TAMPERE ECONOMIC WORKING PAPERS

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Working Paper 101
March 2016

SCHOOL OF MANAGEMENT

FI-33014 UNIVERSITY OF TAMPERE, FINLAND

ISSN 1458-1191
ISBN 978-952-03-0088-3

Testing for Granger Causality between Corruption and Governance

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March 2016

Abstract

In the economic literature, a common view is that corruption is more an institutional problem than a market failure: malfunctioning bureaucracy makes firms turn to corruption. Following this viewpoint, major International Financial Institutions urge developing countries to improve their governance in order to secure efficiency in all international transactions. Still, some observers claim that rent-seekers deliberately provoke institutional malfunctioning in order to extract private gains. This is to say that corruption is a built-in element of poor governance. This paper tackles this endogeneity issue by testing for Granger causality between bad governance and corruption. The test utilizes dynamic panel data of 117 countries, consisting of World Bank's WGI indicators from 1996 to 2013. The paper finds substantial proof for causal effects between poor governance and corruption, the causal direction depending on specific measures of the quality of governance. In particular, the findings show that global anti-corruption efforts have made these causalities clearer, and that they depend on country-specific socio-economic mentalities.

Keywords: endogeneity, governance indicators, institutions

JEL classification: D73

1 Introduction

A common understanding is that corruption undermines democratization, distorts the market, and biases investment policies (see e.g. Shleifer and Vishny, 1993; Mauro, 1995; Rose-Ackerman, 1999). Rapidly evolving globalization pushes all countries to follow common norms and practices so that all international transactions are safe and efficient. Developing countries are typically major playing fields of both corruption and deficient governance, and global awareness has risen to make things right in those countries. This stands high in the agenda of International Financial Institutions (IFIs) such as the World Bank, and the International Monetary Fund (IMF), whose special concern is to secure efficient use of their funds and loans. Nationally, the global trend means enforcement of the neoclassical market-based design, where the state is in charge of guaranteeing property rights, reducing transaction costs, and avoiding expropriations (Khan, 2002a, 2002b).

Corruption can be regarded simply as an act of bribe, as rent-seeking, or even as natural human behavior. Nye (1967) defines corruption as "behavior which deviates from the formal duties of a public role because of private-regarding (personal, close family, private clique) pecuniary or status gains; or violates rules against the exercise of certain types of private-regarding influence". Khan (1996) agrees by seeing corruption as "behavior that deviates from the formal rules of conduct governing the actions of someone in a position of public authority because of private-regarding motives such as wealth, power, or status". The World Bank condenses the definition to "the abuse of public agent for private ends". By Rose-Ackerman (1999), bribe is "an illegal payment in favor of a public agent to obtain an advantage that may, or may not be deserved without reward". Thus, the exchange contract between the briber and the grafter does not have to guarantee the advantage, which may be the case e.g. in the context of privatization (Shleifer *et al.*, 1993; Thompson, 1993). In developed economies, corruption takes more modern forms like lobbying, funding of interest groups and thought leaders, subsidizing electoral candidates, etc. While economic development reduces classical types of corruption, it may raise it in its modern forms (Khan, 2002a,b; 2004). In any case, corruption seems to be more an institutional matter than a plain market distortion.

Governance is a multidimensional concept, which can be perceived at least from three angles: The selection process of the policymakers (political dimension); Policymakers' ability to formulate and implement policy for efficient allocation of resources (economic dimension); and Credibility and respectability of the institutions (institutional respect dimension). Naturally, economists take mainly the second angle, which suffices to cover the interplay of corruption and governance. The above definitions of corruption and the three perceptions of governance highlight the overlap of corruption and bad governance. Kaufmann (2005) defines governance simply as the institutions and practices by which authority is used for the national interest, and argues that anticorruption accords with good governance.

A prevalent line of economic research assumes that corruption is caused by distorted bureaucracy. For example, administrative slack in allotting licenses, permits, or signatories makes governance sluggish and inefficient, and corruption is applicable in bypassing these rigidities. Taking this approach, Bardhan (1997) states that corruption in fact mitigates the pre-existing distortions caused by malfunctioning governance. Likewise, Méndez & Sepúlveda (2006) finds out that corruption fosters economic growth, if the quality of governance is low, and Méon & Weill (2008) shows that corruption tends to boost aggregate efficiency, if governance is deficient. On the other hand, Myrdal (1968), and Kurer (1993) argue that it is in the bureaucrats' self-interest to create distortive tediousness in order to raise motives for bribery, implying that corruption would influence and explain the quality of governance. Kaufmann *et al.* (2000) strongly opposes the idea, and argues that corruption is endogenous to poor governance thus exacerbating rather than mitigating the pre-existing distortions. For a proof, a survey over 3000 multinational firms is performed with the result that bribery in fact increases bureaucratic sluggishness.

In short, there seems to be some distinction in viewpoints: some explain the effects of corruption by the exogenous state of governance, and others take the interplay between corruption and the quality of governance endogenous. By no means, neither viewpoint rejects the other, but the distinction raises up the question of causality between governance and corruption. Many earlier studies have considered this correlation (e.g. Leff, 1964; Rose-Ackerman, 1999; La Porta, 1999; Kaufmann, 2000, 2005; Khan, 2004; Méon & Sekkat, 2005; Méndez & Sepúlveda, 2006), but very few have tested their causal relations. Therefore, this paper empirically tests the causality between the quality of governance and corruption, and specifies the direction of such causality. Section 2 of the paper presents the Granger method of causality testing, and the data used in the analysis. Section 3 presents the empirical findings, and Section 4 concludes.

2 Method and data

The relationship between the quality of governance and corruption seems to be a typical "chicken-egg" paradox. In addressing such cases, the Granger method is commonly used in economics (Granger, 1969). By definition, there is Granger causality from *X* to *Y*, when the utilization of the histories of both *X* and *Y* predicts *Y* better than the history of *Y* alone. Such causal relationships in both ways can be formalized by the following baseline models:

$$Y_{i,t} = \sum_{j=1}^{J} \lambda_j Y_{i,t-j} + \sum_{k=1}^{K} \gamma_k X_{i,t-k} + u_{i,t} \dots (1),$$

$$X_{i,t} = \sum_{j=1}^{J} \lambda'_j X_{i,t-j} + \sum_{k=1}^{K} \gamma'_k Y_{i,t-k} + u'_{i,t} \dots (2).$$

There is Granger causality from *X* to *Y*, if model (1) fits statistically better than

$$Y_{i,t} = \sum_{j=1}^{J} \lambda_j Y_{i,t-j} + u_{i,t} \dots (1.1).$$

Likewise, there is Granger causality from *Y* to *X*, if model (2) fits better than

$$X_{i,t} = \sum_{j=1}^{J} \lambda'_j X_{i,t-j} + u'_{i,t} \dots (2.1).$$

In the above equations, λ, γ, and λ', γ' denote the coefficients to be estimated, *u* and *u'* denote the error terms, the subscript *i =1,….,N* denotes particular cross-sections, *t =1,….,T* denotes time, and *J* and *K* denote the number of lag periods. To carry out the test, the coefficients λ, γ, and λ', γ' in the baseline models (1) and (2), respectively, have to be estimated. Main attention must be paid on γ and γ', as their estimates point to possible existence of causality. The choice of lag periods is critical, because too few lags provoke autocorrelated errors and thus spurious test statistics, while too many lags reduce the power of the test. Here, the choice of lag periods obeys the rule of Dumitrescu & Hurlin (2012), which says that the minimum time extent for *J* and *K* should be chosen according to $T>5+2z$ (where T is the number of time periods and z is the number of lags). The error terms u and u' are assumed to follow a one-way error component model. Since the study is based on balanced panel data (i.e. no unobserved specific effects), the error term in model (1), for example, is reduced to the following equation: $u_{i,t} = \mu_i + v_{i,t}$,; where $\mu_i \sim IID(0,\sigma_\mu^2)$ stands for period-specific effects and $v_{i,t} \sim IID(0,\sigma_v^2)$ represents the error term. The same attributes apply for model (2), too.

Dynamic panel data regressions are basically subject of estimation bias over time. Since the lagged dependent variable $Y_{i,t-j}$ in equation (1), or $X_{i,t-j}$ in equation (2), could be also endogenous, their presence among explanatory variables in the respective models may cause correlation with the error term. Furthermore, there may also appear effects caused by heterogeneity among the study units. With dynamic and endogenous regressors, the use of the Generalized Least Squares (GLS) estimators, or the Fixed Effects (FE) estimators would lead to inconsistent estimates (Baltagi, 1995). Therefore, Blundell & Bond (1998) propose using the two-step System Generalized Method of Moments (GMM) estimator, which is an augmented version of the Difference GMM estimator of Arellano & Bond (1991). The method is commonly used, because it takes into account all orthogonality conditions, and allows rigorous control over the instrument matrix.

Referring to the baseline models (1) and (2), let variable X refer to the quality of governance, and variable Y to the extent of corruption. Data on these variables come from the *Worldwide Governance Indicator 2014 (WGI)* dataset published by The World Bank. The dataset includes balanced panel data of 117 countries listed in *Appendix 1*. The time span is from 1996 to 2013, with 15 periodical observations on six aspects of the quality of governance. The aggregated indicators for the quality of governance are[1]:

- *Voice and accountability (*denoted *VA)*, which "reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media"
- *Political stability and absence of violence/terrorism (PS)*, which "reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism";
- *Government effectiveness (GE),* which "reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality if policy formulation and implementation, and the credibility of the government's commitment to such policies";
- *Regulatory quality (RQ)*, which "reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development";
- *Rule of law (RL)*, which "reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence";
- *Control of corruption (COR).*

The *COR* indicator is used for the corruption variable, since it attempts to capture the extent to which bureaucrats resort to opportunistic behavior for private ends. Originally, all governance

[1] For further details on the indicators, see Kaufmann *et al.* (2010).

indicators score from -2.5 to 2.5, with the upper bound indicating best possible quality of governance, and full integrity for *COR* as a corruption variable. For ease of interpretation, the indicators are transformed by subtracting their original values from 3.5. As a result, the transformed indicator values vary from 1 to 6, with the upper bound standing for the worst quality of governance, and for utmost corruption with *COR*. *Appendix 2* reports the descriptive statistics of the set of variables.

