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Corruption and Capital Growth: Identification of Bribery by the Firm

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ABSTRACT

The existence of the contradiction between the 'grease the wheel' hypothesis and the 'sand the wheel' hypothesis encouraged this study. Some studies that support the grease the wheel hypothesis stated that corruption can reduce inefficiency and facilitate the establishment of businesses that can increase capital and economic growth, especially in countries with weak governance systems. By developing Ramsey's economic growth theory, this study found that corruption actually worsened the economy, because of the inefficiency it caused. This study also employs more in-depth empirical analysis in Asian countries using the Ordinary Least Square (OLS) and Two Stage Least Square (TSLS) methods with an instrument variable. The results found that corruption can reduce the share of capital to the Gross Domestic Product (GDP) and also reduce the growth of capital, especially in countries that have weak institutional systems. Hence, this study supports the sand the wheel hypothesis and encourages the eradication of corruption.

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INTRODUCTION

According to Transparency International, corruption is the abuse of entrusted power for private gain. Corruption has encouraged various studies to analyze the relationship of corruption with the socio-economic life of society, such as the suicide rate (Yamamura et al., 2012), income inequality (Barreto, 2001; You and Khagram, 2005), and poverty (Yusuf and Malarvizhi, 2014). Other studies related to the impact of corruption on an economy are often analyzed from the perspective of economic growth. This is because economic growth is considered to be an important indicator to assess an economy's performance, and it is considered to be capable of reducing the level of poverty in the community (Anderson, 1964; Deaton and Dreze, 2002; Gallaway, 1965; Gottschalk and Danziger, 1985; Northrop, 1988). Strassmann (1956) and Scully (2003) show that economic growth can also increase the level of income inequality in the community. However, Korzeniewicsz and Smith (2000) discover a reversed phenomenon in which economic growth is capable of reducing income inequality in Latin America.

Research into the impact of corruption on economic growth has been done both empirically and theoretically. Nevertheless there are controversial results from several studies into the impact of corruption on economic growth, which cause the effects of corruption on economic growth to be questioned. Adenike (2013), Bardhan (1997), Dridi (2013), Dzhumashev (2014), Erlich and Lui (1999), Frolova et al. (2019), Mauro (1995, 1998), Meon and Sekkat (2005), Mo (2001), Shleifer and Vishny (1993), argue that corruption has a negative effect on economic growth. This hypothesis is known as the *sand the wheel hypothesis*. Dzhumashev (2014), Meon and Sekkat (2005), Shleifer and Vishny (1993), stated that corruption directly affects the economic growth. Mauro (1995) argues that corruption has a negative effect on the rate of economic growth through its positive influence on lower investment rates.

Some studies argue otherwise, known as the *grease the wheel hypothesis*, which states that corruption can improve the economy. Lui (1985) argues that corruption is a 'way out' of inefficiency so corruption can have a positive effect on economic growth. For example in a queue to obtain services in the form of business permits, paying a bribe will speed up the granting of the desired business permits without going through a long process. Then entrepreneurs can start their businesses more quickly, so corruption can have a positive effect on economic growth. Lui (1985) supports Huntington (1968), Leff (1964), Leys (1965), Barreto (2001), Meon and Weil (2010), and Dreher and Gassebner (2013), who all argue that corruption can increase economic growth[1]. In addition, there is another study suggesting that corruption has no effect on economic growth (Svensson, 2005).

Regarding the study of the determinants of economic growth, Levine and Renelt (1992) concluded that one of the robust variables affecting economic growth is the investment variable[2]. Taking their perspective from the investment variable, Dreher and Gassebner (2013) identify the influence of entrepreneurial activity on economic growth[3]. That study found that strict regulation reduces entrepreneurial activity, especially if there is no corruption. It means that corruption can reduce the negative impact of strict regulation and increase entrepreneurial activity. Dreher and Gassebner (2013) also revealed that the entry of firms into highly regulated economies tends to be facilitated by corruption, in order to foster economic growth. Therefore, corruption can indirectly increase investment which further encourages economic growth. Generally, Huntington (1968), Leff (1964), Leys (1965), and Lui (1985) stated that corruption can boost an economy if the economic conditions have poor governance. However, in a good economic system and good governance, corruption has a negative impact on the economy.

Bowles (2000) states that corruption consists of bribes, extortion, and embezzlement. The practice of corruption, such as extortion and bribery to obtain public services, has been analyzed by Shleifer and Vishny (1993). Weak government institutions cause bureaucrats to more readily accept bribes and make illegal payments so that investment costs are high. This can lead to corruption lowering the levels of investment and growth.

