn, affected investments and resource allocation efficiency. Many factors of institutional quality determine the efficiency (Chan et al., 2015; Hussain et al., 2021), capital structure (Alraheb et al., 2019) and systemic risk (Anginer et al., 2018; Canh et al., 2021) of financial institutions. Credit growth plays a prominent role in the presence of high-quality institutions in the financial sector (Awdeh & El-Moussawi, 2021; El Hourani & Mondello, 2019; Gani & Rasul, 2020). Yakubu (2019) examined the effect of corruption on bank profitability, and the findings supported the sand the wheels hypothesis. In contrast, in a study of the effects of corruption on firm performance in India, Kato and Sato's (2015) and Onody et al.'s (2022) findings supported the grease the wheels hypothesis.

Omrane (2016) and Nur-tegin and Keith (2020) identified a significant negative association between corruption, investment and public spending. In the absence of corruption, Cieślik and Goczek (2018) found that corruption had a positive and statistically significant effect on real per capita GDP and increased the investment ratio. In contrast, corruption has been shown to have a negative long-run effect on real per capita GDP in less democratic countries under low FDI and high inflation (Al Qudah et al., 2020; D'Amico, 2015; Gründler & Potrafke, 2019). Meanwhile, while recording progress related to economic advancement, Huang (2016) and Jiang and Nie (2014) found that corruption was rising in South Korea and China. Their results, which were supported by Ondo (2017), indicated that corruption had a positive effect on economic growth by eliminating administrative bottlenecks and promoting the creation and development of private enterprises.

Williams and Kedir (2016) and Boukou (2017) found that corruption had a significant positive effect on sales and productivity growth. Meanwhile, Achim (2017) found that corruption had a negative effect on business development. Furthermore, corruption may involve high-level government officials or low-level administrators

(Seck, 2020; Teixeira, 2015). Nur-tegin and Keith (2020) found that several dimensions of performance occur depending on the type. Furthermore, Krammer (2019) found that the type and quality of the institutional context determined the type of corruption. In addition, studies have revealed that low firm performance occurred once corruption was high (Krammer, 2019; Seck, 2020). In such cases, corruption may make it easy to implement the work and minimise bureaucratic and regulatory obstacles (Krammer, 2019). Wu (2019) found that corruption harmed the innovation of firms, while Thakur et al. (2020) indicated that corruption harmed productivity growth. Furthermore, Martins et al. (2020) found that a very corrupt environment had a negative effect on market competitiveness. In contrast, corruption may help firms create products due to the low cost of transactions and help them hedge political risks. Meanwhile, Krammer (2019) indicated that, in high institutional quality environments, innovative firms are less likely to engage in corruption because the obstacles to the firms' activities are lower, and the costs of those activities are higher. Ghosh et al. (2022)indicated that varies of ownership strategy interpreted many different levels of corruption.

As far as we know, no study has investigated the relationship between corruption and GE and their effects on RPOL or conducted the analysis in countries grouped by income level. Therefore, this study filled this gap in 21 countries. This is especially relevant since the 2008 global financial crisis proved that one of the causes of the collapse of RPOL was corruption, and the present findings can help countries identify the causes of the crisis and work to avoid similar crises in the future. Therefore, this study focused on the following question: Do corruption control, government effectiveness enhance banking stability from a grease or sands the wheels perspective?

Methodology

This paper aimed to examine the relationship between corruption, GE and RPOL in 21 countries, which were classified based on three income levels. The seven high-income countries were Australia, Iceland, Israel, Romania, the Czech Republic, Uruguay and the USA. The seven middle-income countries were Bulgaria, Mexico, Brazil, Malaysia, the Philippines, Thailand and Armenia, and the seven low-income countries were the Gambia, Madagascar, Mozambique, Rwanda, Sierra Leone, Tajikistan and Uganda. The data were collected from World Development Indicator (WDI) and Worldwide Governance Indicator (WGI) reports for the period of 2003–2019. This 17-year period yielded 119 observations for each income group.

The study used two types of software: Stata 15 statistical software and E-Views 10. To increase the freedom degrees and specific parameters, a panel data technique was used to reduce the multicollinearity issue. This technique has two dimensions: a cross-sectional dimension (i) and a time series dimension (t) (De Hoyos & Sarafidis, 2006). Furthermore, panel data address endogeneity by controlling missing information and the effect of unobserved variables by considering the dynamics and individuality of the entities (Hsiao, 2007). In addition, panel data work by time series and cross-sectional country, while the heterogeneity of the panel data explicitly

considers the individual (the microunit) (Baltagi, 2008). The use of this technique ultimately enhanced the reliability and efficiency of the results.

The basic functional forms of the corruption, GE and RPOL nexus of main panel model are written as follows:

$$RPOL_{i,t} = \beta_0 + \beta_0 Independent.Var_{i,t} + \beta_0 control\ varaibles_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots \quad (1)$$

where $RPOL_{it}$ is the banking stability (RPOL) measured by the risk premium on lending (lending rate minus treasury bill rate, %) proxy of country I at time t as a dependent variable. The $Independent.\ Var_{i,\ t}$ are the corruption control (COR) index and government effectiveness (GE) index proxies. The $control\ variables_{i,\ t}$ are GDP per capita growth (annual %) (GDP), inflation, consumer prices (annual %) (INF) and bank capital to assets ratio (%) (BCA). These variables are defined in the Appendix.

