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Perceived Corruption and Economic Growth: A World Panel Data Analysis

Mochamad Taufiq Ariq Purwanto[1], [2]Alfa Farah✉

[1,2]Departemen Ilmu Ekonomi dan Studi Pembangunan, Fakultas Ekonomika dan Bisnis, Universitas Diponegoro

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Abstract

The prevailing view on the impact of corruption on economic growth support the Sand the Wheels argument, namely: corruption impedes economic growth. Corruption increases transaction costs and market certainty. Furthermore, corruption redirects skilled labor from productive towards rent-seeking activities. Corruption also distorts the allocation of government expenditures. Nevertheless, empirical literature on the impact of corruption on economic growth is not unambiguous. Therefore, this study empirically investigates the relationship between corruption and economic growth. This study measures corruption using the Corruption Perception Index (CPI) published annually by Transparency International (TI). Using a sample of 123 countries around the world during the period 2011 to 2018 and the fixed-effects method, the results show that higher corruption is associated with lower economic growth. In specific, a country that can lower its corruption level has a higher level of economic growth. Nevertheless, our heterogenous analysis that classifies country by continent shows that the significant effect remains only in America and Asia-Oceania.

✉ Corresponding author :
Address: Fakultas Ekonomika dan Bisnis, Universitas Diponegoro
E-mail: alfafarah@live.undip.ac.id

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INTRODUCTION

Widespread corruption is commonly associated with underdevelopment. Svensson (2006) shows that developing and transition countries have the highest levels of corruptions. Figure 1 supports this notion by showing a simple negative correlation between corruption and economic growth

Despite the widespread belief in the adverse effects of corruption on economic growth, the empirical evidence remains unclear. Various studies support the claim that corruption is detrimental to economic growth; e.g. Mauro (1995, 1997), Mo (2001), Dridi (2013), D'Agostino et al. (2016), Aidt et al. (2008), Mendez and Sepulveda (2006), Gründler & Potrafke (2019), Swaleheen (2011), Meon and Sekkat (2005), and Pellegrini and Gerlagh (2004). Conversely, Leff (1964), Lui (1985), and Huntington (1996) show positive effects. Additionally, Treisman (2000) finds a reverse causality, indicating that higher economic growth rates can potentially lead to decreased corruption levels.

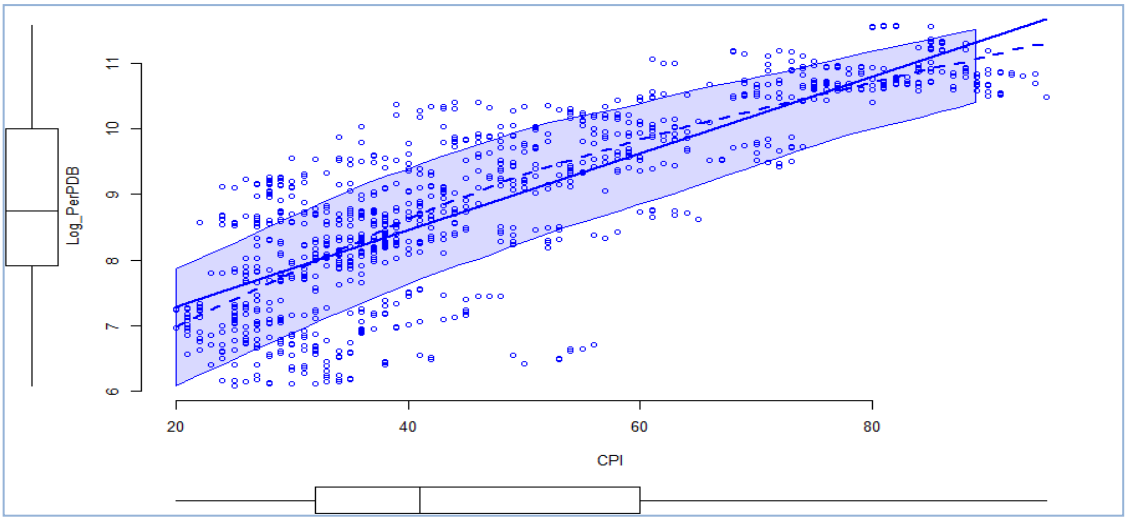

Figure 1. Economic Growth and Corruption in the World (2011-2018, average)

Note: On the x-axis is the Corruption Perceptions Index (CPI) published by Transparency International. The index ranges from 0 to 100, with higher scores indicating greater corruption and lower scores indicating less corruption. On the y-axis is the logarithm of GDP per capita, where higher values indicate greater economic growth.