3 Empirical results

The first thing is to ensure that the time series are stationary, meaning that their distribution neither follows any trend nor changes over time, which is a key requirement for the validity of time series regressions. The Augmented Dickey-Fuller method is used with the null hypothesis that all panels contain a unit root, saying that the series are *nonstationary*. The alternative hypothesis of stationarity is accepted, if the probability is less than the critical value 0.05. As can be seen from *Appendix 2*, the conclusion is that all series are stationary. This is confirmed also by the Philipps-Perron unit-root test, the results of which are also reported in *Appendix 2*.

To test the existence of Granger-causality between the quality of governance and the extent of corruption, the Two-step System GMM is used. GMM yields asymptotically robust estimators, and all variables enter regression with their logarithmic values. For the lag length, 2 is chosen, which seems optimal since it enables to eliminate serial correlation in residuals (Arellano, 2003). The Arellano tests AR (1) and AR (2) are used to respect the condition of Dumitrescu & Hurlin (2012).

In equation (1), the test of whether poor governance causes corruption is based on the Wald test with the null hypothesis that the values of the lagged variables of poor governance are zero, which means that these regressors have no predictive contains for $Y_{i,t}$ (i.e. $\gamma_1=\gamma_2=\ldots\gamma_K=0$). The same applies for equation (2) in the opposite direction (i.e. $\gamma_1'=\gamma_2'=\ldots\gamma_K'=0$). Following the benchmark models, due attention is paid on the coefficient of the sum of the lagged variables of governance in equation (1), and alternatively on the sum of the lagged variables of corruption in equation (2). If the coefficient is significant, the explanatory variable explains the dependent variable (positively or negatively). When studying causality, positive or negative coefficients of the explanatory variable have the same interpretation.[2]

3.1 Granger causality test – preliminary specification

For preliminary investigation of Granger causality between the quality of governance and corruption, the models (1) and (2) are tested as such along the procedure presented in the previous section. This is to say that possible causality is examined in both ways, from the quality of governance to corruption, that is model (1), and from corruption to the quality of governance, that is model (2). The tests are made according to each indicator of the quality of governance. The full results of the Granger causality tests are reported in *Table 1*.

[2] Note that the signs of the estimated coefficients tell about effects rather than causes. Yet, the interpretation in this case is similar.

Table 1: Results of Granger causality tests between Corruption and the quality of Governance

	Granger test between *COR & VA*		Granger test between *COR & PS*		Granger test between *COR & GE*		Granger test between *COR & RQ*		Granger test between *COR & RL*	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	VA® COR	*COR ® VA*	*PS® COR*	*COR® PS*	*GE® COR*	*COR® GE*	*RQ® COR*	*COR® RQ*	*RL ® COR*	*COR® RL*
$CORRUPTION_{t-1}$	0.760*** (0.03)	-0.012 (0.020)	0.741*** (0.035)	0.086** (0.033)	0.738*** (0.041)	0.003 (0.028)	0.761*** (0.038)	0.000 (0.029)	0.682*** (0.045)	0.024 (0.032)
$CORRUPTION_{t-2}$	0.128* (0.051)	0.041· (0.024)	0.119* (0.055)	-0.013 (0.030)	0.111* (0.051)	0.043 (0.032)	0.130* (0.054)	0.057* (0.028)	0.119* (0.047)	0.040· (0.022)
$\sum_{i=1}^{2} CORRUPTION_{t-i}$	0.082* (0.039)	-0.011 (0.018)	0.085· (0.043)	-0.029 (0.029)	0.057 (0.046)	0.009 (0.027)	0.059 (0.046)	0.006 (0.02)	0.066 (0.049)	0.038 (0.029)
$GOVERNANCE_{t-1}$	0.118* (0.051)	0.960*** (0.034)	0.110*** (0.029)	0.786*** (0.044)	0.070 (0.051)	0.783*** (0.050)	0.046 (0.045)	0.861*** (0.05)	0.255*** (0.074)	0.924*** (0.062)
$GOVERNANCE_{t-2}$	-0.033 (0.057)	-0.099* (0.041)	-0.025 (0.031)	0.074· (0.041)	0.013 (0.052)	0.116. (0.059)	-0.038 (0.047)	0.014 (0.034)	-0.044 (0.086)	-0.008 (0.068)
$\sum_{i=1}^{2} GOVERNANCE_{t-i}$	-0.056 (0.041)	0.106*** (0.029)	-0.010 (0.021)	0.043 (0.028)	0.009 (0.038)	0.021 (0.042)	0.041 (0.039)	0.040 (0.029)	-0.059 (0.045)	-0.044· (0.026)
Number of observations	2691	2691	2691	2691	2691	2691	2691	2691	2691	2691
Number of groups	117	117	117	117	117	117	117	117	117	117
Sargan test[a] (p-value)	1	1	1	1	1	1	1	1	1	1
AR (1)[b] (p-value)	1.2175e-09	3.9678e-08	3.3884e-09	5.1984e-15	6.8559e-09	5.1149e-08	3.3749e-09	2.22e-16	4.6125e-09	5.5864e-10
AR (2)[b] (p-value)	0.88478	0.92163	0.97637	0.34706	0.71062	0.2212	0.78187	0.0377	0.7557	0.38242
Wald test for coefficients[c]	(46066.7)***	(62415.27)***	(28465.5)***	(4537.64)***	(20784.1)***	(34527)***	(19465.3)***	(14072.7)***	(19438.7)***	(33227.6)***
Wald test for time dummies[c]	(33.578)***	(23.145)***	(26.393)***	(15.818)	(30.43)***	(45.544)***	(30.489)***	(25.248)***	(29.052)***	(19.308)

Notes: [a] The null hypothesis of the Sargan test (robust to autocorrelation) is that the instruments are not correlated with the residuals. [b] The null hypothesis of the AR (1) and AR (2) tests is that the residual from the estimations is first-order, but not second-order correlated. [c] The Wald test checks whether $GOVERNANCE_{t-i} = 0$ for equation (1) and $CORRUPTION_{t-i} = 0$ for equation (2). [c] The null hypothesis of the Wald test for time dummies examines whether $dummy_t=0$ (the GMM technique always generates tests for times). Robust standard errors to heteroscedasticity are in parentheses. The following superscripts '***', '**', '*', '·' represent the statistical significance at 0.1, 1, 5, and 10 percent level.

Table 1 shows that the dependent variables in models (1) and (2) are significantly predicted by their respective past values. In the estimations of model (1) (possible causality from bad quality of governance to corruption), the coefficients of the two lagged variables of corruption are always statistically different from zero. However, the coefficient estimate of the sum of lagged variables of governance (row 6 in bold, left colums) is never significant, meaning that there is no Granger causality from any of the five governance indicators to corruption. With the reverse model (2) (possible causality from corruption to the deterioration of the quality of governance), the endogenous variables are also (at least to some extent) statistically predicted by their past values, but the estimates of the sum of the lagged variables of corruption (row 3 in bold, right columns) are again never significant. Hence, there seems to be no Granger causality from corruption to deficient governance.

To synthesize the results of *Table 1*, it seems that poor governance does not cause corruption, and corruption does not cause poor governance. This is quite surprising, at least in the light of the intuitively appealing proposition by Kaufmann (2000) that corruption should endogenously lead to poor governance, and exacerbate economic distortions. Even a quick look on the country-wise data shows that excessive corruption and bad quality of governance usually go hand-in-hand, and vice versa. The finding somewhat contradicts also the mainstream neoclassical view of efficient governance in securing property rights with a low risk of expropriation, and preserving collective interests – why shouldn't idle control of corruption make it less efficient (see Khan, 2000a,b)?

3.2 Closer scrutiny on Granger causality

By all means, the above result that there is no Granger causality between poor governance and corruption needs closer assessment with further specifications on models (1) and (2). Two specifications are tried, one concerning possible changes in the governance-corruption nexus over time, and the other concerning possible differences in the nexus between country types.

Concerning the first specification, it is quite plausible that the governance-corruption causality is time-dependent, and that there may exist some critical breaking points that affect it. One quite obvious breaking point is due to the rapidly rising awareness of the necessity of the struggle against corruption in the beginning of the 21st century. As a prominent example of this awareness, 140 countries have ratified the anti-corruption agreements of the UN convention in 2003 in Mérida, Mexico. The widely adopted anti-corruption measures should have had worldwide influence on the extent of corruption. A plausible assumption is that the links to the quality of governance, if any, should have also been shaken (ref. e.g. Charron, 2001 on the impact of foreign aid on corruption).

To test the breaking point proposition, a time dummy variable is constructed so that it is 1 for years after 2000 and 0 otherwise. The interaction term between the time-dummy (denoted *Post2000*) and the key variables are then included among the predictors. Models (1) and (2) are estimated following the same procedure as in the previous case. The results of these estimations are reported in *Table 2*.