Many estimations were made in this study to increase robustness, including the use of descriptive statistics. After checking the stationarity of the data, Pesaran's (2004) cross-sectional dependence (CD) test was used to check for the prerequisite for the unit root test through the existence of cross-sectional independence in the data series. The Pedroni (2004) panel cointegration test was used to determine the long-run relationship between corruption, GE and RPOL. Once the study variables showed cointegration of the same order, we checked for the existence of a long-run relationship between corruption, GE and RPOL. Kao (1999) and Westerlund (2007) were applied.

FMOLS has been explained by Kao (1999). This test focuses on the optimal cointegration of estimations. The asymptotic distribution of the OLS test and kernel estimators of the nuisance parameters were included in FMOLS. Furthermore, FMOLS controlled for endogeneity and serial correlation issues. The DOLS was used to determine the short- and long-run relationships. According to Stock and Watson (1993), DOLS estimates the effect of endogenous variable on exogenous variables, including the lags, leads and levels of the explanatory variables. In addition, like FMOLS, DOLS controls for endogeneity, serial correlation and small sample bias by adding the lags or leads of the independent variables of the study. In accordance with Dumitrescu and Hurlin (2012), a heterogeneous panel causality test was applied to explain the bivariate causality between corruption, GE and RPOL through pairwise Dumitrescu-Hurlin panel causality tests. This technique is different from Granger causality because it requires cross-sectional dependency in the panel.

Results and Discussion

Descriptive Statistics for All Income Groups from 2003 to 2019

Table 1 shows the six proxies used to examine the relationship between corruption control, GE and RPOL among the three control variables in the three income groups over the period of 2003–2019. The mean, standard deviation, skewness, kurtosis and

Table 1 Descriptive statistics

	COR	GE	RPOL	GDPPC	BCA	INF
High-income countries						
Mean	1.105	1.059	3.956	2.427	9.888	3.719
Median	1.270	1.260	3.2150	2.095	8.656	2.707
Maximum	2.340	2.110	26.41	11.144	21.05	19.37
Minimum	−0.370	−0.360	1.007	−7.094	5.043	−1.544
Std. Dev.	0.751	0.673	2.938	2.884	4.449	3.394
Skewness	−0.335	−0.761	4.566	0.090	1.190	1.658
Kurtosis	2.033	2.482	31.405	4.697	3.46813	6.787
Sum	131.5	126.04	470.82	288.89	1176.7	442.6
Sum Sq. Dev.	66.71	53.45	1018.9	981.79	2335.8	1359.5
Jarque-Bera	6.855	12.83	4414.2	14.45	29.182	125.65
Probability	0.032	0.001	0.000	0.000	0.000	0.000
Observations	119	119	119	119	119	119
Medium-income countries						
Mean	−0.304	0.197	8.433	3.321	11.27	3.715
Median	−0.340	0.110	4.138	3.282	10.39	3.597
Maximum	0.410	1.270	44.97	14.69	23.01	14.71
Minimum	−0.930	−0.450	0.318	−13.51	7.498	-1.418
Std. Dev.	0.309	0.400	10.62	3.754	3.439	2.579
Skewness	0.296	1.198	1.917	−0.161	2.185	0.988
Kurtosis	2.484	3.729	5.470	7.433	7.316	5.560
Sum	−36.23	23.50	1003.5	395.23	1341.54	442.15
Sum Sq. Dev.	11.309	18.94	13322.3	1663.58	1395.92	785.45
Jarque-Bera	3.065	31.10	103.19	97.96	187.11	51.88
Probability	0.215	0.000	0.000	0.000	0.000	0.000
Observations	119	119	119	119	119	119
Low-income countries						
Mean	−0.654	−0.725	14.68	2.839	12.18	7.960
Median	−0.770	−0.680	11.54	3.443	10.86	7.091
Maximum	0.760	0.270	52.30	18.05	32.57	20.47
Minimum	−1.420	−1.340	−4.057	−22.31	3.345	-1.704
Std. Dev.	0.486	0.376	12.12	4.068	5.988	4.293
Skewness	1.215	0.514	1.691	−1.932	1.220	0.630
Kurtosis	4.203	2.773	5.525	16.31	4.438	3.080
Sum	1747.8	337.91	1449.58	947.34	1747.80	337.91
Sum Sq. Dev.	17344.4	1952.7	4231.04	2175.16	17344.4	1952.78
Jarque-Bera	88.32	953.53	39.80	7.915	88.32	953.53
Probability	0.000	0.000	0.000	0.019	0.000	0.000
Observations	119	119	119	119	119	119

This table included the summary statistics of all 6 variables of 21 countries

Jarque-Bera were included in the descriptive statistics. Table 1 explains the mean distribution of the data, while the standard deviation indicates the spread of the data from the mean.