Two theories generally explain the contrasting empirical evidence, namely Sand the Wheels and Grease the Wheels (Leff, 1964; Huntington, 1968; Leys, 1965; Lui, 1985). The Sand the Wheels theory argues that corruption hinders economic growth by disincentivizing investment, diverting skilled labour, increasing tax evasion, and distorting the allocation of government expenditure. In countries where corruption is pervasive, an individual needs to pay bribes to set up a firm and to ensure its longevity (Ackerman, 1997; Tanzi, 1998). Bribes imply higher transaction costs and market uncertainty. The increase in costs and market uncertainty ultimately hampers economic growth (Mauro, 1997; Murphy et al., 1991). Corruption also diverts skilled labor towards rent-seeking activities. As the profits from rent-seeking activities increase, economic agents shift from productive to rent-seeking activities, decreasing human capital in productive sectors (Murphy et al., 1991). Corruption increases tax evasion because companies bribe public officials to avoid taxes (Johnson et al., 1997). Furthermore, corruption leads to government expenditure misallocation, as officials prioritize sectors or projects that are easier for rent-seeking activities over sectors that are more important for the public (Mauro, 1997; Tanzi & Davoodi, 1997).

Contrary to the Sand the Wheels theory, the Grease the Wheel theory argues that corruption enhances economic growth. Left (1964) argues that corruption can perform as a

"hedge" and a safeguard against bad government policies. When the government undertakes bad policies or, even, good policies that go wrong, corruption acts as an insurance against the potential consequences of serious policy mistakes. Additionally, Lui (1985) argues that bribery can accelerate bureaucratic performance. In his model, customers can pay bribes to buy better positions in the queue. The government official as the service provider speeds up the service in order to maximize the number of bribers. Huntington (1996) also adds that corruption produced by the expansion of governmental regulation may help stimulate economic development.

Similar to previous studies, this study also investigates how corruption might affect economic growth. However, this study differs from the previous studies in two ways. First, previous studies (e.g., Grundler and Potrafke, 2019; D'Agostino et al., 2016; Dridi, 2013) did not conduct heterogenous analysis. Most of them studied world dataset or a single continent dataset. This study provides heterogenous analysis by grouping the worldwide sample according to continents. Doing so, we enrich the analysis by showing whether or not specific-continent factors might affect the relationship between economic growth and corruption. Secondly, to the best of our knowledge, with very few exceptions (e.g., Grundler and Potrafke, 2019), the previous studies employed data from more than 10 years ago. By using the more recent data from the period of 2011 until 2018, this study provides an update to the existing empirical literature.

Using a fixed-effects panel data method and the world panel data covering the period of 2011 to 2018, the study generally supports the Sand the Wheels theory; that is, corruption impedes economic growth. However, when the sample is grouped by continents, the significant negative relationship between corruption and economic growth occurs in America and Asia-Oceania only.

The rest of the paper is as follows. Following the introduction, we set out our empirical method. We then present our data and discuss the results. Finally, we conclude our findings in the last section.

RESEARCH METHODS

This study employed panel data covering 123 countries during the period of 2011 and 2018. This study measures corruption using the Corruption Perception Index (CPI) published annually by Transparency International (TI) since 1995. The CPI measures the perceived level of corruption based on the extent to which corruption by officials, employees, and politicians occurs in the public sector. The CPI aggregates data from 13 different sources from a variety of reputable institutions such as the World Bank and the World Economic Forum. These sources capture perceptions by business people and country experts of the level of corruption in the public sector.

Until 2011, the CPI ranged between 0 and 10, with higher scores indicating lower corruption. Since 2012, TI has rescaled CPI, scoring on a scale of 0 (highly corrupt) to 100 (very clean). Since our study covers the period of 2011 to 2018, we adjusted the old scale into the new scale.