[1] Barreto (2001) used a sample of 58 countries, while Meon and Weill (2010) used a sample of 69 countries. Barreto (2001) concluded that corruption had a significant positive effect on economic growth and income distribution inequality. Meon and Weill (2010) concluded that there is a positive marginal effect of increased corruption on efficiency in countries with poor governance.

[2] Levine and Renelt (1992) mapped 41 studies on economic growth and concluded using the extreme bound analysis methods that the robust variables affecting economic growth are investment, human capital and initial GDP per capita.

[3] Dreher and Gassebner (2013) revealed that the underlying cause of the grease the wheel hypothesis, in previous studies, was due to an analysis that found the impact of corruption on economic growth is direct; whereas in practice the impact of corruption on economic growth is indirect.

Dreher and Gasebner (2013) proved that the model described by Shleifer and Vishny (1993) is not entirely true empirically. Dreher and Gassebner (2013) suggest that on average, with more procedures and a higher minimum capital requirement for starting a business, it is able to reduce the number of entrepreneurs entering the market. Thus, corruption can reduce the impact of strict regulation on the entry of companies into the market, resulting in increased investment.

In clarifying Dreher and Gassebner (2013), Dzhumashev (2014) modeled corruption as a bribery activity as part of a tax evasion scheme, and concludes that corruption can negatively affect economic growth. However, Dzhumashev (2014) is still unable to confront the research of Dreher and Gassebner (2013) because of the differences in the type of corrupt activities discussed. Dreher and Gassebner (2013) represent corruption as a bribe during entrepreneurial activities. Dzhumashev (2014) represents corruption as the bribing activities of tax embezzlers. Thus, the contradiction of the two hypotheses has not yet reached a comprehensive conclusion, especially in the case of corruption that is represented as a bribe in an effort to facilitate entrepreneurial activity, as is the case in the research supporting the grease the wheel hypothesis, as per the works by Dreher and Gassebner (2013), or Lui (1985).

Other studies have identified the impact of corruption on economic growth directly, using macro data at the country level, and not using the perspective of corruption when offering a bribe for a business convenience. Therefore, this research attempts to model the impact of corruption on economic growth through the microeconomic approach, which is further generalized into a macroeconomic approach by accommodating Ramsey's growth model. This is because Ramsey's growth model is considered to be able to capture the micro behavior of households and companies, which can then be generalized into various macroeconomic approaches. The type of corruption that will be identified in this research is corruption in the form of bribery activity by a firm for bureaucrats. Therefore, the firm can obtain a business license so that it can affect capital and economic growth. This study uses the perspective of corruption activities in accordance with Dreher and Gassebner (2013), in an effort to clarify that research in particular.

By using a modeling approach to Ramsey's growth model for a corrupt economy, which uses micro foundations and is later aggregated into the macro level; the analysis conducted is expected to provide a comprehensive conclusion about the effects of corruption on economic growth. In an effort to simplify the model, corruption, as the bribery activity by a firm with the bureaucrats, will be analyzed in an economy without taxes. This research question is how the effects of corruption, as the bribery activities of the firm obtaining a license, and the ease of doing business, will influence the economic growth of an economy without taxes. The result of the theoretical model will be empirically verified using data related to the ease of doing business.

The supporters of the grease the wheel hypothesis argue that corruption, as an activity conducted by a firm, can facilitate growth in the entrepreneurship sector, which can have a positive effect on investment and economic growth. Therefore, this study will model corruption as bribery by firms with bureaucrats. This study seeks to provide a theoretical overview about corruption which is considered to accelerate the economy, and is expected to draw conclusions about the impact of corruption on economic growth, particularly corruption as a bribery activity by a firm. The empirical results, especially in the case of corruption as a bribery activity, show support for two hypotheses: the grease the wheel hypothesis and the sand the wheel hypothesis[4]. Therefore, this study focuses more on modeling the effects of firms' corruption on capital growth at the macro level.

With so many variables affecting economic growth, Levine and Renelt (1992) mapped the empirical studies related to economic growth, and found that the robust variables which can affect economic growth are: investment, initial income per capita, and human capital[5]. Acemoglu (2009) concludes that there are other determinants that also significantly affect economic growth such as culture, institutions, and geography. Cultural and institutional factors are divided into several aspects, one of which is corruption. Robertson-Snape (1999) and Tirole (1996) suggest that culture has an influence on the existence of corruption. Corrupt

[4] Dreher and Gasebner (2013) found that corruption can facilitate entrepreneurial activity in a country. Kuncoro (2004), Fisman and Gatti (2006) revealed that corruption causes the company management to spend a longer time negotiating with public employees. Kuncoro (2004) conducted a study in Indonesia, while the Fisman and Gatti's (2006) research sample included 61 countries with survey data at the enterprise level by the World Business Environment Survey (WBES) in 1999 and 2000.