Average Annual Growth Rate Statistics for All Income Groups per Variable from 2003 to 2019

The study analysed the mean annual growth for each variable according to the income level group. Figure 1 shows COR for the three income groups. The range evaluation depended on whether the +2.5 scale was strong governance, and the −2.5 scale was weak governance. The high-income countries were ranked first, followed by the medium- and low-income countries. Furthermore, the difference between the high- and medium-income countries was large, while the difference between the medium- and low-income countries was small. Figure 2 shows GE for the three income groups. The range evaluation depended on whether the +2.5 scale was strong and the −2.5 scale was weak. The high-income countries were ranked first, followed by the medium- and low-income countries. Furthermore, the difference between the levels GE of the countries was equal. Figure 3 shows the banking stability measured by risk premium on lending for the three income groups. The

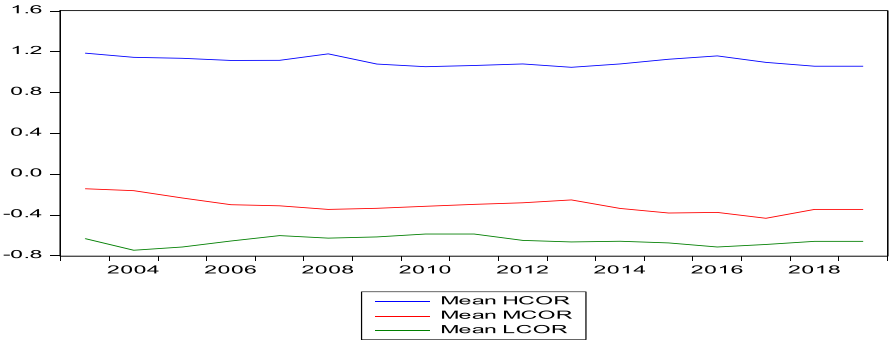

Fig. 1 Corruption control

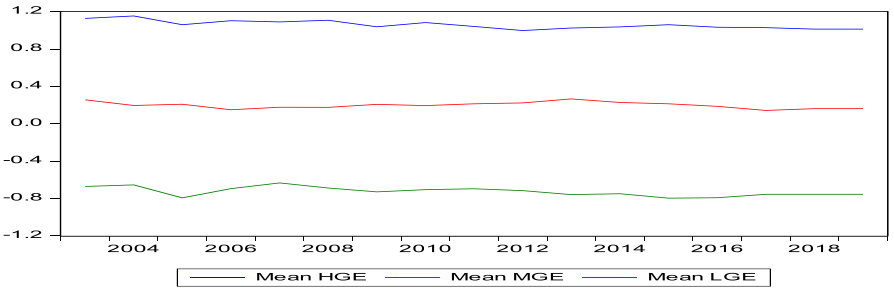

Fig. 2 Government effectiveness

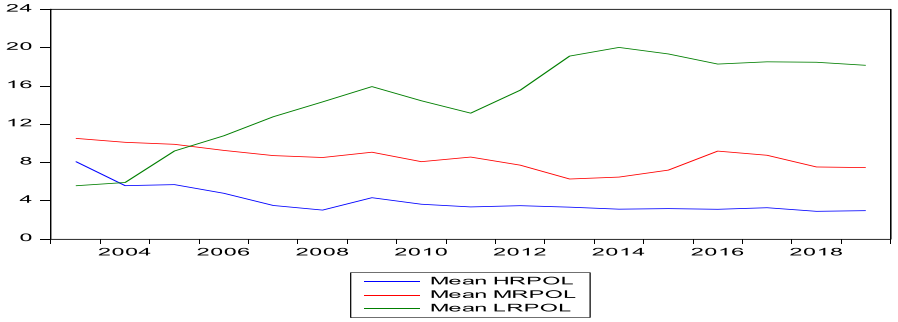

Fig. 3 Risk premium on lending

high-income countries were ranked first, which means they had a low risk of lending due to strong banking capital and strong credit guarantees. The medium-income countries were ranked second, followed by the low-income countries.

Figure 4 shows the GDP per capita growth (annual %) (GDP) for the three income groups. The middle-income countries ranked first in most years, followed by the high- and low-income countries. The shock period was in 2008 and 2009, and performance decreased in most of the countries due to the 2008 financial crisis. Furthermore, the slowdown was more severe in the medium-income countries than

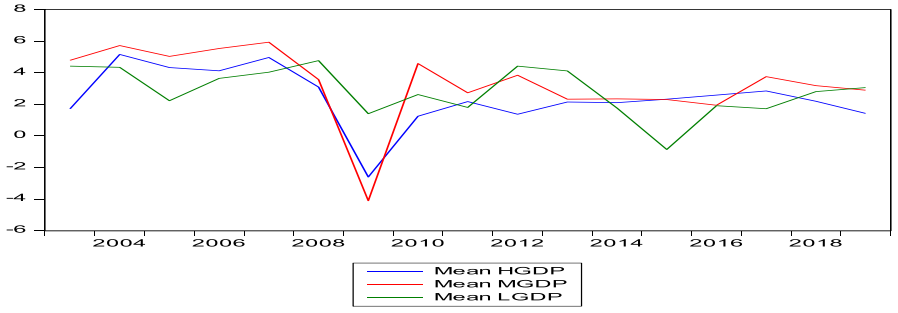

Fig. 4 GDP per capita growth (annual %) (GDP)