The baseline equation to estimate the effect of corruption is as follows:

$$Log\ Y_{it} = \alpha + \beta\ corr_{it} + \sum \lambda_j x_{jit} + \delta_i + \varepsilon_{it}, \ldots\ldots\ldots (1)$$

where Log Y_{it} denotes economic growth of country i at year t, as measured by the log of the GDP per capita and $corr_{it}$ denotes the corruption level in country i in year t, as measured by the CPI. Additionally, we included control variables that explain economic growth, namely population growth, investment, human capital, government spending, political stability, inflation, and trade openness. Table 1 informs the variables and their measures in detail. Finally, parameter δ_i denotes country fixed-effects that capture country-specific heterogeneities.

We estimated the empirical model using the Fixed-Effects Model (FEM) method because it moderates endogeneity problems arising from the unobserved time-invariant heterogeneities. By using FEM, our results imply within country comparison over time.

Table 1. Variable and Data Sources

Variable	Measures	Source
Economic Growth	Per capita GDP, constant US$ 2015 prices (log)	World Bank
Corruption	Corruption Perception Index (0=corrupt, 100=clean)	Transparency International
Human Capital	Human Development Index (0=low, 1=high)	United Nations Development Programme
Investment	Foreign direct investment (%GDP)	World Bank
Technology	Global Innovation Index (0=low, 100=high)	World Intellectual Property Organization
Population Growth	Population (log)	World Bank
Political Stability	Political Stability and Absence of Violence/Terrorism Index (-2.5=unstable, 2.5=stable)	Worldwide Governance Indicator, the World Bank
Trade Openness	Export plus import (%GDP)	UNCTAD
Inflation	Consumer Price Index (% annual change)	World Bank
Government Expenditure	%GDP	World Bank

Source: Data Processed, 2024

RESULTS AND DISCUSSION

Table 2 describes the data used in this study. It shows that per capita GDP (calculated at the 2015 USD constant price) is between 430 USD and 108,350 USD. The average per capita GDP is 16,320 USD, which is lower than the standard deviation of 20,190 USD. This suggests that per capita GDP is spread out over a relatively wide range with a significant amount of variability. This largely indicates the existence of outliers. Table 2 also shows that the mean value of CPI is 47.19, indicating a relatively moderate corruption. The minimum value of CPI is 20 and the maximum value is 95, with a standard deviation of 19.30. In addition, Table 2 highlights differences in governance and security in which the Political Stability Index averages 0.72, with values between 0.0004 and 2.81. Control variabels such as population, FDI, and trade openness show high variation, implying there are significant differences across observations.

Table 2. Descriptive Statistics

Variable	N	Mean	SD	Min	Max
Per capita GDP (thousand, constant US$ 2015 prices)	984	16.32	20.19	0.43	108.35
CPI	984	47.19	19.30	20.00	95.00
HDI	984	0.75	0.15	0.35	0.96
FDI (%GDP)	984	6.25	16.16	0.00	279.36
GII	984	37.87	11.57	17.20	68.40
Population (Million)	984	54.90	174.18	0.32	1402.76
Political Stability Index	984	0.72	0.49	0.00	2.81
Export + Import (%GDP)	984	90.47	60.27	21.12	442.62
Inflation (annual growth, %)	984	4.23	5.17	0.01	59.22
Government expenditure (%GDP)	984	15.90	4.87	4.40	31.84

Source: Data Processed, 2024

Table 3 shows our baseline estimates. We introduced the controls gradually to see the sensitivity of corruption. We also reported estimates without outliers in Column (10). We reported clustered robust standard errors to allow for heteroskedastic error variances in all columns. In Table 3, corruption is positive and significant in all columns. This indicates that the positive relation between corruption and economic growth is relatively robust and not sensitive to the inclusion of controls. However, the level of significance decreases starting from column 3, from 1% to 5%, implying that the omitted variable bias in the first three columns is larger than it is in the rest of the columns. The adjusted R-squared value increases as control variables are added one by one, indicating that the controls are relevant.

The most conservative results in column (9) show the parameter estimate of corruption is 0.002, meaning that, holding other things constant, a country grows by 0.2 percent when it improves its CPI score by 1 point. In other words, when a country succeeds in curbing inflation, its economic growth increases. Column (10) reports results without outliers and the results remain unchanged.