Table 2: Regression results: Granger causality tests between Corruption and Poor governance in the post 2000s

	Granger test between *COR & VA*		Granger test between *COR & PS*		Granger test between *COR & GE*		Granger test between *COR & RQ*		Granger test between *COR & RL*	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	VA® COR	*COR® VA*	*PS® COR*	*COR® PS*	*GE® COR*	*COR® GE*	*RQ® COR*	*COR® RQ*	*RL® COR*	*COR® RL*
$CORRUPTION_{t-1}$	0.885*** (0.049)	-0.002 (0.027)	0.789*** (0.045)	0.170*** (0.048)	0.786*** (0.074)	0.046 (0.036)	0.809*** (0.05)	0.05 (0.04)	0.77*** (0.06)	0.07· (0.04)
$CORRUPTION_{t-2}$	0.086 (0.054)	-0.04 (0.032)	0.087 (0.055)	-0.108** (0.04)	0.086 (0.059)	-0.01 (0.051)	0.11* (0.053)	0.08* (0.03)	0.07 (0.05)	0.01 (0.034)
$\sum_{i=1}^{2} CORRUPTION_{t-i}$	0.096* (0.044)	0.035· (0.021)	0.113* (0.046)	-0.042 (0.031)	0.067 (0.042)	0.062 (0.039)	0.032 (0.041)	0.011 (0.026)	0.11* (0.05)	0.031 (0.029)
$GOVERNANCE_{t-1}$	-0.068 (0.057)	0.949*** (0.044)	0.048 (0.050)	0.74*** (0.072)	0.019 (0.084)	0.74*** (0.053)	-0.012 (0.067)	0.77*** (0.05)	0.13 (0.09)	0.85*** (0.066)
$GOVERNANCE_{t-2}$	0.019 (0.059)	-0.069 (0.049)	-0.008 (0.042)	0.191** (0.06)	0.026 (0.058)	0.148* (0.075)	-0.039 (0.059)	-0.03 (0.043)	-0.01 (0.09)	0.022 (0.077)
$\sum_{i=1}^{2} GOVERNANCE_{t-i}$	-0.097* (0.046)	0.083** (0.031)	-0.06* (0.027)	0.012 (0.041)	-0.0005 (0.045)	-0.006 (0.061)	0.081* (0.039)	0.046 (0.033)	-0.09* (0.05)	-0.025 (0.032)
$CORRUPTION_{t-1}$*Post2000	-0.131*** (0.032)	0.004 (0.021)	-0.037 (0.033)	-0.09* (0.043)	-0.034 (0.072)	-0.04 (0.04)	-0.055 (0.045)	-0.071· (0.039)	-0.06 (0.05)	-0.082* (0.038)
$CORRUPTION_{t-2}$*Post2000	0.053· (0.03)	0.096*** (0.016)	0.048* (0.024)	0.111** (0.033)	0.039 (0.038)	0.062 (0.038)	0.024 (0.03)	-0.051· (0.03)	0.08* (0.04)	0.02 (0.031)
$\sum_{i=1}^{2} CORRUPTION_{t-i} * Post2000$	-0.018 (0.027)	-0.087*** (0.015)	-0.029 (0.022)	-0.01 (0.024)	-0.002 (0.039)	-0.094* (0.04)	0.055· (0.033)	-0.007 (0.027)	-0.05 (0.04)	-0.019 (0.021)
$GOVERNANCE_{t-1}$*Post2000	0.207*** (0.046)	0.034 (0.033)	0.052 (0.045)	0.087 (0.063)	0.032 (0.09)	0.056 (0.053)	0.073 (0.072)	0.108* (0.054)	0.07 (0.07)	0.122* (0.051)
$GOVERNANCE_{t-2}$*Post2000	-0.047 (0.037)	-0.035 (0.027)	-0.032 (0.032)	-0.134** (0.045)	-0.018 (0.041)	-0.034 (0.052)	-0.0004 (0.045)	0.09* (0.04)	-0.09· (0.04)	-0.044 (0.043)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * Post2000$	0.009 (0.032)	0.017 (0.021)	0.03 (0.023)	0.045 (0.034)	-0.007 (0.039)	0.046 (0.048)	-0.095* (0.04)	-0.018 (0.035)	0.067 (0.04)	0.017 (0.027)
Number of observations	2691	2691	2691	2691	2691	2691	2691	2691	2691	2691
Number of groups	117	117	117	117	117	117	117	117	117	117
Sargan test (p-value)	1	1	1	1	1	1	1	1	1	1
AR (1) (p-value)	1.253e-14	3.002e-08	3.098e-12	2.22e-16	1.538e-12	6.486e-09	4.100e-12	8.69e-13	2.63e-11	2.537e-08
AR (2) (p-value)	0.30835	0.31498	0.33915	0.1946	0.48066	0.0111	0.7631	0.1223	0.3634	0.1942
Wald test for coefficients	147150.7***	182527.6***	146859.8***	38966.3***	170549.7***	116355.4***	158725.9***	134400.1***	140663.1***	231899.6***
Wald test for time dummies	32.70828***	53.90***	22.297***	12.346	19.245	33.376	19.193	24.818***	21.507***	18.907

Table 2 includes the coefficient estimates for the new interaction terms. In particular, the causal link from one variable to another is checked against the significance of the coefficient estimate of the sum of the interaction terms on the bolded rows (numbers 9 and 12) in the *Table*. Inspection of model (1) (row 12, left columns) shows that there exists a statistically significant one-way Granger causality from

- *RQ* to corruption (at 5 % treshold level).

With model (2) (row 9, right columns), the results show statistically significant unidirectional Granger causalities from

- corruption to *VA* (at 0.1 % threshold); and
- corruption to *GE* (at 5 % threshold level).

The results mean that the nexus between corruption and these particular aspects of the quality of governance has evolved over the breaking point year 2000. However, there still seems to exist no statistically significant Granger-causalities between corruption and the quality of governance, measured in terms of *PS*, or *RL* in either direction.

The second specification is based on the perception that corruption is a complex phenomenon, which is likely to be connected to e.g. racial, lingual, political, cultural, historical, and religious factors that largely determine the socio-economic mentality of particular countries. In order to get statistically meaningful results, the whole sample of countries is divided into reasonably large sub-samples. The sub-sampling stands on the assumption that countries close to each other often have same kinds of mental patterns. Thus, the mental link should hold also over wider areas (Treisman, 2000; Goel and Nelson, 2008). These shared patterns may also be reflected by belonging to economic and political unions, or defence alliances. Sometimes the geographical aspect may not imply proximity, but rather the opposite. For example, isolated countries that lay on isles far away from the mainland may generate common mental features, albeit they may locate quite far from each other.

The 117 countries in the whole sample are arranged into 7 sub-samples, or country groups.[3] In constructing the groups, the criterion is that the countries in each group are as homogenous as possible concerning their socio-economic mentality. The sub-sampled country groups are the following:

- *Sub-Saharan Africa* (denoted *SSA*), including: Burundi, Benin, Botswana, Central African Republic, Cote d'Ivoire, Cameroon, Democratic Republic of Congo, Republic of Congo, Gabon, Ghana, Gambia, Kenya, Liberia, Lesotho, Mali, Mozambique, Mauritania, Malawi, Namibia, Niger, Rwanda, Sudan, Senegal, Sierra Leone, Swaziland, Togo, Tanzania, Uganda, South Africa, and Zambia (30 countries in total);
- *Latin America* (*LA*), including: Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, Panama, Peru, Paraguay, El Salvador, Uruguay, and Venezuela (17 countries in total);

[3] The sub-samples include 115 of the 117 countries. United States and Canada are omitted, because no regressions can be performed with a group of two (North American) countries, and because it is not reasonable to include them it the other groups.

- *Europe* (*EUR*), including: Albania, Austria, Belgium, Bulgaria, Switzerland, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Hungary, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, and Sweden (21 countries in total);
- *South-East Asia* (*SEA*), including: Brunei Darussalam, Hong Kong, Indonesia, India, Cambodia, Laos, Malaysia, Singapore, and Viet Nam (9 countries in total);
- *East Asia* & *South Asia* (*EASA*), including: Bangladesh, China, Japan, Republic of Korea, Macao, Mongolia, Nepal, Pakistan, and Thailand (9 countries in total);
- *Island Countries* (*ISLA*), including: Australia, Bahrain, Barbados, Cyprus, Dominican Republic, Fiji, Ireland, Iceland, Jamaica, Sri Lanka, Maldives, Malta, Mauritius, New Zealand, Philippines, Trinidad and Tobago, and Taiwan (17 countries in total);
- *Middle East* & *Northern Africa* (*MENA*), including: Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Morocco, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, and Turkey (12 countries in total).

To capture the mentality-dependent specificities, the two baseline models (1) and (2) are re-estimated with respect to the above grouping. To operationalize the grouping, 7 dummy variables are used so that they get the value 1, if the country belongs to the country group in question, and the value 0 otherwise. Interaction terms are now constructed by using the group-wise dummy multiplication with the corruption and governance variables. In other respects, the estimation procedure remains unchanged. *Table 3* summarizes the relevant information, and full estimation results are presented in *Appendix 3*.