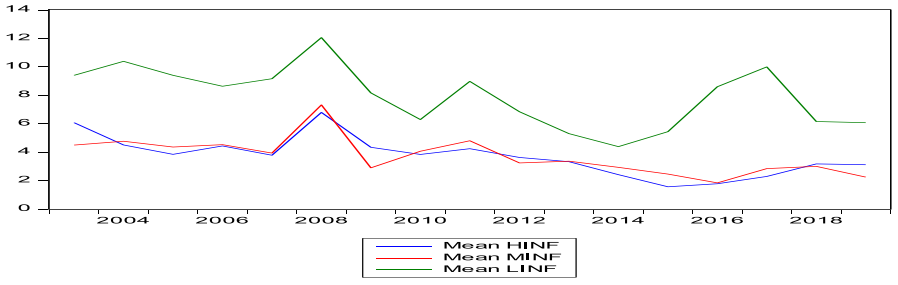

Fig. 5 Inflation, consumer prices (annual%)

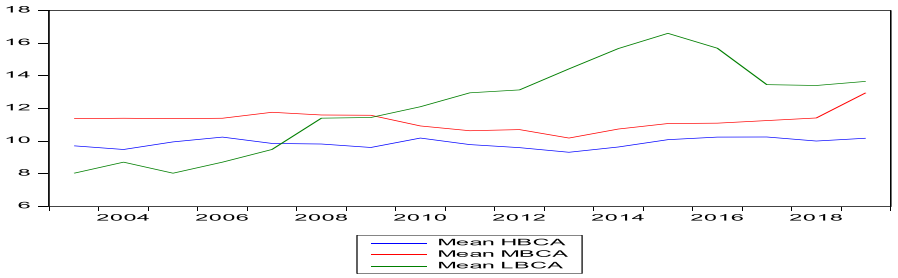

Fig. 6 Bank capital to assets ratio (%)

in the high-income countries; the last rank was held by the low-income countries because they were not heavily dependent on external banking investments and foreign trade, unlike the other countries. Figure 5 shows the inflation and consumer prices (annual %) (INF) for the three income groups. The high-income countries had the lowest inflation rate, followed by the medium-income countries; however, the level of inflation of these countries was sometimes equal. Figure 6 shows the bank capital to assets ratio (%) (BCA) in the three income groups. The ratio was highest in the middle-income countries until 2009, after which the low-income countries had the highest ratio until 2019. The high-income countries had the lowest rank right after 2008 because they were highly affected by the financial crisis in terms of banking capital.

Table 2 Correlation matrix

	RPOL	COR	GE	BCA	GDP	INF
High Income Countries						
RPOL	1.000					
COR	-0.307	1.000				
GE	-0.340	0.826	1.000			
BCA	0.025	0.455	0.238	1.000		
GDP	0.119	-0.279	-0.374	-0.041	1.000	
INF	0.516	-0.037	-0.377	0.226	0.107	1.000
Medium Income Countries						
RPOL	1.000					
COR	0.150	1.000				
GE	-0.442	0.664	1.000			
BCA	0.054	-0.333	-0.325	1.000		
GDP	-0.097	0.011	-0.040	0.396	1.000	
INF	0.414	-0.086	-0.341	0.020	-0.046	1.000
Low Income Countries						
RPOL	1.000					
COR	-0.131	1.000				
GE	-0.301	0.767	1.000			
BCA	-0.003	0.221	0.326	1.000		
GDP	-0.242	0.039	0.128	0.100	1.000	
INF	-0.168	-0.068	-0.171	-0.192	0.097	1.000

This table presents the correlation coefficients of the 6 variables. Standard errors in parentheses ***$p<0.01$, **$p<0.05$, *$p<0.1$

Correlation Matrix Statistics for All Income Groups from 2003 to 2019

Table 2 presents the correlation matrix of coefficients. The economic theory was consistent with the signals of the variables. Furthermore, the correlation of most coefficients indicated weakness between the variables (Evan, 1996), confirming the appropriateness of the regression and indicated that there was no multicollinearity between the two variable predictors.

Cross-Sectional Dependency and Im-Pesaran-Shin

Pesaran's (2004) CD test was used to show the existence of cross-sectional independence in the data series. Furthermore, CD test is considered a prerequisite for the unit root test as a second-generation test. Table 3 shows the results of both tests in all three income groups from 2003 to 2019. The findings showed that GDPPC and INF were cross-sectionally dependent at the 1% significance level in the high- and medium-income countries, and COR was cross-sectionally dependent at the 5% significance level. RPOL and BCA were cross-sectionally dependent at the 1% significance level in the low-income countries, while INF

Table 3 Cross-sectional dependency (Pesaran CD test) and panel unit root (CIPS test)

