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Growth and Development Under Different Corruption Regimes*

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Abstract

This paper explicitly models four different corruption regimes according to the way in which corruption is practised. It distinguishes between organised and disorganised, collusive and non-collusive corruption. The implications of these are compared and contrasted to provide ranking regarding their impacts on growth. Corruption is always bad, but the extent of the detrimental effect on growth is sensitive to the corruption regime observed. The least (or most) damaging regime is the one in which corruption is both organised and collusive (or disorganised and non-collusive), as broadly characterises the situation in China and its fast-growing neighbours (or some African countries). An effective anti-corruption policy should focus on fighting embezzlement and discretionary rent-seeking first, which will dramatically reduce the adverse effect of corruption on growth.

JEL Classification: D73, H26, O11, O41.

Keywords: Corruption regimes, corruption-growth nexus, organised/disorganised corruption, collusive/non-collusive corruption.

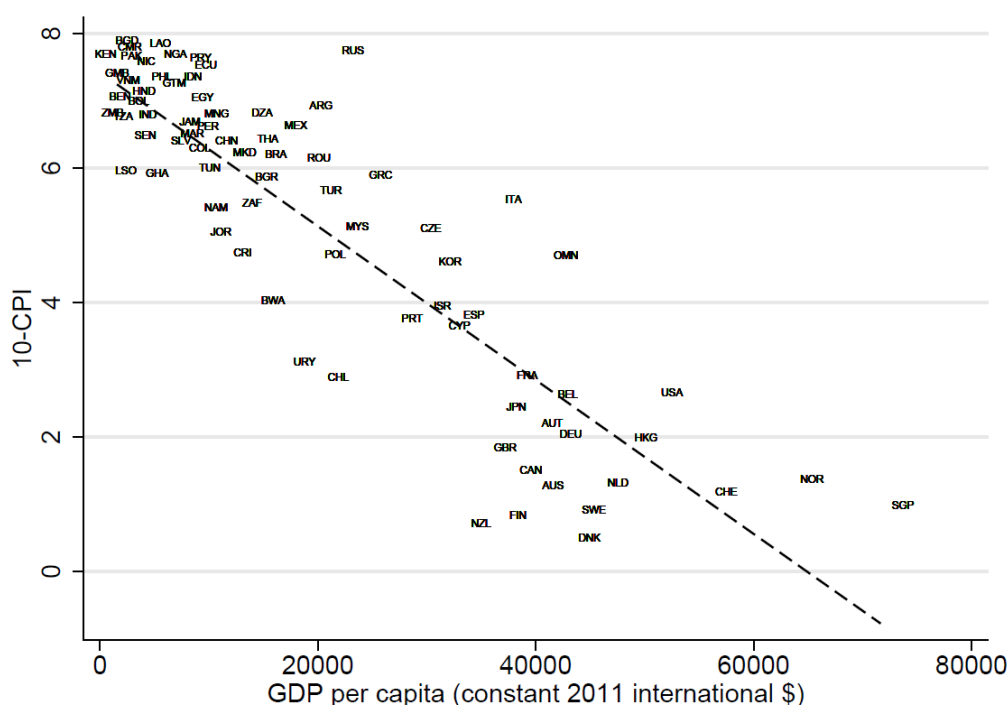
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1. Introduction

Corruption has existed in all countries in one form or another, to a lesser or greater degree. There are various ways in which public officials can abuse their authority, and there are many ways in which such behaviour can affect economies at the macro level. Corruption is broadly recognised as one of the most dangerous obstacles to economic growth and development. In the seminal contribution by Mauro (1995), it is found that corruption has a significant adverse effect on growth, with the principal transmission mechanism being the impact of corruption on investment. A similar effect can also be observed in many other studies (e.g., Ades and Di Tella, 1997; Johnson *et al.*, 2011; Mo, 2001; Swaleheen, 2011), together with pointers to other ways in which corruption may take hold, such as increasing the costs of doing business (Tanzi and Davoodi, 2001), or reducing inflows of foreign direct investment (Hakkala *et al.*, 2008; Morrissey and Udomkerdmongkol, 2011), causing misallocations of public expenditures (Celimene *et al.*, 2016; Murphy *et al.*, 1991) and deterring innovations (e.g., Blackburn and Forgues-Puccio, 2009; Murphy *et al.*, 1993).

At the same time, there is also evidence to suggest that causation could work the other way, meaning that the level of development determines the incidence of corruption (e.g., Holcombe and Boudreaux, 2015; Treisman, 2000). Figure 1 indicates a negative correlation between corruption and per capita real GDP. It can be clearly seen that developed countries are usually less corrupt, with a few exceptions such as Italy. The most deprived nations of the world are often the most corrupt.