[5] Levine and Renelt (1992) supported Erdós (1973) and Razin (1977). Razin (1977) suggested that there is a strong relationship between economic growth and education (human capital). Erdós (1973) suggested that there is a strong relationship between investment and economic growth.

conditions will increase the probability of other individuals participating in corrupt activities (Andvig and Moene, 1990).

This study identifies the effects of corruption on economic growth beginning with theoretical modeling, which will then be empirically verified. Theoretical modeling can accommodate the integration of micro approaches to macro approaches. However, the assumptions and limitations of modeling causes theoretical modeling to still be less than comprehensive when explaining the effects of corruption on economic growth. It is necessary to verify the empirical data so that both theoretical modeling and empirical verification can complement each other in explaining the relationship of corruption and economic growth.

MODELING CORRUPTION BY THE FIRM

Firm

A company is an economic agent that acts as a private manufacturer of goods or services. The features of companies are: 1) The firm pays wages for labor inputs. 2) The company pays the rental payments on the capital input. 3) The firm has access to production technology. 4) The firm pays bribes to bureaucrats to establish and streamline its business processes. 5) The firm's production function is: $Y(t) = F[K(t), L(t), T(t)]$, a function of capital, labor and technology. It is assumed to fulfil the neoclassical production function. $T(t)$ represents the level of technology, which has a constant growth x, where $x \geq 0$. Furthermore, the normalization of technology assumes that $T(0) = unity$, therefore $T(t) = e^{xt}$. Products from labor and the level of technology are referred to as effective labor, where $\hat{L} \equiv LT(t) = Le^{xt}$. Therefore, the production function becomes $Y = F(K, \hat{L})$. Furthermore the quantity is expressed in per effective worker units, so the quantity per effective worker unit becomes $\hat{k} = \frac{K}{\hat{L}}$; $\hat{y} = \frac{Y}{\hat{L}} = f(\hat{k})$.

In an economy without bribes then the profit of a firm is:

$$\Pi = F(K, \hat{L}) - rK - \delta K - wL \quad (1)$$

From Equation (1) we can obtain $F(K, \hat{L}) = \Pi + (r + \delta)K + w\hat{L}e^{-xt}$, and when this is divided by the effective workers, $\hat{L}$ becomes:

$$f(\hat{k}) = \pi + (r + \delta)\hat{k} + we^{-xt} \quad (2)$$

The first derivation of capital i.e.:

$$f'(\hat{k}) = r + \delta \quad (3)$$

Equation (3) shows that the marginal product of capital per effective worker is equal to the sum of the capital rent rate and the rate of capital depreciation. The wage per effective worker can be transformed from Equation (2) and becomes :

$$w = [f(\hat{k}) - \pi - (r + \delta)\hat{k}]e^{xt} \quad (4)$$

$$w = [f(\hat{k}) - \pi - \hat{k}f'(\hat{k})]e^{xt} \quad (5)$$

Equation (5) shows that the wage of an effective worker is equal to the output minus the profit minus the multiplication of capital by the *marginal product of capital per effective worker*. In the same way, if the firm pays a bribe to a bureaucrat, which is a proxy of its capital bK to get permits and make it easier to do business, then the firm's profit becomes lower:

$$\Pi = F(K, \hat{L}) - rK - \delta K - bK - wL \quad (6)$$

The output per effective worker becomes:

$$f(\hat{k}) = \pi + (r + \delta + b)\hat{k} + we^{-xt} \quad (7)$$

The *marginal product of capital per effective worker* is the sum of the rent for capital, the rate of capital depreciation, and the rate of bribery, then:

$$f'(\hat{k}) = r + \delta + b \tag{8}$$

The wage per effective worker is:

$$w' = [f(\hat{k}) - \pi - (r + \delta + b)\hat{k}]e^{xt} \tag{9}$$

Thus the bribes paid by firms to bureaucrats can lead to a lower effective labor wage than that which would exist without the payment of bribes. However, there are also alternative decisions by the company regarding wages, which will be explained further.