	COR	GE	RPOL	BCA	GDPPC	INF
High-income countries						
Panel A						
Pesaran CD test	−0.973	−1.217	−1.827	−0.935	7.876	5.764
p value	0.330	0.223	0.067	0.349	0.000	0.000
Panel B						
CIPS (level)	−1.36*	−3.09***	−6.45***	−2.57***	−2.55***	−4.78***
CIPS (1st difference)	−7.88***	−10.16***	−8.56***	−9.52***	−7.38***	−8.68***
Medium-income countries						
Panel A						
Pesaran CD test	2.110	−1.875	1.874	−0.531	9.062	4.648
p value	0.034	0.060	0.060	0.595	0.000	0.000
Panel B						
CIPS (level)	−1.432*	−0.784	−2.431***	0.619	−5.647***	−5.61***
CIPS (1st difference)	−6.990***	−7.296***	−7.61***	−5.880***	−10.95***	−11.12***
Low-income countries						
Panel A						
Pesaran CD test	−1.097	0.667	4.838	9.837	1.637	1.899
p value	0.272	0.504	0.000	0.000	0.101	0.057
Panel B						
CIPS (level)	1.467	−1.871**	−3.504***	0.228	−4.159***	−3.492***
CIPS (1st difference)	−8.585***	−12.20***	−6.861***	−4.906***	−9.72 ***	−10.72***

The significance levels refer to $p < 0.01$ (***), $p < 0.05$ (**) and $p < 0.1$ (*)

was cross-sectionally dependent at the 10% significance level. Based on the CD test findings, it is better to use the Im et al. (2003) (IPS) test, while the conventional panel unit root test is appropriate because the cross of IPS (CIPS) test takes cross-sectional independence into consideration. Table 3 shows the results of the Im et al. (2003) test; all study variables were significant in the first order difference of 1(1), which means that the variables were different and not in the same order. All variables were stationary at the 1% significance level in the first order difference.

Table 4 Pedroni panel cointegration test

Alternative hypothesis: common AR coefs. (within-dimension)				
Weighted				
Panel: within-dimension	Statistic	Prob.	Statistic	Prob.
High-income countries				
v-statistic	0.819	0.206	−0.553	0.710
rho-statistic	0.173	0.568	1.237	0.892
PP-statistic	−4.061	0.000	−1.169	0.121
ADF-statistic	−5.390	0.000	−1.656	0.048
Medium-income countries				
v-statistic	−1.980	0.976	−1.235	0.891
rho-statistic	3.514	0.999	2.588	0.995
PP-statistic	−2.223	0.013	−2.019	0.021
ADF-statistic	−2.443	0.007	−2.153	0.015
Low-income countries				
v-statistic	−0.884	0.811	−1.833	0.966
rho-statistic	3.411	0.999	3.036	0.998
PP-statistic	−2.704	0.003	−2.061	0.019
ADF-statistic	−3.259	0.000	−2.246	0.012
Alternative hypothesis: individual AR coefs. (between-dimension)				
High-income countries				
rho-statistic	2.129	0.983		
PP-statistic	−2.409	0.008		
ADF-statistic	−2.681	0.003		
Medium-income countries				
rho-statistic	3.340	0.999		
PP-statistic	−2.675	0.003		
ADF-statistic	−2.1491	0.015		
Low-income countries				
rho-statistic	3.929	1.000		
PP-statistic	-3.576	0.000		
ADF-statistic	-3.149	0.000		

Pedroni Panel Cointegration Test

The three cointegration approaches used in this study assumed heterogeneity in the panels using residuals based on Pedroni's (2004) approach and cross-section dependence, as explained by Westerlund (2007) and Kao (1999). Table 4 shows the Pedroni (2004) panel cointegration results, which depended on the lag-based Akaike information criterion (AIC). The residual-based Pedroni (2004) cointegration test presents 11 statistics; if two or more variables shift together at roughly the same series time, then the test is called cointegrated, and the results show the stationary linear combination of these variables. The Pedroni (2004), Kao (1999) and Westerlund (2007) cointegration tests were used to show the long-run relationship between the study variables and increase robustness. Three within-dimension statistics and two between-dimension statistics were statistically significant in the high-income countries, while 6 of the 11 statistics were significant in the middle- and low-income countries. The null hypothesis of no cointegration was rejected at the 1% and 5% significance levels, confirming the long-run effects of corruption control and government effectiveness on banking stability.

Kao Residual Cointegration Test

The Kao panel cointegration test findings are presented in Table 5. The null hypothesis of no cointegration was rejected in all three income groups at the 1% significance level. The results also confirm the long-run relationship between COR, GE and RPOL.

Table 5 Kao residual cointegration test

Tests	*t* statistic	Prob.
High-income countries		
Augmented Dickey-Fuller (ADF)	−8.693	0.0000
Residual variance	3.496	
HAC variance	2.534	
Medium-income countries		
Augmented Dickey-Fuller (ADF)	−3.649	0.0001
Residual variance	4.644	
HAC variance	4.507	
Low-income countries		
Augmented Dickey-Fuller (ADF)	−3.008	0.0013
Residual variance	17.92	
HAC variance	12.63	

Table 6 Westerlund panel cointegration test

Statistic	Value	*p* value [a]	*p* value [b]
High-income countries			
Group τ	−11.794	−15.90	0.000
Group α	−0.583	4.273	1.000
Panel T	−2.835	2.630	0.996
Panel α	−1.008	2.896	0.998
Medium-income countries			
Group τ	−18.209	−43.67	0.000
Group α	−0.261	4.384	1.000
Panel T	−28.842	−21.37	0.000
Panel α	−0.461	3.086	0.999
Low-income countries			
Group τ	−6.240	−10.514	0.000
Group α	−0.247	4.389	1.000
Panel T	−3.763	1.773	0.962
Panel α	−0.289	3.147	0.999

Westerlund Panel Cointegration Test

Table 6 presents the Westerlund (2007) panel cointegration test results and confirms the long-run relationship between corruption, GE and RPOL. The test is based on whether the error correction term is equal to zero in a conditional panel error correction model (ECM) and includes four tests: group mean (Gτ and Gα) and panel (Pτ and Pα). The findings showed group *t* in high- and low-income countries and group *t* and panel *t* in middle-income countries. The null hypothesis of no cointegration was rejected, confirming a long-run relationship between COR, GE and RPOL.