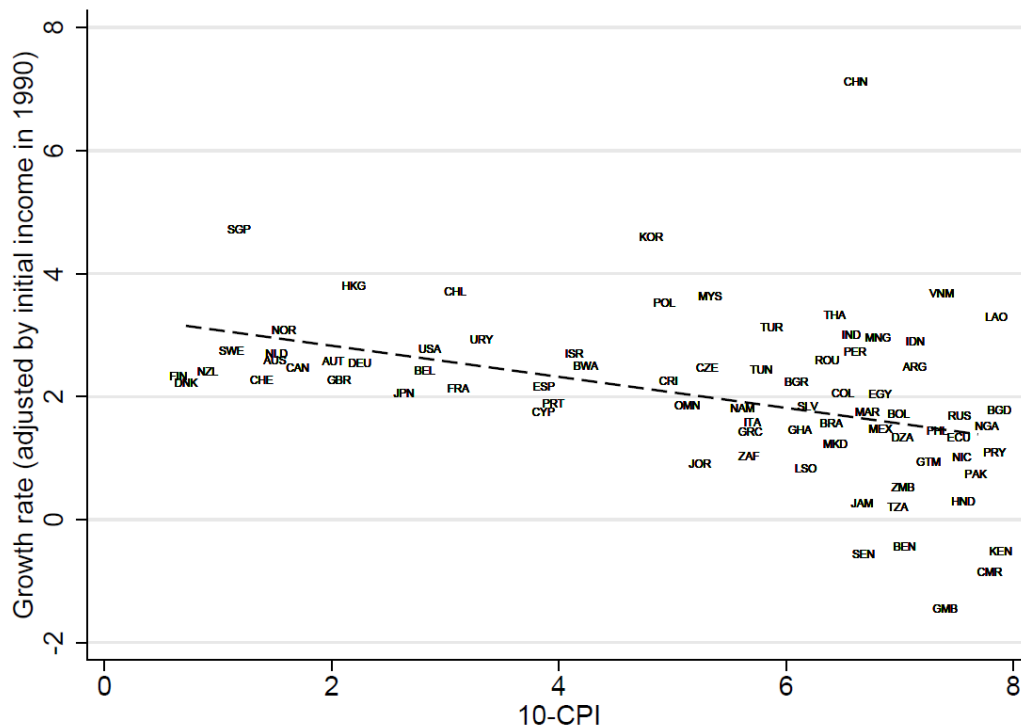
Figure 1. Corruption versus Per Capita Real GDP, 2005-2015¹



¹ Figure 1 is computed using a balanced panel of 78 countries from across the world, excluding some outliers such as a few oil-producing countries, from 2005 to 2015. The vertical axis is the average corruption measured using the Corruption Perceptions Index (CPI) from Transparency International. The corruption indicator is re-scaled between 0 (least corrupt) and 10 (most corrupt). The horizontal axis is the average per capita real GDP (PPP adjusted) computed from the raw data of the World Bank Economic Indicator. An attempt was also made to use the Worldwide Governance Indicator (WGI) from the World Bank as an alternative indicator of corruption. The relationship exhibited is consistent with the one in Figure 1.

Looking at the plot of economic growth rate against corruption in Figure 2, it is undoubtedly true that many less developed countries have suffered due to severe corruption, particularly in Sub-Saharan Africa (Figure 2, lower right corner). Some Latin American nations with a thriving corruption culture have stagnated in the so-called “Middle Income Trap”.² However, it is also the case that several others have displayed exceptional growth performance, which forms the basis of the “East Asian Paradox” (Wedeman, 2002) that countries such as China, Indonesia, South Korea and Thailand have all enjoyed considerable growth despite their reputations for being mired in corruption. A similar phenomenon was also observed during Japan's economic development in the second half of last century (e.g., Iga and Auerbach, 1977; Nyblade and Reed, 2008; Reed, 1996), though this is not evident in Figure 2, which uses recent data. Such observations suggest that corruption seems not to deter economic growth much in the countries where this paradox exists.³ In other words, it appears that these countries have coped well with the corruption problem, while many others struggle for survival. What could account for these observations?