Household

This model assumes a closed economic system, in which there is no inter-economic lending. Thus, assets per capita are equal to capital per capita ($a = k$). The growth of per capita assets is as follows:

$$\dot{k}_{nç} = (r - n)k_{nç} + (w')_{nç} - c_{nç} \tag{10}$$

The per capita asset growth of the bureaucrat's household as the recipient of bribes from the firm is:

$$\dot{k}_{be} = (r - n)k_{be} + (w + b - l)_{be} - c_{be} \tag{11}$$

By substituting equations (4) and (9) into equations (10) and (11) then:

$$\dot{k}_{nç} = e^{xt}[(r - n)\hat{k}_{nç} + \{f(\hat{k}_{nç}) - \pi - \hat{k}_{nç}(r + \delta + b)\} - \hat{c}_{nç}] \tag{12}$$
$$\dot{k}_{be} = e^{xt}[(r - n)\hat{k}_{be} + \{f(\hat{k}_{be}) - \pi - \hat{k}_{be}(r + \delta)\} - \hat{c}_{be} + b - l] \tag{13}$$

The equation shows that if firms give bribes to bureaucrats to make it easier to do business, this will reduce the companies' profits, so that the growth of capital per worker in the economy becomes lower. The capital growth of the bureaucrat's household could be higher than if no bribes were paid. However, the growth of aggregate capital in the economy may not be optimal, as there is no corruption due to the concealment cost (l), which can be a burden on the economy.

In an effort to conceal the proceeds from the bribe, then the bribe that should be able to increase the flow of bureaucratic capital, in fact becomes less than optimal. This is because the bribe money is taken out of the economy (even though this may be temporary) as a result of the bureaucrats concealing their proceeds from corruption. The capital flow of the bureaucrats becomes less than optimal, as is the flow of aggregate capital. The existence of bribes causes the growth of capital to be below the optimal level, and this becomes lower when compared with the conditions without the payment of bribes. The better an institutional system is, then the higher the level of corruption detection is, and the greater the concealment costs become, so that the growth of capital will become lower. Then bribes will be more detrimental to an economy that has a better institutional system than to one that has a poor institutional system.

The assumption that the company shifts the burden of its bribes by reducing the wages of workers may be incorrect. Therefore, the losses incurred by having to pay bribes are diverted to consumer prices or to the quantity and/or quality of the firm's goods, which leads to higher the amount of consumption. This analogy corresponds to Bardhan (1997) who states that a firm paying bribes can supply low-quality goods at high prices.

With this second scenario, there could be a decrease in the quality and/or quantity of the output and also an increase in price, so that the consumption of both workers and bureaucrats will increase, while the growth of household capital will decrease, as indicated in equations (14) and (15), where $c'_{nç} > c_{nç}$ and $c'_{be} > c_{be}$.

$$\dot{k}_{nç} = (r - n)k_{nç} + (w)_{nç} - c'_{nç} \tag{14}$$
$$\dot{k}_{be} = (r - n)k_{be} + (w + b - l)_{be} - c'_{be} \tag{15}$$

This model shows that corruption, especially bribery by a firm, negatively affects the growth of capital in the economy. In addition to being influenced by corruption, the above model shows that capital growth can also be affected by per capita income, population growth, and the legal and regulatory systems. Further verification is through an empirical model to identify the negative effects of corruption on capital growth, especially that caused by bribery by firms. Capital growth will be proxied as a variable of the growth of the gross fixed capital formation in the empirical model. If corruption negatively affects the growth of capital, then corruption also indirectly and negatively affects economic growth, as per the conclusions of Dreher and Gassebner (2013).

EMPIRICAL MODEL VERIFICATION

The core debate between the grease the wheel hypothesis and the sand the wheel hypothesis is whether corruption can be a positive influence on an economy that has poor governance. Therefore, this study uses countries in Asia as the objects of the research. This is because there are still many countries in Asia that have high levels of corruption and weak governance[6].

Equations (14) and (15) show that corruption can affect the growth of capital. Dreher and Gasebner (2013) modeled that entrepreneurship is influenced by corruption, entrepreneurial procedures, and other factors. Wennekers and Thurik (1999) added that entrepreneurial activity also plays a role in the formation of capital that affects economic growth. Wong et al. (2005) found that entrepreneurial growth had a significant impact on economic growth. Therefore, this research developed Dreher and Gasebner's (2013) research model, because this research wanted to identify the effect of the interaction between corruption and entrepreneurial procedures on the growth of capital[7].