Panel Fully Modified the Least Squares and Panel Dynamic Least Squares

As the OLS estimator was inconsistent and biased on the cointegrated panel, Table 7 shows the panel FMOLS and DOLS results. For the high-income countries, the coefficients were positive and significant between GE, BCA, INF and RPOL, except GDP. Specifically, 1% increases in GE, BCA and INF led to 3.223, 0.296 and 0.2277 increases, respectively, in RPOL. In the FMOLS model, 1% increases in GE, BCA and INF led to 3.419, 0.326 and 0.245 increases, respectively, in RPOL in the DOLS model. There was a negative coefficient relationship between COR and RPOL in the FMOLS and DOLS models. A 1% increase in COR led to a −4.529 decrease in RPOL in the FMOLS model, while a 1% increase in COR led to a −4.770 decrease in RPOL in the DOLS model.

For the middle-income countries, the coefficients were positive and significant between BCA, INF and RPOL in the DOLS model and between BCA and RPOL in the FMOLS model. Specifically, 1% increases in BCA and INF led to 0.928 and 0.603 increases, respectively, in RPOL in the DOLS model, while a 1% increase

Table 7 Panel fully modified least squares and panel dynamic least squares

Long-run equation								
	Panel fully modified least squares (FMOLS)				Panel dynamic least squares (DOLS)			
Variable	Coefficient	Std. error	*t* statistic	Prob.*	Coefficient	Std. error	*t* statistic	Prob.*
High-income countries								
COR	−4.529	1.351	−3.350	0.0011	−4.770	2.394	−1.992	0.0487
GE	3.223	1.192	2.703	0.0080	3.419	1.890	1.808	0.0731
BCA	0.296	0.056	5.257	0.0000	0.326	0.090	3.592	0.0005
INF	0.227	0.064	3.550	0.0006	0.245	0.071	3.440	0.0008
GDP	0.017	0.034	0.525	0.6005	0.027	0.057	0.487	0.6269
Medium-income countries								
COR	−3.552	1.181	−3.006	0.0034	−4.236	2.186	−1.937	0.0575
GE	0.460	1.455	0.3162	0.7525	1.306	3.033	0.430	0.6683
BCA	1.050	0.293	3.571	0.0006	0.928	0.489	1.898	0.0626
INF	0.238	0.159	1.495	0.1382	0.603	0.245	2.456	0.0171
GDP	0.074	0.0767	0.967	0.3359	0.248	0.160	1.542	0.1283
Low-income countries								
COR	1.213	1.851	0.655	0.5138	13.35	6.854	1.947	0.0563
GE	−6.273	1.824	−3.438	0.0009	−5.338	5.969	−0.894	0.3749
BCA	−1.890	0.188	−10.04	0.0000	−3.244	0.709	−4.574	0.0000
INF	−0.185	0.052	−3.54	0.0006	−0.439	0.180	−2.429	0.0183
GDP	−0.4311	0.068	−6.325	0.0000	−0.569	0.226	−2.511	0.0148

in BCA led to a 1.050042 increase in RPOL in the FMOLS model. There was a negative coefficient relationship between COR and RPOL in the FMOLS and DOLS models. A 1% increase in COR led to a −3.552 decrease in RPOL in the FMOLS model, while a 1% increase in COR led to a −4.236 decrease in RPOL in the DOLS model.

These results can be interpreted using the grease the wheels hypothesis, which considers previous behaviour and explains that if COR is decreases, corruption increases. This hypothesis leads to increased growth and RPOL due to the minimisation of routine activities, which also occurs when GE is high and institutional quality is low. This situation allows investors to go beyond the laws and rules to more smoothly achieve their own goals. In other words, corruption solves the problem of insufficient institutional quality; if the government is unable to correct the institutional infrastructure, corruption can be considered a normal way to address this issue in order to achieve growth and enhance RPOL.

These results are consistent with those of Aburime (2009), who found that corruption has a positive impact on profitability, productivity and effectiveness and that economic growth enhances financial development. These findings are also supported by Shahbaz (2010). Beck et al. (2006) did not find any obstacle to bank lending; this view supports the adoption of corrupt internal operations, which is in line with the grease the wheels hypothesis. Specifically, to reduce costs caused by redundant

bureaucratic activities, banks may grease the wheels (Dreher & Gassebner, 2013; Méon & Sekkat, 2005) by increasing banking lending to encourage investment growth (Shahbaz, 2009).