Table 3: Granger test estimates for the sums of the group-wise interaction terms

	Granger test between *COR & VA*		Granger test between *COR & PS*		Granger test between *COR & GE*		Granger test between *COR & RQ*		Granger test between *COR & RL*	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	VA® COR	*COR® VA*	*PS® COR*	*COR® PS*	*GE® COR*	*COR® GE*	*RQ® COR*	*COR® RQ*	*RL® COR*	*COR® RL*
$\sum_{i=1}^{2} CORRUPTION_{t-i} * SSA$		0.033 (0.049)		0.009 (0.104)		-0.063 (0.056)		-0.003 (0.040)		-0.102· (0.058)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * SSA$	0.045 (0.081)		-0.034 (0.054)		-0.028 (0.117)		-0.0003 (0.090)		-0.078 (0.104)	
$\sum_{i=1}^{2} CORRUPTION_{t-i} * LA$		0.009 (0.071)		0.107 (0.094)		-0.083 (0.062)		0.082· (0.048)		0.012 (0.057)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * LA$	0.218** (0.079)		0.061 (0.059)		0.042 (0.077)		-0.032 (0.064)		0.158 (0.129)	
$\sum_{i=1}^{2} CORRUPTION_{t-i} * EUR$		0.05 (0.039)		-0.059 (0.063)		0.038 (0.068)		-0.028 (0.050)		0.014 (0.047)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * EUR$	-0.201· (0.120)		0.076· (0.046)		-0.020 (0.078)		0.016 (0.117)		-0.061 (0.099)	
$\sum_{i=1}^{2} CORRUPTION_{t-i} * SEA$		0.002 (0.069)		-0.123 (0.103)		0.035 (0.140)		-0.012 (0.139)		-0.029 (0.05)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * SEA$	0.251 (0.257)		-0.168* (0.076)		0.031 (0.135)		-0.117 (0.081)		-0.178 (0.122)	
$\sum_{i=1}^{2} CORRUPTION_{t-i} * EASA$		-0.091* (0.038)		-0.027 (0.060)		-0.030 (0.054)		0.104 (0.099)		0.133 (0.132)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * EASA$	-0.3272* (0.151)		0.033 (0.066)		-0.227** (0.084)		-0.300* (0.142)		0.028 (0.169)	
$\sum_{i=1}^{2} CORRUPTION_{t-i} * ISLA$		0.011 (0.045)		-0.012 (0.063)		0.023 (0.061)		0.014 (0.044)		-0.113* (0.051)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * ISLA$	0.027 (0.119)		-0.0007 (0.058)		0.041 (0.073)		-0.028 (0.095)		0.161 (0.137)	
$\sum_{i=1}^{2} CORRUPTION_{t-i} * MENA$		-0.003 (0.039)		0.077 (0.063)		0.051 (0.071)		-0.036 (0.061)		-0.024 (0.059)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * MENA$	0.069 (0.159)		-0.102 (0.075)		0.077 (0.237)		0.235 (0.163)		0.209 (0.200)	

In *Table 3*, the attention is again on the coefficients of the sums of the interaction variables. The areal specification seems have produced a substantial amount of statistically significant estimates that confirm Granger causality. With model (1) (left columns, even number rows), the results show that there exists Granger causality in the following cases:

- from *VA* to corruption in Latin America (at 1 % threshold), in East Asia & South Asia (at 5 % threshold), and in Europe (at 10 % threshold);
- from *PS* to corruption in South-East Asia (at 5 % threshold), and in Europe (at 10 % threshold); and
- from *GE* and *RQ* to corruption in East Asia & South Asia (at 5 % threshold).

With model (2) (right columns, odd number rows), the findings show Granger causality in the following cases:

- from Corruption to *VA* in East Asia & South Asia (at 5 % threshold);
- from Corruption to *RQ* in Latin America (at 10 % threshold); and
- from Corruption to *RL* in the Island Countries (at 5 % threshold), and in Sub-Saharan Africa (at 10 % threshold).

However, no significant Granger causalities are found in the country group of Middle East & Northern Africa in either direction.

4 Conclusions

The paper examines the causal nexus between the quality of governance and corruption. The data includes Word Bank's WGI indicators on both key variables from 117 countries worldwide over the period 1996-2013. The methodology to address the issue follows Granger (1969), and econometric regressions are carried out by dynamic panel data GMM estimations.

The preliminary tests find no Granger causality between governance and corruption in either direction. However, taking the issue under closer scrutiny, and making further data specifications reveals considerable causalities in both directions. The first specification concerns the influence of major anti-corruption efforts taken after 2000. The findings show that the causality between poor governance and corruption has evolved after the emergence of the efforts, and that the direction of the causality thereafter depends on the particular measures of the quality of governance.

A strong unidirectional causal link from increasing corruption to the deterioration of the quality of governance is discovered, when the quality aspects *Voice and accountability* (citizens' ability to select their government, and freedom of expression, association, and media), or *Government effectiveness* (quality of public services, independence of civil servants from political pressures, quality if policy formulation and implementation, and government's commitment to policies) are concerned. On the other side, there is a strong unidirectional causality from bad *Regulatory quality* (government's ability to implement policies and regulations that promote private sector development) to increasing corruption. Still, no causal links are found in either direction, when the quality of governance is indicated by *Political stability and absence of violence/terrorism* (the likelihood that the government will be destabilized or overthrown by unconstitutional means, including politically-motivated violence and terrorism), or by *Rule of law* (agents' confidence in the rules of society, quality of contract enforcement, property rights, police, and courts, and the likelihood of crime and violence).

The second specification is reasoned by possible areal differences in socio-economic mentality, which is supposed to be a major factor in explaining the governance-corruption nexus. The specification yields strong causal effects between corruption and all the five aspects of the quality of governance. For instance, In Sub-Saharan Africa, or in Island Countries, unidirectional Granger causality is observed from corruption to the quality of governance, when *Rule of law* is concerned. On the other hand, Europe shows unidirectional causality from the quality of governance to corruption in terms of *Voice and accountability*, or *Political stability and absence of violence/terrorism*, and South-East Asia shows similar pattern concerning the latter aspect of the quality of governance.

However, the case is not so clear with other country groups. For example in Latin America, causality is observed from corruption to the quality of governance, measured in terms of *Regulatory quality*, but from the quality of governance to corruption, when quality is measured in terms of *Voice and accountability*. The case is particularly complicated concerning East Asia & South Asia. The causality from the quality of governance to corruption is clear in terms of *Government effectiveness* and *Regulatory quality*, but there seems to be strong causalities in both directions, when quality is measured in terms of *Voice and accountability*. The finding that both increasing corruption disrupts governance and bad governance rouses corruption yields proof for endogeneity that is too deep to be itemized by the Granger test.

As a summary, the two specifications clearly improve the power of the Granger causality test, and manage to produce significant results on the issue. Operating the two specifications in the same regression would lead to spurious estimations, but, in any case, the results of the two specification rounds can be compared. Juxtaposing the results shows that both of them reveal causality from the quality of governance to corruption, when quality is measured by *Regulatory quality*, and causality from corruption to the quality of governance, when quality is measured by *Voice and accountability*. Noting that both hold in East & South Asia, and recalling the above discussion about the endogeneity of corruption and governance in that area, a deeper look on the issue in that socio-economically very interesting area should well be worthy of taking.

References

Aidt, Toke S., Dutta, Javasri, and Sena, Vania (2008). "Governance regimes, corruption and growth: Theory and evidence," *Journal of Comparative Economics,* 36, 195–220.

Arellano, Manuel, and Bond, Stephen (1991). "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations," *Review of Economic Studies,* 58, 277–297.

Arellano, Manuel (2003). "*Panel data econometrics*". Oxford University Press, New York.

Baltagi, Badi H. (1995). "*Econometric analysis of panel data*". Wiley: New York.

Bardhan, Pranab (1997). "Corruption and development: A review of issues," *Journal of Economic Literature*, 35 (3), 1320–1346.

Blundell, Richard, and Bond, Stephen (1998). "Initial conditions and moment restrictions in dynamic panel data models," *Journal of Econometrics,* 87, 115–143.

Dumitrescu, Elena, and Hurlin, Christophe (2012). "Testing for Granger non-causality in heterogeneous panels," *Economic Modelling,* 29, 1450–1460.

Goel, Rajeev K., and Nelson, Michael A. (2008). "Causes of corruption: History, geography and government," *Bofit-Institute for Economies in Transition, Bank of Finland, Discussion paper 6*.

Granger, Clive W. (1969). "Investigating causal relations by econometric models and cross-spectral methods," *Econometrica: Journal of the Econometric Society,* 424–438.

Kaufmann, Daniel (2005). "Back to basics-10 myths about governance and corruption," *Finance & Development 42 (3)*.

Kaufmann, Daniel, and Wei, Shang-Jin (2000). "Does 'grease money' speeds up the wheels of commerce?" *International Monetary Fund Policy Working Paper WP/00/64*.

Kaufmann, Daniel, Kraay, Aart, and Mastruzzi, Massimo (2010). "The worldwide governance indicators: A summary of methodology, data and analytical issues," *World Bank Policy Research Working Paper No. 5430.* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1682130.

Khan, Mushtaq H. (1996). "A typology of corrupt transactions in developing countries," In Barbara Harriss-White, and Gordon White [eds]. "Liberalization and the New Corruption". *IDS Bulletin 27(2):* 12–21.

Khan, Mushtaq H. (2000a). "Rents, efficiency and growth," In Mushtaq H. Khan, and Jomo K.S. [eds]. *Rents, Rent-Seeking and Economic Development*: *Theory and Evidence in Asia*. Cambridge University Press, Cambridge.

Khan, Mushtaq H. (2000b). "Rent-seeking as process," In Mushtaq H. Khan, and Jomo K.S. [eds]. *Rents, Rent-Seeking and Economic Development: Theory and Evidence in Asia*. Cambridge University Press, Cambridge.

Khan, Mushtaq H. (2004). "Corruption, governance and economic development," In Jomo, K.S. and Ben Fine (eds) 2004. *The New Development Economics*. New Delhi: Tulika Press and London: Zed Press.

Kurer, Oskar (1993). "Clientelism, corruption, and the allocation of resources," *Public Choice,* 77, 259–273.

La Porta, Rafael, Lopez-de-Silanes, Florencio, Shleifer, Andrei, and Vishny, Robert W. (1999). "The quality of government," *Journal of Law, Economics and Organization, 15,* 222–279.

Mauro, Paulo (1995). "Corruption and growth," *Quarterly Journal of Economics, 110(3),* 681–712.

Méndez, Fabio, and Sepúlveda, Facundo. (2006). "Corruption, growth and political regimes, Cross-country evidence," *European Journal of Political Economy, 22(1),* 82–98.

Méon, Pierre-Guillaume, and Weill, Laurent. (2008). "Is corruption an efficient grease?" Bank of Finland, Institute for Economies in Transition, *BOFIT Discussion Papers, 20*.

Myrdal, Karl G. (1968). "*Asian drama*". Random House, 2, New York.