Figure 2. Economic Growth versus Corruption, 1990-2015⁴



A likely explanation is the organisation of corruption. There are different types of corruption across countries, and their impacts on the economy are not identical. In the spirit of Andvig and Moene (1990), Shleifer and Vishny (1993), an organised rent-seeking among public officials can be less damaging to the economy than a disorganised one because it internalises negative externalities. Based on the former, Ehrlich and Lui (1999) develop an endogenous growth model driven by human capital accumulation. When corruption surfaces, organised corruption is less detrimental to investment in human capitals and hence less damaging to growth. Others highlight another vital prospect in the same vein, which is that organised bureaucracy reduces uncertainty in rent-seeking. Blackburn and Forgues-Puccio (2009) construct a three-sector endogenous growth model in which firms pay bribes to bureaucrats in exchange for licences to undertake research. Their results show that organised corruption demands lower bribes, so allowing greater innovation and hence triggering faster growth than disorganised corruption. Blackburn and Wang (2009) further find that even where organised corruption may demand higher bribes than disorganised corruption, the reduced uncertainty means that, organised corruption is likely to enable more individuals to become entrepreneurs and is hence less detrimental to growth. Fisman and Gatti (2006) the disorganised bureaucracy, but their empirical work also shows that firms are likely to perform better when there is less uncertainty about bribe demands.

The distinction between organised and disorganised corruption is reasonably well acknowledged. However, corruption regimes can be evaluated from an alternative perspective capturing interactions between public officials and private agents of corrupt practices, which produces another dichotomy: collusive versus non-collusive corruption. The relative “merit” of these two remains unclear in the literature. Collusive corruption may serve to temper the greed of public officials, who must rely on the compliance of private agents to pay bribes, and it may therefore be less damaging to the private sector. However, collusive arrangements are beneficial to both parties, and so may be complicated to detect as no one has an incentive to dissent. This creates a significant challenge to anti-corruption campaigns, thereby deterring growth in the long-run. At the same time, non-collusive corruption can be an equally tricky offence to handle, especially when it entails misappropriation of public funds, which is detrimental to the whole of society. The fact that no bribe extortion takes place means private agents have no legal rights by which to protest and seek compensation. To the author’s knowledge, only a few studies explicitly tackle this issue. Foellmi and Oechslin (2007) suggest that, on balance, it is non-collusive corruption that inflicts the most damage based on both theoretical and empirical investigations. Non-collusive corruption is persistently widespread in developing countries but less evident in their wealthy counterparts. Dzhamashev (2014) finds that collusive corruption is less detrimental and may be beneficial to growth depending on the net effect generated by the government. Recently, Dzhamashev (2016) has provided a further contribution by explicitly modelling income uncertainty induced by alternative corruption regimes. He finds that increasing the likelihood of collusive corruption tempers tax evasion and associated income uncertainty, while increasing the likelihood of non-collusive corruption aggravates tax evasion but induces nonlinear impacts on associated income uncertainty given the existing incidence of corruption. Under collusive corruption, if reduced income uncertainty is not accompanied by higher bribe demand, it may promote economic growth. Under non-collusive corruption, if both bribe demand and income uncertainty increase when the likelihood of this type of corruption increases, the impact on economic growth is negative; if the bribe demand increases but income uncertainty decreases, the impact on growth is unclear.

This paper is based on the above studies but differs in various respects. The main concern is to examine the implications of different forms of corruption regime for the growth of an economy. It considers an economy in which growth occurs through physical capital accumulation and corruption is present in the raising and disposing of public funds. Bureaucrats have delegated the responsibility for

collecting taxes from households on behalf of the government. Bureaucrats can abuse their authority, but they incur costs in doing so as resources must be spent if they are to conceal their malfeasance.

First, this paper aims to offer a theoretical contribution to the organisation of corruption literature. The model captures multiple forms of corrupt practices from two spheres: coordination of public officials in corrupt activities, and conspiracy between public officials and private agents engaging in corruption. To the author's knowledge, this has not been done before in a systematic way. The initial idea is to differentiate corruption regimes according to the way that corruption is practised, but not to explicitly model associated uncertainty or income uncertainty as others have (e.g., Blackburn and Forgues-Puccio, 2009; Blackburn and Wang, 2009; Dzhumashev, 2016). Corruption-induced uncertainty is reflected in the costs of practising corruption, which are explicitly modelled in this paper. These costs, which reduce capital accumulation, depend positively on both a bureaucrat's own illegal income and the illegal income of all other offenders, implying potential externality effects in corrupt activities.

Second, in alignment with the first point, this paper helps to clarify some terminologies used in the existing literature by providing a four-fold taxonomy. It explicitly models four corruption regimes: non-collusive and disorganised corruption, non-collusive and organised corruption, collusive and disorganised corruption, and collusive and organised corruption. Organised corruption means a situation in which bureaucrats act together to maximise their illicit earnings, considering the potential externality effects of their actions; disorganised corruption means the opposite scenario, in which each bureaucrat acts individualistically to maximise his illegal income while ignoring the externalities imposed on others. Collusive corruption means a situation in which bureaucrats and households conspire with each other in bribe-taking and tax evasion; non-collusive corruption means a situation in which bureaucrats pocket the tax revenues that they collect.