In addition, there is a perception that corruption increases the supply of bank credit by supporting banks (Ahmad, 2013; Weill, 2011). Heidenheimer et al. (1989) pointed out that corruption can support growth by increasing investments due to an increase in the uncertainty of the market, which enhances the opinion of investors that the situation will not change in the future. Meanwhile, Leff (1964) mentioned that the extensive role of governments in the economy and frequent changes in government personnel and policies create uncertainty in decision-making. Leff (1964) also demonstrated that corruption increases innovation through increased competition in the market and acts as a hedge against bad public policy. Huntington (2002) supported the idea that corruption decreases the degree of delays, time saving through bribery. Lui (1985) pointed out that corruption can be efficient because it saves time due to the opportunity cost for increase in the investment.

Djankov et al. (2007) and Barth et al. (2009) found that the availability of data on bank credit and the existence of legal protection and a strong legal system for banks lead to increases in lending and financial competition and a reduction in bad debts, which, in turn, leads to lower interest rates. The degree of weak corruption and the development of financial markets depends on the quality and efficiency of institutions (Bolgorian, 2012; Voors et al., 2011). If countries are unable to develop their institutional environment, corruption becomes a natural loophole that allows the system to achieve economic growth and RPOL, at least in terms of short- and medium-term growth (Huntington, 1968; Nye, 1967).

For the low-income countries, the coefficients were negative and significant between GE, BCA, INF, GDP and RPOL, except GDP. Specifically, 1% increases in GE, BCA, INF and GDP led to −6.273, −1.890, −0.185 and −0.431 decreases, respectively, in RPOL. In the FMOLS model, a 1% increase in BCA and INF led to a −3.244, −0.439 and −0.569 decreases, respectively, in RPOL in the DOLS model. There was a positive coefficient relationship between COR and RPOL in the DOLS model. A 1% increase in COR led to a 13.35 increase in RPOL. The overall FMOLS and DOLS results were the same, stronger confirming the stability of the relationships of the study variables and increasing the robustness.

These results can be interpreted using the sand the wheels hypothesis, which states that if COR increases, corruption decreases, while the growth is less and increase the banking instability. This view is widely accepted in the literature and reflects the negative effects of corruption on investments, capital human resources and the expenditures of countries when GE is low while institutional quality is high. Cherif and Gazdar (2010) indicated that there is a negative relationship between corruption and economic growth. Ahmad and Ali (2010) indicated that a low level of corruption helps enhance productive activities and leads to economic growth. Park (2012) suggested that corruption contributes to and promotes high-risk projects.

This second hypothesis of ‘sand the wheels’ is supported by Mahmood (2005) and Paldam (2002) that corruption impedes economic outcomes and the inefficiency of long-term foreign and domestic investment. In this scenario, the government increases tax rates, reducing the country’s ability to provide essential public goods and services

and decreasing GE. Treisman (2000) found that low corruption promotes economic development, especially in developing economies. According to Park (2012), in more economically developed countries, misuse of public resources is more likely to be exposed by the government's official opposition. In general, corruption affects bank lending, destabilise RPOL and may lead to financial crises (Ho et al., 2018).

Furthermore, many studies, such as those by Mauro (1997) and Acemoglu (2003), have noted that corruption impedes economic growth and that corruption negatively affects aspects of economic and banking life, which has negative effects on governance, private investment, public spending, human capital and institutional quality. Corruption discourages local and foreign investment and increases uncertainty and competitiveness under weak government rules (Fernandez & Gonzalez, 2005; Group, 2017).

Heterogeneous Panel Causality Test

Table 8 shows the bivariate causality between COR and GE on RPOL in the three income groups. Dumitrescu and Hurlin (2012) developed the pairwise Dumitrescu-Hurlin panel causality tests, which require cross-sectional dependency for the panel data, which is not needed for Granger causality. The null hypothesis assumes homogenous non-causality between variables, while heterogeneous non-causality between variables is considered an alternative hypothesis.

The high-income country results showed bidirectional causality between GDP and RPOL at the 1% significance level and unidirectional causality running from RPOL to BCA. The middle-income country results showed that unidirectional causality ran from RPOL to GE at the 10% significance level and from RPOL to BCA at the 1% significance level. The low-income country results showed bidirectional causality between GDP and RPOL at the 1% significance level and unidirectional causality running from RPOL to COR at the 5% significance

Table 8 Pairwise Dumitrescu-Hurlin panel causality

Null hypothesis *X* does not homogeneously cause *Y*	*W* Stat.	Zbar Stat.	Prob.	Causal direction
High-income countries				
GDP - RPOL	7.102	3.772	0.0002	Bidirectional
RPOL - GDP	7.449	4.057	5.E-05	
RPOL - BCA	5.33191	2.321	0.0203	RPOL → BCA
Medium-income countries				
RPOL - GE	4.568	1.695	0.0899	RPOL → GE
RPOL - BCA	6.915	3.619	0.0003	RPOL → BCA
Low-income countries				
RPOL - COR	5.552	2.502	0.012	RPOL → COR
INF - RPOL	8.629	5.024	5.E-07	Bidirectional
RPOL - INF	5.969	2.843	0.004	

level. These results are consistent with evidence that corruption causes economic growth (Craigwell & Moore, 2008). These results are consistent with those of Ahlin and Pang (2008), who found bidirectional causality between corruption and the efficiency of the financial sector and a complementary direction between financial development and corruption.