In the theoretical model, corruption is identified as a form of bribery by a company to make it easier to get business licenses. In the acquisition of a business license, there are several procedures that must be followed. They are the cost of starting a business, the number of days, and the number of procedures that must be met to obtain a business license. Therefore, the business start variables, the number of days and the number of procedures are included as independent variables. Data related to the procedures of the entrepreneur are available in the Doing Business database of the World Bank. According to Van Stel et al. (2007), the data can be used to analyze the effect of entrepreneurial procedures in increasing investment, productivity, and economic growth.

Therefore, the models for this study are:

$$Capgrowth_{it} = a_i + \gamma_1 CORR_{it} + \gamma_2 X_{it} + \gamma_3 Z_{it} + v_{it} \quad (16)$$

$$Cap_{it} = a_i + \gamma_1 CORR_{it} + \gamma_2 X_{it} + \gamma_3 Z_{it} + v_{it} \quad (17)$$

The dependent variables in this study are capital and capital growth. Capital growth is the dependent variable according to the theoretical modeling. Capital is used as the variable for the robustness check for the Equation (16). Dreher and Gassebner (2013), and Meon and Weill (2010) reveal that corruption can indirectly affect the investment variables. To find another view, this study seeks to identify its influence indirectly through the capital variables, which have been verified previously through the theoretical modeling.

The vector Z is a set of control variables. Vector X is a vector of explanatory variables consisting of Gross Domestic Product (GDP) per capita, business rules (business start-up costs, number of days to start a business, and number of procedures for starting a business), business rules' interaction with corruption i.e. the interaction between business costs with corruption, the interaction between the number of days with corruption, and the interaction between the number of procedures with corruption. This study uses panel data from countries in Asia (2000-2015), and the capital growth will be identified yearly [8].

The econometric issue in this research is the existence of endogeneity in the corruption variable. Therefore, as an alternative to the use of the Ordinary Least Square method (OLS) in model (16), this study

[6] The research of Quah (1982, 2014) provides detailed analysis of bureaucratic corruption issues in Asia in particular. Quah (1982) discusses the bureaucratic corruption of many ASEAN countries and the coping strategies that can be learned for other Asian countries in particular.

[7] Other studies that also identify the effects of corruption on capital accumulation are Lin and Zhang (2009) using overlapping generation models and parameterized simulations.

[8] Lin and Zhang (2009) analyze the determinants of capital growth but still do not include a corruption variable.

will also use instrument variables for the corruption variables. Values for the corruption variables may be influenced by cultural factors and the level of public acceptance of corruption. These variables will be proxied by an index of ethnic fractionalization, as used in Mauro (1995)[9]. The Ethnic Fractionalization Index is assumed not to affect the dependent variable, which is capital growth. The instrument variable only affects the variable of corruption in its effect on the variable of capital growth.

The variables of corruption in this study will be measured using the Corruption Perception Index from Transparency International. It has been re-scaled so that the higher the corruption variable's value is, the higher the level of corruption is. Governance variables are measured by a governance index from the Worldwide Governance Indicators. They have been re-scaled so that the higher the governance variables are, the poorer the governance is. The re-scaling is also done for the business rule variables so the higher the index is, this indicates the more inefficient the business rules are.

There are some permit procedures to be followed in an effort to establish a business. They are the number of procedures to establish a business, the number of days required for the establishment of a business, and the minimum capital required for the establishment of a business. The number of procedures to establish a business is captured as the procedure variable. The number of days required to establish a business is captured as the day variable. The minimum capital needed for the establishment of a business is captured as the cost variable. The three variables are then interacted with the corruption variable to identify the effect of the interaction between the corruption variable and the procedures/rules for establishing a business.

This study will identify the business rules' variables (cost, day, and business procedure) from the ease of doing business data. It will identify whether they can affect entrepreneurial activity, which may further affect investment and economic growth, as has been stated by Dreher and Gassebner (2013). Wennekers and Thurik (1999) stated that entrepreneurial activity also plays a role in the formation of capital, which affects economic growth. Therefore, this study uses the variables cost, day, and business procedures to interact with the corruption variable to identify the effect of corruption, in an effort to facilitate entrepreneurial activity that can affect the formation of capital and economic growth.

This study also uses a dummy variable that is the East Asian dummy. Wennekers and Thurik (1999) discuss the World Bank's report 'The East Asian Miracle' that states there are eight East Asian countries, known as the high-performing Asian economies[10] that have very good economic growth, compared to the other countries in Asia. This phenomenon was investigated by Gray (1996), who showed that the culture of Confucianism has a significant effect on economic growth in East Asian countries[11]. The uniqueness of these East Asian countries encourages the identification of the East Asian dummy variables in this study. Other variables are measured from the World Bank's data.