The above terms are often used interchangeably in the literature, often with references to a centralised and decentralised bureaucratic structure, which is not necessarily true. It is possible that a country has non-collusive and organised corruption under a centralised bureaucratic structure, or that it has collusive and disorganised corruption under a decentralised bureaucratic structure. The different scenarios tend to be associated with different types of institutional structure and different methods of income extraction. Organised (or disorganised) corruption is often allied to the existence of centralised (or decentralised) bureaucracies, whereas collusive (or non-collusive) corruption is often exemplified by bribe extraction (or embezzlement). There is a notable distinction among these terminologies. Organised corruption involves some form of institutionalised group behaviour for the benefit of the group. Collusive corruption has no particular institutional association but is somewhat allied to the bilateral arrangements between public officials and private agents in corrupt practices.

Finally, this paper also intends to share some insights on corruption-growth literature. It does so by exploring the effects of four corruption regimes on economic growth through their direct impact on the costs of corruption. It finds that, in terms of growth, the least detrimental regime is one in which corruption is both organised and collusive, while the most harmful is one in which corruption is both disorganised and non-collusive. The ranking of the remaining two regimes is ambiguous depending on parameter configuration. Understanding the underlying mechanism illuminates the practical merits of conducting effective anti-corruption campaigns. Additionally, this paper provides a brief discussion of corrupt practices in the East Asian countries, which it is hoped will inspire others to trace the evolution of corruption and the improvement of anti-corruption strategies conditional on economic development in the region.

The rest of this paper is organised as follows. Section 2 provides a brief review of corruption in the “East Asian Paradox” countries. Section 3 sets out the general framework. Section 4 provides a characterisation of different corruption regimes. Section 5 evaluates corruption regimes and the effects on growth. Section 6 contains some concluding remarks.

2. Corruption in the “East Asian Paradox” Countries

Wedeman (2002) argues that the poor quality of governance in East Asia is less damaging than in other regions, which is labelled as the “East Asian Paradox”. In the past decade, it seems that a few other countries besides the original four (China, Indonesia, South Korea and Thailand), such as Vietnam, Laos and maybe also Mongolia (as shown in Figure 2), have exhibited similar features. The experience of these countries is both striking and puzzling. From Japan to South Korea and then China and some other countries in the region, widespread corruption has not prevented them from achieving exceptional growth and prosperity.

Bardhan (1997) argues that economic transition provides a fertile ground for corruption. The liberalisation of the old market and privatisation of state-owned enterprises create new opportunities for rent-seeking. At the same time, public officials are granted great discretion. This is commonly observed during economic development across East Asian countries. However, how to use the discretionary power in rent-seeking is more crucial than the discretion *per se*. Campos *et al.* (1999) show that a more predictable rent-seeking process has a smaller negative impact on investment than a less predictable one, which succinctly describes the nature of corruption in the “East Asian Paradox” countries. Rock and Bonnett (2004) find that corruption slows down economic growth in most developing countries and is particularly harmful to small developing countries but increases growth in large East Asian newly industrialised economies due to their strong governments and mutual benefits between politicians and large enterprises. The idea of shared interests between politicians and large enterprises captures very well the corrupt practices in Japan (e.g., Johnson, 1987) and South Korea (e.g., Kang, 2002). Vial and Hanoteau (2010) argue that business networks in East Asian countries are relationship based, and corruption helps the operation of this system.

The significance of the above is that the countries to which this paradox refers are often cited as particular examples of societies in which corruption is, or has been, extremely well organised and, in some cases, strongly collusive as well. The most prominent example is China, where both forms of corrupt practices continue to thrive. Gong (2002) attributes this to an environment in which corruption takes place through well-organised networks of rent-seeking public officials acting in cooperation with private agents and enterprises. Gift exchange is a dominant social norm in Chinese bureaucracies and business transactions, and bribes and other forms of kickback are routinely offered, accepted and reciprocated with appropriate favours of one type or another. Within the bureaucracy itself, it is standard practice for subordinate officials to share their illegal income with superiors in return for obtaining tacit approval to engage in rent-seeking. The most common institution that fosters organised corruption in China is the *Danwei* (work unit), members of which are induced to comply with group norms that encourage acceptance of illicit activities and, deter protest against these activities. This group conformance is fostered further through the existence of a *Xiaojinku* (secret account), which is set up by the work unit to finance unauthorised expenditures for the benefit of the unit as a whole in both state-owned enterprises and large privately-owned enterprises (e.g., Hung, 2008). These observations suggest that corruption in China is a well-organised activity based on a substantial degree of cohesion and cooperation amongst rent-seeking public officials (e.g., Lu, 2000). The collusive nature of corruption

in China means that there is a good deal of compliance by the private sector, implying that the benefits of corruption accrue to agents both inside and outside the government. Wedeman (2004) argues that one possible reason why China has prospered in the face of high corruption is that rent-seeking officials have had strong incentives to form a mutually beneficial relationship with the emerging business community to facilitate profit-making from which both parties can benefit without hindering growth.⁵