Nye, Joseph S. (1967). "Corruption and political development: A cost-benefit analysis," *American Political Science Review, 61(2):* 417–427.

Rose-Ackerman, Susan (1999). "*Corruption and governance: Causes, consequences and reform*". Cambridge University Press.

Shleifer, Andrei, and Vishny, Robert W. (1993). "Corruption," *Quarterly Journal of Economics, CIX,* 599-617.

Thompson, Dennis F. (1993). "Mediated corruption: The case of the Keating five," *American Political Science Review, 87:* 369–381.

Treisman, Daniel (2000). "The causes of corruption: A cross-national study," *Journal of Public Economics, 76(3):* 399–457.

Appendix 1

List of countries/territories in the sample (117 in total)

Albania	Ecuador	Lesotho	Rwanda
Argentina	Egypt	Liberia	Saudi Arabia
Australia	El Salvador	Luxembourg	Senegal
Austria	Fiji	Macao	Sierra Leone
Bahrain	Finland	Malawi	Singapore
Bangladesh	France	Malaysia	South Africa
Barbados	Gabon	Maldives	Spain
Belgium	Gambia	Mali	Sri Lanka
Belize	Germany	Malta	Sudan
Benin	Ghana	Mauritania	Swaziland
Bolivia	Greece	Mauritius	Sweden
Botswana	Guatemala	Mongolia	Switzerland
Brazil	Honduras	Morocco	Syrian Arab Republic
Brunei Darussalam	Hong Kong	Mozambique	Taiwan
Bulgaria	Hungary	Mexico	Tanzania
Burundi	Iceland	Nepal	Thailand
Cambodia	India	Niger	Togo
Cameroon	Indonesia	Namibia	Trinidad and Tobago
Canada	Iran	Netherlands	Tunisia
Central African Republic	Iraq	Norway	Turkey
Chile	Ireland	New Zealand	Uganda
China	Israel	Pakistan	United Kingdom
Colombia	Italy	Panama	United States
Congo, Republic of	Jamaica	Paraguay	Uruguay
Democratic Rep. of Congo	Japan	Peru	Venezuela
Costa Rica	Jordan	Philippines	Viet Nam
Cote d'Ivoire	Kenya	Poland	Zambia
Cyprus	Korea, Republic of	Portugal	
Denmark	Kuwait	Qatar	
Dominican Republic	Laos	Romania	

Appendix 2

Descriptive statistics:

	Minimum	Median	Mean	Std. dev.	Maximum
COR	-0.0895	1.3095	1.1453	0.3995	1.7151
VA	0.5150	1.2527	1.1922	0.2970	1.7121
PS	0.6054	1.2448	1.2317	0.2732	1.8998
GE	0.0679	1.2622	1.1418	0.3571	1.7014
RQ	0.2253	1.2229	1.1457	0.3139	1.7771
RL	0.4057	1.2863	1.1709	0.3393	1.7457

Note: The statistics are based on logarithmic values of variables.

Result of the Augmented Dickey-Fuller tests:

Variable	AD-F Statistics	P-value
COR	-10.814	< 0.01
VA	-9.8521	< 0.01
PS	-9.8957	< 0.01
GE	-9.9102	< 0.01
RQ	-8.5446	< 0.01
RL	-10.374	< 0.01

Note: The series are stationary if all probabilities (P-values) associated to the D-F statistics are smaller than the critical value 0.05.

The Philipps-Perron unit-root test:

Variable	D-F Statistics	P-value
COR	-31.9	0.01
VA	-30.974	0.01
PS	-33.097	0.01
GE	-30.407	0.01
RQ	-32.014	0.01
RL	-31.423	0.01

Note: The Phillips-Perron test is a variation of the basic Dickey-Fuller test, and the D-F statistics differ from the AD-F statistics. The null hypothesis is that the series have a unit root against a stationary alternative. It is rejected, if all probabilities (P-values) associated with the D-F statistics are smaller than the critical value 0.05.

Appendix 3

3.1 Results for Granger causality tests for Sub-Saharan Africa (SSA)

	Granger test between *COR & VA*		Granger test between *COR & PS*		Granger test between *COR & GE*		Granger test between *COR & RQ*		Granger test between *COR & RL*	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	VA ® COR	*COR® VA*	*PS® COR*	*COR® PS*	*GE ® COR*	*COR® GE*	*RQ® COR*	*COR ® RQ*	*RL ® COR*	*COR® RL*
$CORRUPTION_{t-1}$	0.774***	-0.009	0.751***	0.114***	0.754***	0.020	0.764***	-0.01	0.712***	0.023
	(0.038)	(0.021)	(0.037)	(0.033)	(0.041)	(0.03)	(0.037)	(0.029)	(0.048)	(0.033)
$CORRUPTION_{t-2}$	0.109·	0.043	0.103·	-0.033	0.098·	0.053	0.112·	0.049	0.118*	0.039
	(0.056)	(0.028)	(0.06)	(0.031)	(0.057)	(0.035)	(0.059)	(0.032)	(0.052)	(0.025)
$\sum_{i=1}^{2} CORRUPTION_{t-i}$	0.088·	-0.014	0.098·	-0.038	0.073	0.014	0.074	0.005	0.084	0.052
	(0.046)	(0.019)	(0.051)	(0.029)	(0.052)	(0.03)	(0.052)	(0.023)	(0.051)	(0.035)
$GOVERNANCE_{t-1}$	0.111·	0.935***	0.089*	0.775***	0.055	0.758***	0.023	0.892***	0.239*	0.954***
	(0.066)	(0.044)	(0.035)	(0.052)	(0.06)	(0.053)	(0.045)	(0.047)	(0.099)	(0.068)
$GOVERNANCE_{t-2}$	-0.009	-0.056	-0.019	0.076	0.012	0.106·	-0.021	0.015	-0.102	-0.044
	(0.073)	(0.041)	(0.036)	(0.050)	(0.056)	(0.063)	(0.047)	(0.038)	(0.105)	(0.083)
$\sum_{i=1}^{2} GOVERNANCE_{t-i}$	-0.066	0.088**	-0.008	0.059·	0.008	0.006	0.043	0.028	-0.043	-0.055·
	(0.056)	(0.033)	(0.025)	(0.035)	(0.039)	(0.046)	(0.044)	(0.033)	(0.058)	(0.031)
$CORRUPTION_{t-1}$*SSA	-0.054	-0.016	-0.005	-0.118	-0.072	0.013	-0.01	0.076	-0.016	-0.002
	(0.090)	(0.058)	(0.087)	(0.072)	(0.119)	(0.06)	(0.100)	(0.055)	(0.101)	(0.055)
$CORRUPTION_{t-2}$*SSA	0.116	-0.004	0.111	0.152·	0.09	-0.051	0.119	0.022	0.035	0.012
	(0.122)	(0.062)	(0.126)	(0.085)	(0.147)	(0.064)	(0.134)	(0.055)	(0.122)	(0.042)
$\sum_{i=1}^{2} CORRUPTION_{t-i} * SSA$	-0.036	0.033	-0.063	0.009	-0.042	-0.063	-0.057	-0.003	-0.031	-0.102·
	(0.076)	(0.049)	(0.074)	(0.104)	(0.084)	(0.056)	(0.082)	(0.040)	(0.084)	(0.058)
$GOVERNANCE_{t-1}$*SSA	0.013	0.047	0.016	0.016	0.074	-0.023	0.050	-0.193*	-0.112	-0.178·
	(0.103)	(0.075)	(0.062)	(0.074)	(0.133)	(0.093)	(0.126)	(0.086)	(0.142)	(0.107)
$GOVERNANCE_{t-2}$*SSA	-0.089	-0.123	-0.027	0.008	-0.027	0.065	-0.102	0.020	0.196	0.148
	(0.111)	(0.107)	(0.071)	(0.083)	(0.154)	(0.09)	(0.176)	(0.086)	(0.148)	(0.110)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * SSA$	0.045	0.059	-0.034	-0.07	-0.028	0.069	-0.0003	0.081	-0.078	0.124·
	(0.081)	(0.072)	(0.054)	(0.058)	(0.117)	(0.075)	(0.090)	(0.066)	(0.104)	(0.064)
Number of observations	2691	2691	2691	2691	2691	2691	2691	2691	2691	2691
Number of groups	117	117	117	117	117	117	117	117	117	117
Sargan test (p-value)	1	1	1	1	1	1	1	1	1	1
AR (1) (p-value)	3.5859e-14	5.7487e-12	1.044e-14	3.4191e-16	2.22e-16	1.0295e-07	1.0367e-15	1.931e-12	6.8736e-16	6.1627e-11
AR (2) (p-value)	0.81802	0.80678	0.92143	0.2708	0.69044	0.33686	0.64356	0.041725	0.78988	0.36096
Wald test for coefficients	51052.98***	56406.94***	40733.12***	7846.56***	41575.62***	43305.39***	25796.94***	28435.41***	36917.51***	7813.14***
Wald test for time dummies	31.424***	21.544***	27.0254***	15.863	30.2312***	46.60***	29.2584***	25.419***	28.661***	20.871***