DISCUSSION

Equations (12) and (13) show that the corruption variable can negatively affect the capital growth variable. Further identification aims to identify the empirical evidence of the effects of corruption on capital growth, as in equations (12) and (13). Table 4.1 shows an analysis of the effect of the corruption variable on capital growth using the OLS method. It shows that the corruption variable has a significant negative effect on capital growth, especially in Asia. The higher that the level of corruption is in a country can significantly lower the rate of capital growth.

In Table 4.1, it is known that the variable for the number of days has a significant positive effect on capital growth, which is the longer days that are needed for the process of establishing a business, the better it is. This can increase the growth of capital. However, when the variable for the number of days interacts with the corruption variable, the beta coefficient decreases and the level of significance decreases to only 10%.

[9] Mauro (1995) used the Ethno-Linguistic Fractionalization Index (ELF) as the instrument variable; this study used the ethnic, language, and religion fractionalization indexes. The Ethnic Fractionalization Index explains the combination of racial characteristics. The ELF index describes the probability of a country's people speaking the same language. The Language Fractionalization Index illustrates the probability of a country's people speaking the same language. The Religion Fractionalization Index illustrates the probability of a country's people having the same religion. The indexes are come from The QoG Institute.

[10] The eight countries are Korea, Taiwan, Singapore, Hong Kong, Japan, Indonesia, Malaysia and Thailand.

[11] Gray (1996) uses a sample of countries Hong Kong, Singapore, Japan, Korea and Taiwan. Confucian dynamism variables in the study measure the legitimacy of the hierarchy, the value of persistence, the savings, the absence of business initiative detention, (business) by tradition and social obligations.

This finding is contrary to the argument of Dreher and Gasebner (2013) that corruption can grow the economy due to bypassing of overly strict regulations. This study suggests that higher levels of corruption lead to inefficiencies in business start-up processes, which can lead to a decrease in the capital growth. In other findings (Belgibayeva and Plekhanov, 2019; Cuervo-Cazurra, 2006) it can be seen that greater foreign direct investment flows between countries with good control of corruption. It means that corruption leads to inefficiencies in business. Additionally, Sabir et al. (2019) inferred that institutional quality is a more important determinant of foreign direct investment for developed countries than for developing countries.

Table 1 Results of Estimation of the Influence of Corruption on Capital Growth in Asia Using the OLS Method

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Corruption		0.5366**	-0.4078***	-0.3319**	-0.3110**	-0.3078**
		(0.2604)	(0.1230)	(0.1401)	(0.1306)	(0.1396)
Governance	-1.8327***					
	(0.3505)					
*Governance*Corruption*		-0.1883***				
		(0.0525)				
Day	0.01589***					
	(0.0056)					
Day * *Corruption*			0.0016*			
			(0.0009)			
Cost	-0.0160**					
	(0.0081)					
Cost * *Corruption*					-0.0013	
					(0.0015)	
Procedure	-0.0557*					
	(0.0302)					
Procedure * *Corruption*				-0.0010		
				(0.0045)		
Busfreed* *Corruption*						0.0004
						(0.0016)
Dummy East Asia	-0.1611	-0.6143	-0.2696	-0.2089	-0.3129	-0.2608
	(0.3165)	(0.2985)	(0.3314)	(0.3623)	(0.3292)	(0.3150)
Control Variable	Y	Y	Y	Y	Y	Y
Uji F	10.05***	5.85***	2.83***	2.29**	2.57***	2.78***
R^2	0.4007	0.2280	0.2547	0.2213	0.2299	0.1576
N	94	108	93	93	93	102

Note: standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable: Ln_Capital Growth. All the models have met the OLS assumption.
Source: Author's calculation (2017)

Table 1 also shows that the interaction between governance and corruption has a significant effect on the capital growth. The worse the governance system is, and if this is accompanied by higher levels of corruption, it will cause capital growth to be lower. Thus, the analysis using the OLS method concludes that corruption negatively affects and can exacerbate a country's economic problems, from the perspective of the rate of its growth of capital.

The existence of potential bias that can appear in the variable for corruption is caused by endogeneity, which motivated this research to also identify the further effect of the corruption variable on capital growth using the TSLS method. The instrument variables used are the Ethnic Fractionalization Index, the Religion Fractionalization Index, and the Language Fractionalization Index. It was used because some cultural characteristics positively affect the tolerance of corruption (Jun, Kim, and Rowley; 2019).

The result of the analysis using the instrument variables shows that there is no endogeneity of the corruption variable to the capital growth variable. Therefore, the identification of the effect of the corruption variable on capital growth refers to the OLS method. The result of this study provides support for the sand the wheel hypothesis.