While corruption in China remains organised and collusive, the corrupt practices in other paradox countries are mixed. In Indonesia, non-collusive corruption was widespread during the autocratic Soeharto's regime through so-called "crony capitalism". Soeharto and his cronies were involved in stealing national assets and then laundering ill-gotten gains through non-profit organisations. However, an organised bureaucratic structure was also evident, with Soeharto on the top and different levels of public officials underneath, and the cooperation amongst rent-seeking public officials eventually surfaced. Since the collapse of Soeharto's regime, there has been much more collusion in rent extraction in the Indonesian economy, as discussed in Smith *et al.* (2003). The organised form of corruption existing under Soeharto's regime has been replaced by a more disorganised one (e.g., Kuncoro, 2006; Vial and Hanoteau, 2010).

In South Korea, corruption is interpreted as "money politics" (e.g., Kang, 2002), which highlights the relationship between public officials and large private enterprises. The collusive nature of corruption in South Korea means there is a mutual benefit between politicians and large enterprises. The collusive feature promotes the development of large private enterprises, for example, Samsung, in return for more bribes. Chang (2008) argues that how bribes are used and where the illegal income is invested are crucial. If public officials reinvest bribes/kickbacks received from one capitalist in another equally productive capitalist domestically, this may not influence the economy. Khan (1998) states that illegal money transactions between public officials and private agents in South Korea are not accessible to the non-capitalist class. Politicians act through bureaucrats to allocate privileges to capitalists that can extract more payoffs from non-capitalist classes and this network is well organised to ensure the reallocation of privileges and rent collections. Khan (1998) further argues that the organised structure creates strong incentives for the state to reallocate resources to maximise long-run growth. If public officials are "clever enough", most productive capitalists can survive and grow, while the less productive ones eventually leave the market (Chang, 2008).

Thailand exhibits similar collective and organised features but with some variations. In Thailand, Chinese capitalists have been ethnically and politically well integrated into Thai society for historical reasons (e.g., Rock, 1994). Thai-born Chinese capitalists share a well established network with local public officials having a Chinese background. The network is restricted to people with Chinese ancestry only. Thai-born Chinese capitalists negotiate resource allocations with Thai-born Chinese public officials in return for pecuniary recompense and election support, which looks very like the collusive corruption phenomenon. Furthermore, Rock (2009) argues that the bureaucratic structure is well coordinated amongst politicians, senior bureaucrats and army officials in Thailand, which captures the organised nature of corruption there. However, it has been observed that disorganised corruption has started to replace this following democratisation in recent years.

The specific set of corrupt practices in each "East Asian Paradox" country is unique. However, a common feature of the paradox countries is the high incidence of corruption with a well organised and/or collusive rent-seeking structure. In contrast, though the incidence of corruption in African countries is equally high, it tends to be more disorganised and decentralised than elsewhere, as indicated

⁵ Wedeman (2012) provides a detailed review of corruption in China.

in many studies (e.g., d’Agostino *et al.*, 2016; Gyimah-Brempong, 2002). In most Latin American countries, corruption is mainly concentrated on “hyper-presidentialism” political corruption (e.g., Rock and Bonnet, 2004; Whitehead, 1989 and 2000), which exhibits features of less organised and/or collusive corruption. In general, the culture which forms the social norm seems to influence the organisation of corruption substantially. In East Asia, the long history of Chinese culture and Confucian ethical philosophy most affects the way people think and practise in daily life, which provides a fertile ground for more coordinated corrupt practices. As economic development continues in this region, corruption perception and corruption incidence are tempered under the pressure of anti-corruption campaigns. However, people’s ideology can not be changed easily, and so organised and/or collusive corruption is still broadly observable in the East Asian societies.

3. A General Framework

A two-period overlapping generation model is used following other studies (e.g., Blackburn *et al.*, 2006; Blackburn and Forgues-Puccio, 2007; Blackburn and Sarmah, 2008). For simplicity, the economy is closed with zero population growth. All agents are risk neutral, working only when young and consuming only when old. All agents are differentiated at birth by their abilities (or skills). For each generation, the population is divided into two groups: m households and n bureaucrats. It is assumed that $n + m = 1$ to simplify notations, and that $n < m$.⁶

Households work for firms to produce final output. They are differentiated by the labour endowments which determine their incomes and propensities to be taxed. A fraction, μ ($0 < \mu < 1$), of households are endowed with $\lambda > 1$ units of labour and are liable to pay tax, whereas a fraction, $1 - \mu$, of households are endowed with $\lambda = 1$ unit of labour and are exempted from paying tax.