Regarding the control variables, the signs of the control variables are relatively consistent. The human capital (HC) is positive, the population growth variable (Log_POP) is negative, the political stability variable (POL) is negative, and the government expenditure variable (GOV) is negative. However, in column (9), only the human capital variable (HC), population growth variable (Log_POP), and government expenditure are significant.

Table 3. Baseline Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CPI	0,007***	0,003***	0,003***	0,002**	0,002**	0,002**	0,002**	0.002	0,002**	0,002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
HC		4,220***	4,220***	4,297***	5,125***	5,089***	5,099***	5070***	4,999***	5,161***
		(0.302)	(0.305)	(0.299)	(0.342)	(0.347)	(0.351)	(0.347)	(0.337)	(0.393)
INV			0.0000	0.00001	0.00004	0.00003	0.00004	0.00004	0.0001	-0.001
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.002)
TECH				0,004**	0.002	0.002	0.002	0.001	0.001	-0.002
				(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log_POP					-0,373***	-0,373***	-0,368***	-0,374***	-0,335***	-0,487***
					(0.091)	(0.093)	(0.093)	(0.093)	(0.086)	(0.103)
POL						-0.017	-0.017	-0.014	-0.013	-0.009
						(0.016)	(0.016)	(0.015)	(0.014)	(0.021)
OPEN							0.0001	0.0002	0.0001	-0.0001
							(0.0004)	(0.0004)	(0.0003)	(0.001)
INF								-0.001	-0.001	0.001
								(0.001)	(0.001)	(0.001)
GOV									-0,008***	-0,006*
									(0.002)	(0.003)
R.Sq	0.9979	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993	0.9992
Adj R-Sq	0.9976	0.999	0.999	0.9991	0.9991	0.9991	0.9991	0.9992	0.9992	0.9991
No. Countries	123	123	123	123	123	123	123	123	123	66
No. Year	8	8	8	8	8	8	8	8	8	8
Obs.	984	984	984	984	984	984	984	984	984	528

The dependent variable is the log of per capita GDP. Clustered robust standard errors are in parentheses. Column (10) reports the estimates without outliers.

*** significant at 10% level, ** significant at 5% level, *significant at 1% level.

Source: Data Processed, 2024

In addition to our baseline estimates, we also conducted heterogeneity analysis by splitting the samples by continents. This analysis explores whether or not there are continent-specific factors that crucially determine the relationship between corruption and economic growth. Since the level of development differs hugely among continents, this analysis also informs how the level of development might affect the relationship between corruption and economic growth. Table 4 confirms that Africa has the lowest per capita GDP on average. The standard deviation is slightly lower than the mean indicating low variation in per capita GDP in Africa. In addition, Africa also has the lowest CPI on average, implying the highest level of corruption.

Table 4. Descriptive Statistics by Continents

Continents	Variable	N	Mean	SD	Min	Max
Africa	Per Capita GDP	224	2.23	2.16	0.43	10.65
	CPI	224	35.71	10	20	65
America	Per Capita GDP	152	12.38	13.67	2.12	59.61
	CPI	152	43.24	17.44	22	87
Asia-Oceania	Per Capita GDP	280	16.83	18:55	0.75	73.49
	CPI	280	45.09	18.97	20	95
Europe	Per Capita GDP	328	27.38	23.98	2.12	108.35
	CPI	328	58.86	18.92	23	94

Notes: Per capita GDP is in thousand constant US$ 2015 prices
Source: Data Processed (2024)

Table 5 reports the heterogenous analysis. Corruption remains positive in all columns. However, it is only significant in America (at 10% significance level) and Asia-Oceania (at 1% significance level). This means that corruption can only explain economic growth in America and Asia-Oceania, but not in Europe and Africa