To test for robustness, this study replicated the analysis, but replaced the dependent variable. The alternative dependent variable is the share capital of the Gross Domestic Product (GDP). Table 2 and Table 3 show the analysis. Table 2 shows that the interaction between governance and corruption has a significant effect on the share capital of the Gross Domestic Product (GDP). The worse the governance system is, and if this is accompanied by higher levels of corruption, then it will cause a lowering of the percentage of capital to GDP. Thus, the interaction between higher corruption and weak institutional systems actually worsens the economy, especially the decreasing amount of capital to GDP. The analysis shows that East Asian countries have a higher proxy of capital to GDP than non-East Asian countries. This is in line with Wennekers and

Thurik (1999) who showed that East Asian countries have better and faster economic growth compared to non-East Asian countries.

Table 2 Results of Estimation of the Influence of Corruption on Capital in Asia Using the OLS Method

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Corruption		-6.7655***	-6.2042***	-5.1427***	-5.2136***	-5.6123***
		(2.3137)	(1.5791)	(1.5875)	(1.2733)	(1.7203)
Governance	-13.1435***					
	(2.9046)					
*Governance*Corruption*		0.1286				
		(0.3920)				
Day	0.1031***					
	(0.0262)					
Day * *Corruption*			0.0045			
			(0.0036)			
Cost	-0.2152***					
	(0.0578)					
Cost * *Corruption*					-0.0258***	
					(0.0068)	
Procedure	-0.7599***					
	(0.1514)					
Procedure * *Corruption*				-0.0793***		
				(0.0198)		
Busfreed* *Corruption*						-0.0060
						(0.0094)
Dummy East Asia	-1.9132	5.8758***	4.4795*	4.9793**	1.2908	5.4391**
	(2.4484)	(2.0923)	(2.4084)	(2.1239)	(2.4443)	(2.2313)
Control Variable	Y	Y	Y	Y	Y	Y
Uji F	10.01***	8.20***	8.50***	11.01***	9.90***	9.90***
R^2	0.5503	0.4417	0.4640	0.4869	0.5362	0.5362
N	141	154	137	137	137	137

Note: standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models have met the OLS assumption.
Source: Author's calculation (2017)

In model (4) Table 2, the beta coefficient for the interaction variable between the number of procedures and the level of corruption gives a value of -0.0793, while the TSLS method gives a value of -0.1495. It means that the influence of the interaction variable between the number of business start-up procedures and corruption becomes more negative using the TSLS method.

In model (5) Table 2, the beta coefficient value in the OLS model for the interaction variable between the minimum required capital and the level of corruption gives a value of -0.0258, which is significant, while the TSLS method gives a value of -0.0123, but this is not significant. This means that the influence of the interaction variables between the variables for cost and corruption becomes insignificant when using the TSLS method. However, the effect of the corruption variable on model (5) becomes higher using the TSLS method. Model (6) shows no significance for the interest variable. Therefore, from the five models in Table 2 it can be concluded that higher levels of corruption can reduce the value of the share of capital to GDP. The lower levels of investment have a lower impact on economic growth (Levine and Renelt, 1992). Thus, corruption worsens the economy.

The results of the robustness test indicate that the greater the number of days that are needed to establish a business can actually can increase the share of capital to GDP. However, the interaction between the number of days with the variable for corruption does not show a significant effect on the share of capital to GDP. This shows that there is no significant effect that causes the interaction between the corruption variable and the number of day's variable.

The interaction between the corruption variable and the procedure variables shows a significant negative effect. This means that the more procedures that are needed to start a business, if accompanied by high levels of corruption, then this will result in a decrease in capital. The interaction between the corruption variable and cost variable also shows a significant negative effect. The high level of corruption accompanied by the high minimum capital requirements for opening a business will reduce the share of capital to GDP.

Model (6), Table 2, shows that the interaction between the Business Freedom Index and corruption has no significant effect on the share of capital per GDP. In general, the five models show that corruption has a significant negative effect on the share of capital per GDP. That is, higher levels of corruption worsen the economy, especially by reducing the share of capital per GDP in Asia.

Further identification for the robustness test is done by analyzing the TSLS method by considering the endogeneity of the corruption variable. The results of the TSLS analysis are shown in Table 3. In Table 3 the influence of the East Asia dummy variable becomes unsound. In model (3) the effect of the East Asian dummy variable is negatively insignificant, whereas in model (4) the East Asian dummy's influences is positively significant.