Bureaucrats working for the government to collect taxes are differentiated according to their proclivity for engaging in corrupt practices. However, that information is kept private. Suppose that a fraction, η ($0 < \eta < 1$), of bureaucrats, are always corrupt; whereas a fraction, $1 - \eta$, of bureaucrats, are never corrupt. Such differences may reflect moral attitudes towards being corrupt and/or proficiency at being corrupt. The initial idea is to ensure that the government receives at least some tax revenues to cover public expenditures.⁷ All bureaucrats are endowed with one unit of labour, which rules out the possibility that a bureaucrat collects taxes from himself. Further, $n = \mu m$ is assumed. Hence, each bureaucrat is responsible for collecting taxes from one high-income household.

Corruption takes place through either bribe demand in exchange for tax exemption or embezzlement of tax revenues. Suppose that a fraction, π ($0 < \pi < 1$), of bureaucrats engage in the former, whereas a fraction, $1 - \pi$, of bureaucrats participate in the latter. Each sector of the model is described in more detail as follows.

3.1 Government

⁶ $n < m$ simplifies the model in several ways. Most notably, it eliminates the possibility of endogenous changes in the size of the bureaucracy and the resulting endogenous changes in the incidence of corruption.

⁷ This assumption is also used to determine salaries of bureaucrats in a relatively straightforward way that does not require additional assumptions about how public sector pay is determined. This will become clear soon.

The government provides public goods and services, g_t , which contribute to the production of final output, y_t , as in the setup of many others (Barro, 1990; Barro and Sala-i-Martin, 1992). The expenditure on public goods and services provision is a fixed proportion of final output, $g_t = \theta y_t$, where $0 < \theta < 1$.

Another part of government expenditure is to cover bureaucrats' salaries. The precise value of bureaucrats' salaries is unimportant as they cancel out in the general equilibrium. However, one may think that they are determined as follows. Any bureaucrat (corrupt or non-corrupt) can work like a low-income household for a firm to receive the same wage as a low-income household. If a bureaucrat is happy to accept any salary less than the wage paid to a low-income household, he is revealed immediately as being corrupt. Suppose that a bureaucrat who is discovered to be corrupt is subjected to the maximum fine of having all of his income confiscated (see also Acemoglu and Verdier, 1998). In other words, the bureaucrat is dismissed without pay and all illegal gains are forfeited.⁸ Given this background, non-corrupt bureaucrats would never compromise themselves in the way just described. The government can minimise labour costs to ensure complete bureaucratic participation by setting the salaries of bureaucrats equal to wages paid by firms to low-income households. Hence, there is no incentive for incumbent bureaucrats to switch occupation. Alternatively, potential bureaucrats can work in the private sector in the first place, but they are less likely to switch to the public sector later.

Let w_t stand for the average wage each bureaucrat receives. The total labour cost for the government is nw_t , which is financed by taxes collected from high-income households under the administration of bureaucrats. Let τ_t stand for the lump-sum tax levied on each high-income household. The maximum amount of expected tax revenue is $\mu m \tau_t$.

Due to corruption, the government does not receive the full amount of tax revenue. A population of $\pi \eta n$ bureaucrats allows high-income households to evade taxation by demanding bribes, which implies a reduction of $\pi \eta n \tau_t$ on tax revenue. A population of $(1 - \pi) \eta n$ bureaucrats simply steals collected taxations, which induces a further decrease of $(1 - \pi) \eta n e_t$ on tax revenue. e_t stands for embezzlement.

Suppose the government runs a balanced budget each period. The budget constraint is:

$$(\mu m - \pi \eta n) \tau_t - (1 - \pi) \eta n e_t = g_t + n w_t \quad (1)$$

Evidently, for any given g_t and w_t , the effect of corruption increases τ_t by the need to compensate for the tax evasions and/or the embezzlement of public funds.

3.2 Firms

A representative firm uses labour (l_t), capital (k_t) and public goods (g_t) to produce final output (y_t) as follows:

⁸ One may argue that a fine should be put into practice if a corrupt bureaucrat is caught. Arguably, the fine should be endogenised such that it increases with the total amount of illegal income. This paper approaches this idea in a different way that will become clear soon.

$$y_t = Al_t^\alpha k_t^{1-\alpha} g_t^\alpha \quad (2)$$

where $A > 0$ and $0 < \alpha < 1$. Labour and capital are paid at the competitive market rates, w_t and r_t , respectively. A profit maximisation condition plus $g_t = \theta y_t$ implies:

$$\begin{aligned} w_t &= a\alpha k_t / l \\ r_t &= a(1 - \alpha) = r \end{aligned} \quad (3)$$

where $a = [A(l\theta)^\alpha]^{1/(1-\alpha)}$ and $l = l_t = [\mu\lambda + (1 - \mu)]m$. (3) suggests that the market clearing wage is proportional to the capital stock, and the equilibrium interest rate is constant.