3.2 Results for Granger causality tests for Latin America (LA)

	Granger test between *COR & VA*		Granger test between *COR & PS*		Granger test between *COR & GE*		Granger test between *COR & RQ*		Granger test between *COR & RL*	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	VA® COR	*COR® VA*	*PS® COR*	*COR® PS*	*GE® COR*	*COR® GE*	*RQ® OR*	*COR® RQ*	*RL® COR*	*COR® RL*
$CORRUPTION_{t-1}$	0.771*** (0.036)	-0.009 (0.019)	0.745*** (0.037)	0.080* (0.033)	0.741*** (0.042)	0.007 (0.028)	0.762*** (0.037)	-0.005 (0.027)	0.695*** (0.046)	0.025 (0.029)
$CORRUPTION_{t-2}$	0.124* (0.054)	0.038 (0.026)	0.126* (0.058)	0.001 (0.031)	0.109* (0.055)	0.037 (0.033)	0.134* (0.056)	0.057* (0.029)	0.12* (0.049)	0.04. (0.023)
$\sum_{i=1}^{2} CORRUPTION_{t-i}$	0.072. (0.043)	-0.009 (0.018)	0.086. (0.047)	-0.044 (0.030)	0.053 (0.05)	0.009 (0.029)	0.059 (0.049)	-0.009 (0.021)	0.068 (0.052)	0.033 (0.034)
$GOVERNANCE_{t-1}$	0.106. (0.058)	0.963*** (0.038)	0.115*** (0.031)	0.793*** (0.046)	0.07 (0.058)	0.775*** (0.051)	0.049 (0.046)	0.856*** (0.047)	0.25** (0.083)	0.912*** (0.065)
$GOVERNANCE_{t-2}$	0.017 (0.061)	-0.105* (0.044)	-0.026 (0.035)	0.085* (0.040)	0.029 (0.055)	0.130* (0.061)	-0.044 (0.053)	0.027 (0.038)	-0.031 (0.093)	-0.007 (0.076)
$\sum_{i=1}^{2} GOVERNANCE_{t-i}$	-0.083. (0.044)	0.108*** (0.032)	-0.024 (0.023)	0.038 (0.028)	0.009 (0.040)	0.016 (0.045)	0.049 (0.044)	0.065. (0.033)	-0.075 (0.048)	-0.026 (0.027)
$CORRUPTION_{t-1}*LA$	-0.072 (0.074)	-0.022 (0.102)	-0.020 (0.071)	0.115 (0.103)	-0.006 (0.074)	0.009 (0.054)	-0.019 (0.074)	0.075 (0.09)	0.001 (0.081)	0.003 (0.055)
$CORRUPTION_{t-2}*LA$	0.028 (0.128)	0.051 (0.107)	-0.051 (0.143)	-0.205 (0.129)	-0.017 (0.153)	0.086 (0.082)	-0.058 (0.154)	-0.148 (0.109)	-0.018 (0.147)	0.006 (0.046)
$\sum_{i=1}^{2} CORRUPTION_{t-i} * LA$	0.057 (0.093)	0.009 (0.071)	0.11 (0.111)	0.107 (0.094)	0.131 (0.116)	-0.083 (0.062)	0.137 (0.118)	0.082. (0.048)	0.105 (0.115)	0.012 (0.057)
$GOVERNANCE_{t-1}*LA$	0.163 (0.107)	-0.068 (0.082)	-0.105. (0.054)	-0.041 (0.099)	0.014 (0.115)	0.123 (0.093)	-0.120 (0.091)	0.153* (0.067)	-0.042 (0.166)	0.064 (0.116)
$GOVERNANCE_{t-2}*LA$	-0.39** (0.125)	0.054 (0.119)	0.001 (0.06)	-0.067 (0.167)	-0.172 (0.118)	-0.214. (0.124)	0.086 (0.105)	-0.048 (0.073)	-0.212 (0.236)	0.005 (0.160)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * LA$	0.218** (0.079)	-0.032 (0.066)	0.061 (0.059)	0.09 (0.099)	0.042 (0.077)	0.08 (0.089)	-0.032 (0.064)	-0.111* (0.048)	0.158 (0.129)	-0.083 (0.078)
Number of observations	2691	2691	2691	2691	2691	2691	2691	2691	2691	2691
Number of groups	117	117	117	117	117	117	117	117	117	117
Sargan test (p-value)	1	1	1	1	1	1	1	1	1	1
AR (1) (p-value)	2.0797e-14	4.7476e-11	8.0657e-14	4.0555e-15	9.2921e-16	9.9382e-08	4.0553e-15	4.345e-13	3.885e-15	1.3866e-10
AR (2) (p-value)	0.87171	0.9521	0.9706	0.3348	0.73559	0.107	0.81839	0.018638	0.79686	0.36155
Wald test for coefficients	56371.35***	69339.47***	31357.76***	6122.13***	39395.19***	25756.45***	32082.9***	15647.18***	25686.5***	46835.63***
Wald test for time dummies	30.944***	24.609***	26.106***	15.994	29.59291***	44.724***	29.373***	25.053***	28.294***	19.487

3.3 Results for Granger causality tests for Europe (EUR)

	Granger test between COR & VA		Granger test between COR & PS		Granger test between COR & GE		Granger test between COR & RQ		Granger test between COR & RL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	VA ® COR	COR® VA	PS® COR	COR® PS	GE ® COR	COR® GE	RQ® COR	COR ® RQ	RL ® COR	COR® RL
$CORRUPTION_{t-1}$	0.759*** (0.034)	-0.007 (0.024)	0.738*** (0.033)	0.079* (0.038)	0.728*** (0.038)	-0.019 (0.029)	0.766*** (0.038)	-0.013 (0.03)	0.684*** (0.051)	0.034 (0.035)
$CORRUPTION_{t-2}$	0.123* (0.061)	0.038 (0.03)	0.106 (0.065)	0.004 (0.035)	0.119· (0.062)	0.062· (0.032)	0.038· (0.064)	0.048 (0.034)	0.125* (0.054)	0.059* (0.026)
$\sum_{i=1}^{2} CORRUPTION_{t-i}$	0.094· (0.051)	-0.022 (0.02)	0.097· (0.054)	-0.025 (0.033)	0.066 (0.06)	-0.002 (0.029)	0.079 (0.058)	0.007 (0.023)	0.089 (0.056)	0.034 (0.038)
$GOVERNANCE_{t-1}$	0.188*** (0.053)	0.972*** (0.038)	0.108** (0.035)	0.797*** (0.049)	0.134* (0.064)	0.83*** (0.038)	0.033 (0.054)	0.853*** (0.056)	0.258** (0.099)	0.930*** (0.071)
$GOVERNANCE_{t-2}$	-0.108* (0.054)	-0.100* (0.046)	-0.008 (0.036)	0.083· (0.047)	-0.067 (0.056)	0.035 (0.042)	-0.032 (0.056)	0.037 (0.04)	-0.095 (0.094)	-0.039 (0.081)
$\sum_{i=1}^{2} GOVERNANCE_{t-i}$	-0.017 (0.045)	0.090** (0.032)	-0.025 (0.025)	0.017 (0.032)	0.022 (0.050)	0.049 (0.04)	0.032 (0.038)	0.027 (0.035)	-0.049 (0.049)	-0.035 (0.027)
$CORRUPTION_{t-1}*EUR$	0.022 (0.094)	-0.028 (0.042)	0.028 (0.11)	0.063 (0.057)	0.045 (0.099)	0.114 (0.074)	0.001 (0.101)	0.078 (0.053)	0.073 (0.108)	-0.026 (0.047)
$CORRUPTION_{t-2}*EUR$	0.012 (0.101)	0.012 (0.051)	0.053 (0.109)	-0.059 (0.063)	0.008 (0.106)	-0.024 (0.083)	0.049 (0.113)	-0.02 (0.050)	0.018 (0.106)	-0.062 (0.046)
$\sum_{i=1}^{2} CORRUPTION_{t-i} * EUR$	-0.067 (0.070)	0.05 (0.039)	-0.047 (0.067)	-0.059 (0.063)	-0.045 (0.076)	0.038 (0.068)	-0.033 (0.069)	-0.028 (0.050)	-0.084 (0.072)	0.014 (0.047)
$GOVERNANCE_{t-1}*EUR$	-0.193 (0.120)	-0.152* (0.071)	-0.014 (0.057)	-0.050 (0.087)	-0.196· (0.105)	-0.197* (0.089)	-0.007 (0.099)	-0.013 (0.076)	-0.188 (0.154)	-0.119 (0.095)
$GOVERNANCE_{t-2}*EUR$	0.456** (0.167)	0.003 (0.091)	-0.085 (0.067)	-0.059 (0.079)	0.222* (0.101)	0.1796· (0.106)	-0.016 (0.112)	-0.085 (0.07)	0.257· (0.141)	0.153 (0.101)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * EUR$	-0.201· (0.120)	0.106* (0.06)	0.076· (0.046)	0.153** (0.051)	-0.020 (0.078)	-0.126 (0.089)	0.016 (0.117)	0.046 (0.062)	-0.061 (0.099)	0.035 (0.067)
Number of observations	2691	2691	2691	2691	2691	2691	2691	2691	2691	2691
Number of groups	117	117	117	117	117	117	117	117	117	117
Sargan test (p-value)	1	1	1	1	1	1	1	1	1	1
AR (1) (p-value)	8.1079e-13	1.5708e-11	4.2963e-14	1.4248e-14	2.22e-16	2.5577e-09	7.48e-16	1.9706e-13	2.22e-16	3.4323e-10
AR (2) (p-value)	0.79533	0.94961	0.90884	0.26934	0.9452	0.65173	0.9526	0.051622	0.95283	0.34218
Wald test for coefficients	78078.84***	103971.6***	34713.15***	13074.63***	62001.16***	50755.61***	36468.7***	58924.93***	69054.87***	91035.52***
Wald test for time dummies	31.368***	21.91***	27.182***	14.950	32.422***	37.100***	31.451***	24.70289***	29.198***	19.457