Table 3 Results of Estimation of the Influence of Corruption on Capital in Asia Using the TSLS Method

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Corruption	1.8604	6.0582	7.6834	-2.5041	-16.4540***	4.0317
	(2.9973)	(6.3226)	(10.1741)	(5.1221)	(4.5969)	(7.0458)
Governance	-17.9660***					
	(6.6884)					
*Governance*Corruption*		-2.2815**				
		(1.1473)				
Day	0.1337***					
	(0.0364)					
Day * *Corruption*			-0.0056			
			(0.0107)			
Cost	-0.2510***					
	(0.0488)					
Cost * *Corruption*					-0.0123	
					(0.0096)	
Procedure	-0.6977***					
	(0.2451)					
Procedure * *Corruption*				-0.1495**		
				(0,0659)		
Busfreed* *Corruption*						-0.0463
						(0.0318)
Dummy East Asia	-4.7291*	-2.5544	-9.2031	-2.7716	13.3846**	0.2227
	(2.6642)	(3.7378)	(8.7910)	(4.1841)	(5.6756)	4.5586
Control Variable		Y	Y	Y	Y	Y
F Test First Stage	56.98***	209.66***	2.6961**	6.3911**	10.8278**	4.4311**
N	129	146	129	129	137	145

Note: standard error in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The instrument variable that meets the IV assumptions in models (1), (2), and (3) is the Ethnic Fractionalization Index. The instrument variable that meets the IV assumptions and is used in model (4) is the Religion Fractionalization Index.
Source: Author's calculation (2017)

Generally, the analysis showed that the governance and corruption variable can negatively significant influence to both the capital growth and share of capital per GDP. The higher levels of corruption, and the weaker of governance, worsen the economy. It is important to ensure the rule of law, enhance regulatory efficiency and quality, and minimize the discretionary powers of bureaucrats and politicians in an effort to decrease corruption and its impact (Muzurura, 2019).

In model (3) using the OLS and TSLS methods, both indicate that there is no significant effect of the interaction of the number of days' variable and the level of corruption on the share of capital to GDP. The result of the analysis using the TSLS method shows a more significant effect with bigger beta coefficient values.

In model (2) Table 2 the beta coefficient value in the OLS model for the interaction variable between governance and corruption is 0.1286 but it is not significant, while the TSLS method gives a value of -2.2815 and significant at 5%. This means that the influence of the interaction variables between governance and corruption becomes more negative using the TSLS method. It means that the greater the corruption that accompanies the increasingly weak governance will cause the share capital to GDP to lower. The robustness test also supports the sand the wheel hypothesis. Therefore, more efforts are needed to eradicate corruption. Muzurura (2019) argued that it can be done by improving accountability, the early detection of corruption, the prosecution of perpetrators without fear or favor, and severe penalties must be imposed. It needs to be done to improve the social and economic well-being of society (Bajada and Shasnov, 2019). Then, people who engage in practices that discourage corruption should be rewarded (Ezebilo, Odhuno, and Kavan; 2019).

CONCLUSION

This study concludes that corruption can adversely affect an economy. In the theoretical modeling of the bribery by a company to ease the process of doing business, it concludes that corruption by the company can lead to a decrease in the capital growth when compared to an economy without corruption. In the process of establishing a business, Dreher and Gassebner (2013) have argued that corruption can simplify the process so as to boost the economy, but this study actually found the opposite.

The results of our empirical identification found that the corruption variable strongly influences the variable for the share of capital to GDP, in Asia in particular. The higher the level of corruption is, the lower the share of capital to the GDP of a country is. The empirical identification results also found that the variable of corruption had a significant negative effect on the growth rate of a country's capital. The higher levels of corruption in Asian countries can lead to lower levels of capital growth. So it can be concluded that corruption can worsen an economy.

The grease the wheel hypothesis initiated by Leff (1964), Leys (1965), and Huntington (1968) states that in a countries with poor governance systems, corruption can improve efficiency. Because of the weakness of governance and the difficulty of establishing a business due to bureaucratic inefficiency, corruption can be a solution to overcome this inefficiency. Through theoretical modeling of the Ramsey model's development, this study shows that corruption can lead to increased inefficiency when the governance systems are weak. The derivation of theoretical modeling is empirically identified, and finds that higher levels of corruption, when coupled with lower levels of governance, can further reduce the proxy for capital to the country's GDP, and also lower the rate of capital growth. Therefore, this study rejects grease the wheel hypothesis and supports sand the wheel hypothesis. Thus, the efforts to eradicate corruption must be done more seriously and continuously.

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