3.3 Households

Each young household receives a wage of w_t by inelastically supplying his labour to firms. A household endowed with one unit of labour earns a total wage income w_t ; a household endowed with λ units of labour earns a total wage income λw_t . Young households save all wage incomes at the market interest rate, r_{t+1} , and consume when reaching old age. However, old households only consume a part of their savings, s_t^h , and bequeath the remainder to offspring. A household's lifetime utility function is:

$$U^h = (1 + r_{t+1})s_t^h - q_{t+1} + u(q_{t+1})$$

where q_{t+1} stands for the bequest. $u'(\cdot) > 0$ and $u''(\cdot) < 0$ capture the “joy-of-giving” motive for making bequests.⁹ It follows that the household's utility function is maximised when $u'(\cdot) = 1$. This implies $q_{t+1} = q$ for all t . The utility function of the household is fully determined once s_t^h is determined, as in Table 1.

Table 1. Savings of Households

<i>Types of Household</i>	s_t^h
Low-income household ($\lambda = 1$)	$w_t + q$
High-income household ($\lambda > 1$)	
Household paying taxes	$\lambda w_t - \tau_t + q$
Household paying bribes	$\lambda w_t - b_t + q$

Evidently, the household has an incentive to engage in tax evasion if the bribe demanded by a bureaucrat is no higher than taxation, i.e., $b_t \leq \tau_t$. In the determination of b_t , it is assumed that high-income households will always engage in tax evasion whenever the opportunity arises. This is in line with the idea in Dzhumashev (2016) that private agents are willing to practise corruption for their own sake in countries with a high incidence of corruption.

⁹ The main purpose of modelling the altruism of leaving bequests is to ensure a well-defined steady state later.

3.4 Bureaucrats

Each young bureaucrat receives a wage of w_t by inelastically supplying one unit of labour endowment to the government. Similarly, as for households previously, bureaucrats save all wage incomes at the market interest rate, r_{t+1} , for consumption when reaching old age. Each old bureaucrat consumes a part of his savings, s_t^b , and bequeaths the remaining to his offspring. A bureaucrat's lifetime utility function is:

$$U^b = (1 + r_{t+1})s_t^b - q_{t+1} + u(q_{t+1})$$

where q_{t+1} stands for the bequest. The bureaucrat's utility function is maximised when $u'(\cdot) = 1$, which implies $q_{t+1} = q$ for all t . The utility function is fully determined once s_t^b is determined.

For a corrupt bureaucrat, legal wage income is augmented by illegal gains, net of any costs incurred from illicit activities. These costs may be thought of in several ways, such as the effort and resource that must be spent on concealing fraudulent activities. For example, corrupt bureaucrats invest illegal incomes differently from legal profits, or alter patterns of expenditure (e.g., Blackburn *et al.*, 2006; Dzhumashev, 2014). Alternatively, corrupt subordinate bureaucrats share their illegal income with superiors in return for obtaining tacit approval for engagement in rent-seeking or political promotion (e.g., Kahana and Liu, 2010). The moral shame or social stigma (e.g., Andvig and Moene, 1990; Cerqueti and Coppier, 2011; Litina and Palivos, 2016) attached to abuse of public position can also be considered a cost. To the extent that there is some pecuniary element to these costs, a bureaucrat's income will be reduced by some amount, denoted by c_t in the analysis and specified later. Given this, the amount of savings for a bureaucrat can be deduced in Table 2.

Table 2. Savings of Bureaucrats

<i>Types of Bureaucrat</i>	s_t^b
Non-corrupt bureaucrat	$w_t + q$
Corrupt bureaucrat	
Bureaucrat taking bribes	$w_t + b_t - c_t + q$
Bureaucrat embezzling public funds	$w_t + e_t - c_t + q$

Note: b_t stands for bribe payment; e_t stands for embezzlement.