Table 5. Heterogenous Analysis

	Africa	America	Asia-Oceania	Europe
	(1)	(2)	(3)	(4)
CPI	0.001	0,002*	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
HC	2,871***	4,347***	2,871***	5,109***
	(0.650)	(0.1026)	(0.505)	(0.570)
INV	0.001	-0.003	-0.0004	0,0002**
	(0.001)	(0.003)	(0.001)	(0.0001)
TECH	0.001	0,002	0,003	-0,003*
	(0.002)	(0.001)	(0.002)	(0.002)
Log_POP	0,170	-0,160	-0,355**	-0,395**
	(0.136)	(0.254)	(0.139)	(0.198)
POL	-0.003	-0,052*	0.009	-0,028
	(0.013)	(0.028)	(0.030)	(0.023)
OPEN	-0,0001	-0,001**	0,0002	-0,00003
	(0,0005)	(0,0004)	(0,001)	(0,001)
INF	-0,003***	-0,003***	-0,003	0,001
	(0.001)	(0.001)	(0.002)	(0.001)
GOV	0.001	-0,012**	-0,011***	-0,012
	(0.002)	(0.005)	(0.003)	(0.008)
R.Squared	0.9987	0.9993	0.999	0.9987
Adj R-Squared	0.9986	0.9991	0.9988	0.9985
No. Countries	28	19	35	41
No. Year	8	8	8	8
Obs.	224	152	280	328

Notes: The dependent variable is the log of per capita GDP. Clustered robust standard errors are in parentheses. The estimations include outliers.
*** significant at 10% level, ** significant at 5% level, * significant at 1% level.
Source: Data Processed, 2024

To explain the results in Africa and Europe further, we reported detailed estimations in Table 6 and Table 7. Table 6 and Table 7 show that the sign of corruption is robut in that it is negative in all columns. However, corruption becomes insignificant when controls are added. This might indicate that the impact of corruption on economic growth is channeled indirectly through other variables such as investment, human capital, trade openness, political stability, and other variables, thus reducing the direct effect of corruption and ultimately making corruption relatively insignificant (Pellegrini and Gerlagh, 2004). These variables might capture time-variant institutional quality that our model fail to capture. Furthermore, if we look at the data description (Table 4), data for Africa has the lowest standard deviation. When variation in the data is low, the model's ability to identify significant relationships between the two variables will be reduced. Supported by the values and signs of the estimates that are also consistent with the results on other continents, the insignificance of the corruption variable in the African Continent may not be due to the absence of the influence of corruption on economic growth, but rather due to the lack of variability in the data.

Table 6. Additional Analysis for Africa

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CPI	0,011**	0,002*	0,002*	0.002	0.001	0.001	0.001	0.001	0.001
	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
HC		3,453***	3,482***	3,552***	2,932***	2,925***	2,836***	2,899***	2,871***
		(0.414)	(0.448)	(0.479)	(0.752)	(0.754)	(0.703)	(0.657)	(0.650)
INV			0.001	0.001	0.001	0.001	0.001	0.001	0.001
			(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
TECH				0.001	0.002	0.002	0.002	0.001	0.001
				(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log_POP					0.198	0.201	0.212	0.162	0.17
					(0.147)	(0.148)	(0.141)	0.134	(0.136)
POL						-0.007	-0.007	-0.002	-0.003
						(0.012)	(0.012)	(0.013)	(0.013)
OPEN							-0.0002	-0.00003	-0.00001
							(0,001)	(0,0005)	(0,0005)
INF								-0,003***	-0,003***
								(0.001)	(0.001)
GOV									0.001
									(0.002)
R.Sq	0.9959	0.9986	0.9987	0.9987	0.9987	0.9987	0.9987	0.9987	0.9987
Adj R-Sq	0.9953	0.9984	0.9984	0.9984	0.9985	0.9985	0.9985	0.998	0.9986
Countries	28	28	28	28	28	28	28	28	28
No. Year	8	8	8	8	8	8	8	8	8
Obs.	224	224	224	224	224	224	224	224	224

Notes: The dependent variable is the log of per capita GDP. Clustered robust standard errors are in parentheses. The estimations include outliers.