3.4 Results for Granger causality tests for South-East Asia (SEA)

	Granger test between COR & VA		Granger test between COR & PS		Granger test between COR & GE		Granger test between COR & RQ		Granger test between COR & RL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	VA ® COR	COR® VA	PS® COR	COR® PS	GE ® COR	COR® GE	RQ® COR	COR ® RQ	RL ® COR	COR® RL
$CORRUPTION_{t-1}$	0.748*** (0.035)	-0.025 (0.019)	0.736*** (0.036)	0.087** (0.033)	0.736*** (0.041)	0.021 (0.025)	0.755*** (0.036)	-0.009 (0.025)	0.68*** (0.043)	0.001 (0.026)
$CORRUPTION_{t-2}$	0.127* (0.054)	0.056* (0.025)	0.123* (0.057)	-0.019 (0.031)	0.109* (0.054)	0.042 (0.033)	0.138* (0.056)	0.063* (0.029)	0.129** (0.049)	0.05* (0.022)
$\sum_{i=1}^{2} CORRUPTION_{t-i}$	0.083* (0.042)	-0.009 (0.018)	0.099* (0.046)	-0.031 (0.029)	0.071 (0.049)	0.007 (0.027)	0.07 (0.047)	0.008 (0.018)	0.075 (0.049)	0.034 (0.031)
$GOVERNANCE_{t-1}$	0.143** (0.051)	0.951*** (0.037)	0.105*** (0.03)	0.803*** (0.043)	0.053 (0.06)	0.748*** (0.053)	0.049 (0.045)	0.873*** (0.048)	0.253** (0.079)	0.925*** (0.066)
$GOVERNANCE_{t-2}$	-0.027 (0.055)	-0.093* (0.043)	-0.041 (0.033)	0.069· (0.042)	0.028 (0.05)	0.132* (0.061)	-0.067 (0.047)	0.005 (0.038)	-0.075 (0.092)	-0.002 (0.076)
$\sum_{i=1}^{2} GOVERNANCE_{t-i}$	-0.064 (0.041)	0.108*** (0.031)	-0.004 (0.022)	0.048 (0.03)	0.007 (0.040)	0.033 (0.046)	0.063 (0.041)	0.041 (0.029)	-0.047 (0.049)	-0.029 (0.026)
*$CORRUPTION_{t-1}$*SEA*	0.192· (0.107)	0.210*** (0.055)	0.147 (0.094)	0.028 (0.08)	0.150 (0.117)	-0.003 (0.144)	0.106 (0.143)	0.137 (0.101)	0.253· (0.149)	0.26** (0.091)
*$CORRUPTION_{t-2}$*SEA*	0.004 (0.147)	0.233** (0.079)	-0.048 (0.133)	0.087 (0.094)	0.001 (0.184)	0.023 (0.073)	-0.114 (0.175)	-0.153* (0.066)	-0.143 (0.215)	-0.222* (0.104)
$\sum_{i=1}^{2} CORRUPTION_{t-i} * SEA$	-0.174* (0.073)	0.002 (0.069)	-0.082 (0.066)	-0.123 (0.103)	-0.118 (0.114)	0.035 (0.140)	-0.084 (0.063)	-0.012 (0.139)	-0.042 (0.119)	-0.029 (0.05)
*$GOVERNANCE_{t-1}$*SEA*	-0.342* (0.152)	0.131. (0.079)	-0.026 (0.077)	-0.228* (0.115)	0.076 (0.13)	0.130· (0.073)	-0.222* (0.096)	-0.083 (0.177)	-0.271 (0.198)	-0.051 (0.102)
*$GOVERNANCE_{t-2}$*SEA*	0.059 (0.298)	-0.052 (0.106)	0.178* (0.087)	0.141 (0.157)	-0.143 (0.215)	-0.144 (0.119)	0.431*** (0.115)	0.131 (0.095)	0.38· (0.202)	0.118 (0.146)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * SEA$	0.251 (0.257)	-0.059 (0.058)	-0.168* (0.076)	0.082 (0.073)	0.031 (0.135)	-0.055 (0.086)	-0.117 (0.081)	-0.023 (0.114)	-0.178 (0.122)	-0.08 (0.078)
Number of observations	2691	2691	2691	2691	2691	2691	2691	2691	2691	2691
Number of groups	117	117	117	117	117	117	117	117	117	117
Sargan test (p-value)	1	1	1	1	1	1	1	1	1	1
AR (1) (p-value)	1.0708e-14	5.5488e-11	4.6557e-14	4.0688e-15	2.3489e-16	2.6064e-07	2.6137e-15	2.7703e-13	8.5524e-16	2.4131e-10
AR (2) (p-value)	0.86035	0.98067	0.90349	0.30233	0.76886	0.09013	0.9282	0.014724	0.86769	0.5351
Wald test for coefficients	191112.8***	92902.28***	133487.7***	10970.9***	72955.83***	47390.58***	2.22e-16***	32524.62***	234713.1***	48309.2***
Wald test for time dummies	32.967***	23.745***	25.526***	15.680	31.8721***	45.1122***	0.0014***	24.639***	29.2818***	18.42703

3.5 Results for Granger causality tests for East Asia & South Asia (EASA)

	Granger test between COR & VA		Granger test between COR & PS		Granger test between COR & GE		Granger test between COR & RQ		Granger test between COR & RL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	VA ® COR	COR® VA	PS® COR	COR® PS	GE ® COR	COR® GE	RQ® COR	COR ® RQ	RL ® COR	COR® RL
CORRUPTION$_{t-1}$	0.784*** (0.037)	-0.009 (0.022)	0.761*** (0.037)	0.082* (0.034)	0.775*** (0.04)	0.021 (0.030)	0.778*** (0.038)	0.021 (0.027)	0.732*** (0.039)	0.038 (0.024)
CORRUPTION$_{t-2}$	0.139** (0.048)	0.027 (0.025)	0.134** (0.05)	-0.005 (0.032)	0.124* (0.049)	0.044 (0.034)	0.141** (0.051)	0.039 (0.025)	0.124* (0.048)	0.031 (0.022)
$\sum_{i=1}^{2} CORRUPTION_{t-i}$	0.046 (0.031)	-0.004 (0.018)	0.061. (0.033)	-0.032 (0.031)	0.032 (0.035)	0.010 (0.031)	0.029 (0.034)	0.0009 (0.019)	0.038 (0.032)	0.010 (0.02)
GOVERNANCE$_{t-1}$	0.081. (0.044)	0.958*** (0.035)	0.106*** (0.031)	0.745*** (0.042)	0.017 (0.047)	0.748*** (0.051)	0.035 (0.048)	0.858*** (0.042)	0.182*** (0.053)	0.877*** (0.038)
GOVERNANCE$_{t-2}$	-0.027 (0.061)	-0.105* (0.046)	-0.013 (0.031)	0.094* (0.040)	0.033 (0.055)	0.113. (0.062)	-0.031 (0.048)	0.004 (0.030)	0.019 (0.073)	0.063 (0.042)
$\sum_{i=1}^{2} GOVERNANCE_{t-i}$	-0.019 (0.042)	0.116*** (0.030)	-0.017 (0.022)	0.064* (0.029)	0.023 (0.035)	0.039 (0.044)	0.068. (0.041)	0.062* (0.030)	-0.074 (0.051)	-0.033 (0.028)
CORRUPTION$_{t-1}$**EASA*	-0.164. (0.096)	-0.009 (0.052)	-0.153* (0.075)	0.0004 (0.062)	-0.222** (0.08)	-0.073 (0.046)	-0.199. (0.102)	-0.229** (0.082)	-0.344* (0.139)	-0.201. (0.116)
CORRUPTION$_{t-2}$**EASA*	-0.061 (0.211)	0.155. (0.09)	-0.091 (0.214)	-0.031 (0.079)	-0.076 (0.200)	0.016 (0.064)	-0.133 (0.218)	0.085 (0.174)	0.032 (0.178)	0.115 (0.070)
$\sum_{i=1}^{2} CORRUPTION_{t-i} * EASA$	0.2627** (0.085)	-0.091* (0.038)	0.330. (0.180)	-0.027 (0.060)	0.306* (0.137)	-0.030 (0.054)	0.406. (0.216)	0.104 (0.099)	0.313 (0.201)	0.133 (0.132)
GOVERNANCE$_{t-1}$**EASA*	0.156 (0.131)	-0.009 (0.097)	0.113 (0.137)	0.471*** (0.112)	0.405. (0.216)	0.207* (0.092)	0.132 (0.173)	0.141 (0.145)	0.471. (0.241)	0.428* (0.179)
GOVERNANCE$_{t-2}$**EASA*	0.132 (0.155)	0.101 (0.092)	-0.235 (0.171)	-0.380* (0.162)	-0.180 (0.170)	0.042 (0.153)	0.090 (0.124)	0.117 (0.171)	-0.498** (0.153)	-0.540* (0.236)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * EASA$	-0.3272* (0.151)	-0.142 (0.088)	0.033 (0.066)	-0.027 (0.100)	-0.227** (0.084)	-0.162 (0.153)	-0.300* (0.142)	-0.221* (0.103)	0.028 (0.169)	0.060 (0.069)
Number of observations	2691	2691	2691	2691	2691	2691	2691	2691	2691	2691
Number of groups	117	117	117	117	117	117	117	117	117	117
Sargan test (p-value)	1	1	1	1	1	1	1	1	1	1
AR (1) (p-value)	5.5035e-15	1.0584e-13	1.8818e-14	1.2078e-15	2.22e-16	6.4017e-09	2.22e-16	2.4963e-12	5.8564e-16	7.3296e-15
AR (2) (p-value)	0.86137	0.98773	0.6853	0.39798	0.95363	0.0009	0.96595	0.048504	0.79847	0.27555
Wald test for coefficients	56816.75***	53523.33***	30416***	45208.72***	38179.6***	34451.16***	53456.02***	30189.02***	30719.11***	44513.52***
Wald test for time dummies	33.0722***	24.085***	25.914***	17.286	32.106***	46.233***	30.962***	24.073***	30.429***	19.82024***