Conclusion and Policy Implications

Corruption control is one of the most basic standards for stimulating a country's economy and building infrastructure and banking stability. Successive financial crises have proven the importance of controlling corruption as well as strengthening the power and quality of institutional systems. In light of the above analysis, governments must improve the quality and efficiency of institutions to enhance economic growth and financial stability and reduce institutional corruption. The main conclusion of the study is that countries with low corruption levels and high COR enhance growth by applying the grease the wheels hypothesis, and countries with high corruption levels and low COR impede growth by applying the sands the wheels hypothesis. In light of the current results, it is possible to directly improve growth by improving institutional quality and to indirectly improve growth by reducing corruption and improving the level of control over corruption. There is no doubt that opposition to corruption may sometimes harm growth in the presence of a low-quality institution, especially in developing countries.

Our conclusions are of interest and useful for policy makers. Unlike previous studies, we classified countries according to income level, which allowed us to capture a different picture in each of income category. For example, in high- and middle-income countries, increasing corruption control led to less corruption, a high level of government effectiveness and decreased banking stability. This finding supports the grease the wheels hypothesis (Dreher & Gassebner, 2013; Méon & Sekkat, 2005). In contrast, we found that low-income countries fit the sand the wheels hypothesis (Achim, 2017; Mauro, 1995).

Governments are currently working to combat corruption since it has a societal impact that can affect future generations. One path involves adopting policies that promote foreign direct investment, such as facilitating access to credit and enhancing economic stability and the quality of institutions, to help mitigate the impact of corruption. The results of the current study have implications for policy makers who aim to develop the best policies and practices to enhance the economic performance of countries. Governments must combat the destructive effects of economic policies, identify appropriate mechanisms to enhance institutional quality and adopt related regulatory measures. Moreover, governments must suppress corruption and increase control over it in all public and private institutions as well as over those who use their positions to engage in illegal activities.

Developing countries should take advantage of economic growth by using related wealth to reduce corruption by engaging in institutional reform as an entry point to economic reform and performance improvements. Governments

should strive to enhance the transparency of government functions by encouraging citizens to express their opinions and get involved in governance, making policies clear and understandable to all members of society and reducing bureaucracy. The present findings have several policy implications. For example, they indicated that governments must emphasise institutional quality and raise awareness of laws and instructions to develop anti-corruption systems and upgrade the institutional structure so that it can support high-technology industries. Furthermore, the findings can help policymakers develop an effective regulatory framework for institutional policies by diagnosing the level of corruption according to the country's income level in order to maintain the stability of the banking system, increase lending and reduce corruption.

The findings have led to additional policy recommendations. First, to maintain the stability of banks, it should reduce bribery and corruption, which interfere with various transactions, especially loans between companies and the banking sector. Second, banks should work on easing non-price restrictions and establishing flexible conditions for guarantees to access credits so that bribes do not need to be paid to facilitate work. Third, banks should implement effective policies for reporting violations during work. Fourth, regulatory authorities should implement severe penalties to prevent corrupt practices.

Regarding future studies, a large sample size covering several countries would provide a more comprehensive analysis of the relationship between corruption and bank stability. In addition, more variables of corruption, government performance and bank profitability are needed to evaluate the effects of corruption. Furthermore, studies with more data diversification could evaluate corruption in different time frames and compare the growth and recession of the economic cycle. Overall, the relationship between corruption and the quality of institutions requires further investigation.

Appendix. Variable definitions

Variable	Abbreviation	Definition
* Corruption control	COR	This variable measures the extent to which the public sector can impose control over realising private gain and includes all forms of corruption of all sizes. In other words, the extent of control over the public sector is represented by the governments' power over the state's wealth
* Government effectiveness	GE	This variable reflects the quality of public and civil services in society and their degree of independence from political pressures as well as the quality of policy formulation and implementation and the extent of the government's sincerity in adhering to these formulated policies

Variable	Abbreviation	Definition
** Banking stability	RPOL	This variable is measured by the risk premium on lending (lending rate minus treasury bill rate, %). It is the interest rate imposed by banks on customer loans minus the risk-free interest rate represented by treasury bills. This indicator may be negative, indicating that dealing with corporate clients is less risky than dealing with the government
** GDP per capita growth (annual %)	GDP	This variable is the gross domestic product divided by the population and includes the sum of the value added by all producers in the country's economy in addition to taxes
** Inflation, consumer prices (annual %)	INF	This variable is the consumption price index, including the average cost of a basket of services and goods, which may change or be fixed during a specific period of time
** Bank capital to assets ratio (%)	BCA	This variable is the ratio of the bank's capital and all of its reserves, including retained earnings, general reserves and provisions to the total financial and non-financial assets

*Worldwide Governance Indicators (2020), **World Development Indicators (2019)

Data Availability World Development Indicators (WDI) (2019), retrieved on 01-04-2020 from https://databank.worldbank.org/source/worlddevelopment-indicato. Worldwide Governance Indicators (WGI) (2020), retrieved on 01-04-2020 from http://info.worldbank.org/governance/wgi/.

Declarations

Conflict of Interest The authors declare no competing interests.

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