*** significant at 10% level, ** significant at 5% level, * significant at 1% level.

Source: Data Processed, 2024

Table 7. Additional Analysis for Europe

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CPI	0,005**	0.00100	0.00050	0.00100	0.00003	0.00003	0.00003	0.00020	0.00100
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
HC		5,576***	5,621***	5,599***	5,795***	5,734***	5,702***	5,736***	5,109***
		(0.554)	(0.570)	(0.572)	(0.548)	(0.569)	(0.547)	(0.533)	(0.570)
INV			0,0002*	0.00020	0,0002*	0,0002*	0,0002*	0,0002*	0,0002**
			(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
TECH				-0,003	-0,003	-0,003	-0,003	-0,003	-0,003*
				(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log_POP					-0,357*	-0,387*	-0,388*	-0,384*	-0,395**
					(0.204)	(0.217)	(0.222)	(0.219)	(0.198)
POL						-0,027	-0,026	-0,029	-0,028
						(0.028)	(0.029)	(0.027)	(0.023)
OPEN							0,0003	0,0002	-0,00003
							(0,001)	(0,001)	(0,001)
INF								0,001	0,001
								(0.001)	(0.001)
GOV									-0,012
									(0.008)
R-Sq	0.996	0.9986	0.9987	0.9987	0.9987	0.9987	0.9987	0.9987	0.9987
Adj R-Sq	0.9954	0.9983	0.9983	0.9984	0.9984	0.9984	0.9984	0.9984	0.9985
No. Countries	41	41	41	41	41	41	41	41	41
No. Year	8	8	8	8	8	8	8	8	8
Obs.	328	328	328	328	328	328	328	328	328

Notes: The dependent variable is the log of per capita GDP. Clustered robust standard errors are in parentheses. The estimations include outliers.

*** significant at 10% level, ** significant at 5% level, * significant at 1% level.

Source: Data Processed, 2024

Our findings align with much of the existing literature that supports the Sand the Wheels hypothesis, which argues that corruption hampers economic (e.g. Mo, 2001; Mauro, 1995 & 1997; Grundler and Potrafke, 2019; D'Agostino et al., 2016). In particular, our findings correspond to the conclusions of Mauro (1995, 1997), Mo (2001), and Pellegrini and Gerlagh (2004), who provide robust evidence that corruption negatively affects economic growth by distorting investment and reducing the efficiency of public spending. Furthermore, our results agree with Aidt et al. (2008) and Swaleheen (2011), who emphasize that corruption hampers economic development by weakening institutional quality and discouraging productive economic activities. Nevertheless, our heterogeneous analysis, which finds that the negative effect of corruption on growth is significant only in America and Asia-Oceania, suggests that the impact of corruption is not uniform across regions. This is consistent with Meon and Sekkat (2005), who argue that corruption's effect on growth depends on a country's institutional framework. Our findings also support D'Agostino et al. (2016) and Dridi (2013), who show that the impact of corruption may vary depending on governance quality and government effectiveness. Furthermore, while Gründler and Potrafke (2019) find that corruption's adverse effects diminish in more democratic systems, our study suggests that regional factors may also play a role in moderating corruption's impact. The regional differences in our findings further support the argument that the relationship between corruption and economic growth is shaped by institutional and structural characteristics, reinforcing the need for a nuanced, context-dependent analysis.

CONCLUSION

The general findings of this study confirm previous empirical studies (e.g. Mo, 2001; Mauro, 1995 & 1997; Grundler and Potrafke, 2019; D'Agostino et al., 2016) that support the "Sand the Wheel" theory. The Sand the Wheels theory argues that corruption hinders economic growth by increasing transaction costs, market uncertainty, and tax evasion while diverting

skilled labor to rent-seeking and distorting government spending. Specifically, the estimation results generated using the fixed-effects model indicate that corruption impedes economic growth in a country over time. The results are consistent in America and Asia-Oceania only.

There are at least three things to consider when interpreting the results of this study. Firstly, the possibility of measurement error. The CPI index used to measure corruption depends heavily on the subjective perceptions of experts and business people. Perceptions from experts and businesses can also vary from one another depending on their experience, knowledge, and perspectives. This might create uncertainty and inconsistency. Secondly, the possibility of reverse causality between corruption and economic growth. To deal with possible reverse causality, one might apply an instrumental variable method. For example, Treisman (2000) used geographical location as an instrument for corruption. Nevertheless, finding a valid and exogenous instrument remains a challenging task. Thirdly, the coefficients of corruption are relatively small. The parameter estimates of corruption ranges between 0.001 and 0.005. This indicates a relatively small correlation between corruption and economic growth. It may also indicate that the effect of corruption on economic growth is not direct.

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