3.6 Results for Granger causality tests for Island Countries (ISLA)

	Granger test between COR & VA		Granger test between COR & PS		Granger test between COR & GE		Granger test between COR & RQ		Granger test between COR & RL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	VA ® COR	*COR® VA*	*PS® COR*	*COR® PS*	*GE® COR*	*COR® GE*	*RQ® COR*	*COR® RQ*	*RL ® COR*	*COR® RL*
$CORRUPTION_{t-1}$	0.756*** (0.041)	-0.018 (0.021)	0.736*** (0.041)	0.083* (0.038)	0.742*** (0.046)	0.011 (0.031)	0.755*** (0.041)	0.015 (0.03)	0.702*** (0.052)	0.015 (0.034)
$CORRUPTION_{t-2}$	0.112· (0.062)	0.048· (0.027)	0.105 (0.066)	-0.018 (0.035)	0.098 (0.062)	0.052 (0.036)	0.112· (0.065)	0.047 (0.03)	0.113* (0.057)	0.02 (0.024)
$\sum_{i=1}^{2} CORRUPTION_{t-i}$	0.102* (0.049)	-0.013 (0.020)	0.114* (0.053)	-0.035 (0.033)	0.085 (0.058)	-0.001 (0.032)	0.081 (0.055)	0.0012 (0.024)	0.112· (0.058)	0.057 (0.035)
$GOVERNANCE_{t-1}$	0.115* (0.055)	0.969*** (0.032)	0.120*** (0.029)	0.800*** (0.047)	0.065 (0.060)	0.783*** (0.059)	0.041 (0.046)	0.87*** (0.048)	0.219* (0.093)	0.934*** (0.073)
$GOVERNANCE_{t-2}$	-0.024 (0.065)	-0.095* (0.041)	-0.049 (0.033)	0.062 (0.047)	0.014 (0.062)	0.133· (0.069)	-0.042 (0.058)	0.018 (0.04)	-0.043 (0.096)	-0.025 (0.081)
$\sum_{i=1}^{2} GOVERNANCE_{t-i}$	-0.059 (0.045)	0.095** (0.031)	-0.022 (0.023)	0.055· (0.032)	-0.001 (0.045)	0.001 (0.048)	0.053 (0.041)	0.034 (0.03)	-0.102* (0.046)	-0.018 (0.028)
$CORRUPTION_{t-1}*ISLA$	0.003 (0.061)	0.016 (0.053)	0.036 (0.063)	0.023 (0.057)	-0.012 (0.062)	-0.029 (0.053)	0.004 (0.070)	-0.074 (0.069)	0.030 (0.077)	2.8758e-04 (0.044)
$CORRUPTION_{t-2}*ISLA$	0.062 (0.075)	-0.023 (0.065)	0.052 (0.081)	0.019 (0.075)	0.069 (0.075)	-0.035 (0.075)	0.072 (0.078)	0.022 (0.087)	0.062 (0.078)	0.093· (0.051)
$\sum_{i=1}^{2} CORRUPTION_{t-i} * ISLA$	-0.073 (0.056)	0.011 (0.045)	-0.068 (0.065)	-0.012 (0.063)	-0.068 (0.067)	0.023 (0.061)	-0.057 (0.064)	0.014 (0.044)	-0.113 (0.075)	-0.113* (0.051)
$GOVERNANCE_{t-1}*ISLA$	-0.0002 (0.119)	-0.048 (0.123)	-0.139 (0.102)	-0.073 (0.090)	-0.020 (0.091)	0.017 (0.086)	-0.009 (0.114)	0.01 (0.107)	-0.099 (0.135)	-9.4463e-05 (0.093)
$GOVERNANCE_{t-2}*ISLA$	-0.014 (0.116)	-0.022 (0.129)	0.123 (0.093)	0.081 (0.090)	-0.002 (0.084)	-0.085 (0.097)	0.018 (0.076)	5.5951e-05 (0.072)	-0.037 (0.197)	0.105 (0.115)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * ISLA$	0.027 (0.119)	0.068 (0.075)	-0.0007 (0.058)	-0.042 (0.065)	0.041 (0.073)	0.104 (0.080)	-0.028 (0.095)	0.033 (0.078)	0.161 (0.137)	-0.085 (0.062)
Number of observations	2691	2691	2691	2691	2691	2691	2691	2691	2691	2691
Number of groups	117	117	117	117	117	117	117	117	117	117
Sargan test (p-value)	1	1	1	1	1	1	1	1	1	1
AR (1) (p-value)	8.148e-16	4.6743e-11	8.8402e-15	1.6874e-15	3.3804e-16	6.4517e-08	1.8121e-15	1.4058e-13	2.22e-16	1.8062e-10
AR (2) (p-value)	0.99089	0.85089	0.78709	0.42164	0.83499	0.41231	0.93402	0.044518	0.89352	0.29076
Wald test for coefficients	68845.75***	110123.3***	46278.47***	5882.147***	34403.34***	37974.86***	46508.82***	28712.47***	34722.31***	69208.39***
Wald test for time dummies	33.525***	22.785***	25.6315***	16.176	30.576***	45.283***	29.656***	25.706***	28.577***	18.962

3.7 Results for Granger causality tests for Middle East & Northern Africa (MENA)

	Granger test between COR & VA		Granger test between COR & PS		Granger test between COR & GE		Granger test between COR & RQ		Granger test between COR & RL	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	VA → COR	*COR → VA*	*PS → COR*	*COR → PS*	*GE → COR*	*COR → GE*	*RQ → COR*	*COR → RQ*	*RL → COR*	*COR → RL*
$CORRUPTION_{t-1}$	0.760*** (0.037)	0.006 (0.021)	0.753*** (0.037)	0.09** (0.034)	0.743*** (0.042)	0.020 (0.030)	0.765*** (0.038)	-0.009 (0.028)	0.702*** (0.048)	0.036 (0.031)
$CORRUPTION_{t-2}$	0.144** (0.053)	0.038 (0.027)	0.143** (0.054)	-0.007 (0.034)	0.125* (0.053)	0.048 (0.035)	0.143** (0.054)	0.045 (0.031)	0.142** (0.047)	0.032 (0.024)
$\sum_{i=1}^{2} CORRUPTION_{t-i}$	0.065 (0.040)	-0.007 (0.019)	0.069 (0.043)	-0.046 (0.030)	0.046 (0.049)	-0.001 (0.027)	0.054 (0.045)	0.005 (0.022)	0.07 (0.051)	0.031 (0.035)
$GOVERNANCE_{t-1}$	0.125* (0.057)	0.94*** (0.038)	0.083** (0.03)	0.795*** (0.043)	0.063 (0.057)	0.776*** (0.052)	0.019 (0.04)	0.879*** (0.046)	0.223** (0.082)	0.92*** (0.065)
$GOVERNANCE_{t-2}$	-0.032 (0.059)	-0.121** (0.043)	-0.037 (0.033)	0.065 (0.044)	0.018 (0.051)	0.122* (0.060)	-0.013 (0.051)	0.029 (0.036)	-0.042 (0.085)	0.012 (0.077)
$\sum_{i=1}^{2} GOVERNANCE_{t-i}$	-0.058 (0.043)	0.119*** (0.029)	-0.011 (0.021)	0.055. (0.029)	0.005 (0.038)	0.010 (0.044)	0.028 (0.038)	0.041 (0.032)	-0.088* (0.044)	-0.052* (0.024)
$CORRUPTION_{t-1}$*MENA	0.051 (0.094)	-0.096** (0.032)	0.016 (0.082)	-0.001 (0.068)	0.054 (0.092)	-0.053 (0.046)	0.006 (0.089)	0.017 (0.059)	0.022 (0.097)	-0.113* (0.052)
$CORRUPTION_{t-2}$*MENA	-0.150 (0.174)	0.046 (0.045)	-0.166 (0.189)	-0.054 (0.075)	-0.121 (0.167)	0.007 (0.065)	-0.09 (0.179)	0.047 (0.064)	-0.113 (0.139)	0.077 (0.06)
$\sum_{i=1}^{2} CORRUPTION_{t-i} * MENA$	0.083 (0.137)	-0.003 (0.039)	0.124 (0.149)	0.077 (0.063)	0.082 (0.139)	0.051 (0.071)	0.035 (0.157)	-0.036 (0.061)	0.022 (0.127)	-0.024 (0.059)
$GOVERNANCE_{t-1}$*MENA	-0.086 (0.119)	-0.014 (0.097)	0.08 (0.088)	-0.094 (0.172)	-0.017 (0.111)	0.043 (0.093)	0.194. (0.115)	0.064 (0.088)	0.009 (0.214)	0.104 (0.115)
$GOVERNANCE_{t-2}$*MENA	0.025 (0.208)	0.233* (0.108)	0.04 (0.122)	0.118 (0.123)	-0.078 (0.261)	-0.198. (0.119)	-0.385** (0.138)	-0.159 (0.116)	-0.151 (0.393)	-0.263. (0.143)
$\sum_{i=1}^{2} GOVERNANCE_{t-i} * MENA$	0.069 (0.159)	-0.161** (0.062)	-0.102 (0.075)	-0.023 (0.100)	0.077 (0.237)	0.151. (0.080)	0.235 (0.163)	0.066 (0.086)	0.209 (0.200)	0.222** (0.079)
Number of observations	2691	2691	2691	2691	2691	2691	2691	2691	2691	2691
Number of groups	117	117	117	117	117	117	117	117	117	117
Sargan test (p-value)	1	1	1	1	1	1	1	1	1	1
AR (1) (p-value)	2.5465e-14	1.2202e-12	1.0195e-14	6.82e-15	2.22e-16	9.109e-08	1.9701e-15	2.6901e-13	2.22e-16	3.708e-11
AR (2) (p-value)	0.8687	0.77789	0.90076	0.31201	0.7187	0.21318	0.92868	0.03257	0.85527	0.24172
Wald test for coefficients	71839.85***	70669.69***	37385.01***	9472.852***	33945.98***	24195.09***	32216.85***	17287.28***	34120.03***	33524.37***
Wald test for time dummies	29.2981***	22.617***	26.567***	0.0975	28.454***	45.1637***	28.1033***	24.699***	27.00182***	21.862***