3.5 Capital Accumulation

The process of growth and development is summarised by the dynamic path of capital accumulation, obtained from the equilibrium condition that the total demand for capital by firms is equal to the total supply of capital by all agents. Capital is provided from the savings of all agents in Table 3. The total savings in the economy are:

$$s_t = (l + n)w_t - (1 - \pi\eta)n\tau_t + (1 - \pi)\eta ne_t + q - \eta nc_t \quad (4)$$

Table 3. Total Savings

<i>Types of Agent</i>	<i>Population</i>	<i>Savings</i>
Household		
Low-income household	$(1 - \mu)m$	$w_t + q$
High-income household not evading tax ¹⁰	$(1 - \eta)\mu m + (1 - \pi)\eta\mu m$	$\lambda w_t - \tau_t + q$
High-income household evading tax	$\pi\eta\mu m$	$\lambda w_t - b_t + q$
Bureaucrat		
Non-corrupt bureaucrat	$(1 - \eta)n$	$w_t + q$
Bureaucrat taking bribes	$\pi\eta n$	$w_t + b_t - c_t + q$
Bureaucrat embezzling public funds	$(1 - \pi)\eta n$	$w_t + e_t - c_t + q$

The capital accumulation function is obtained by imposing the equilibrium condition, $k_{t+1} = s_t$. Using (1) and (3), the dynamic equation is derived as:

$$\begin{aligned} k_{t+1} &= lw_t - g_t + q - \eta nc_t \\ &= a(\alpha - \theta)k_t + q - \eta nc_t \end{aligned} \quad (5)$$

where $a(\alpha - \theta) > 0$.¹¹ (5) indicates how corruption reduces capital accumulation through the costly concealment of illicit activity. The costs of rent-seeking could have been used for productive activities and hence deter capital accumulation and growth. This may not be the only channel through which corruption could affect growth, but this is the most direct way to think of it.¹² In the subsequent analysis, it turns out that $c_t = c$ (a constant). If $a(\alpha - \theta) \in (0, 1)$ and $q > \eta nc$, the economy converges to a unique stationary point at a positive steady state level of capital, $k^* = \frac{q - \eta nc}{1 - a(\alpha - \theta)}$.

4. Modelling Corruption Regimes

The following analysis concentrates on modelling different types of corruption regime. These regimes differ in the extent to which bureaucrats interact amongst themselves and with households in corrupt practice. Regarding the former, organised and disorganised corruption are distinguished. Organised or disorganised corruption refers to the cases in which bureaucrats act either together or independently in maximising illegal income. Regarding the latter, collusive and non-collusive corruption are differentiated and refer to the situations in which bureaucrats either conspire or do not

¹⁰ These households could be assigned either to non-corrupt bureaucrats or to corrupt bureaucrats who simply embezzle public funds.

¹¹ This restriction requires $\alpha > \theta$, a condition that is satisfied empirically by the fact that the labour share of national income is larger than the government expenditure as a share of GDP. According to the World Bank, World Economic Indicator, the general world government final consumption expenditure is 17% of the total world GDP in 2016. The IMF data (<https://blogs.imf.org/2017/04/12/drivers-of-declining-labor-share-of-income/> [Accessed on 12/07/2018]) indicate that the labour share of national income has been declining since the 1970s. However, the average ratios were around 50% in the advanced economies and 37% in the developing economies in 2015.

¹² Bribe payments, b_t , and embezzlements, e_t , cancel out in (5). The former is purely a transfer between public sector and private sector; the latter affects tax rates needed to balance government budgets. Hence, the salaries of bureaucrats are irrelevant to capital accumulation as discussed previously.

conspire with households in extracting illegal income. Four scenarios represent all possible combinations of the above.

In all scenarios, corrupt bureaucrats face a problem of maximising their illegal income subject to a cost, c_i , of engaging in corrupt activities. It is assumed that these costs are increasing in both the bureaucrat's illegal income and the total illegal income of all other corrupt bureaucrats. The idea behind this is that a higher intensity of fraudulent activity makes such activity more visible and the illegal income less easy to conceal, which implies extra cost for trying to avoid detection. It is presumably more difficult for bureaucrats to dispose of large, rather than small amounts of illegal income without being discovered by the government. Alternatively, one may imagine that if there exist more corrupt bureaucrats, it will be more challenging for each one of them to launder his illegal gains without being caught. Each bureaucrat could access some costly laundering technology, where the cost increases with the number of illegal gains that both he and others attempt to conceal. For example, as discussed in Chang (2008), money laundering in South Korea works in the following way. Corrupt South Korean bureaucrats reinvest illegal income extracted from one productive capitalist in another identically productive capitalist. Arguably, it is less likely that a few corrupt bureaucrats can launder illicit profits through one large company without being detected as the ability (or scope) of that company to launder the money is limited, and hence the potential risk increases as more corrupt bureaucrats crowd into the same company. Presumably, it is not easy to build a “safe exit passageway” even in East Asian countries.

In some other studies (e.g., Aidt, 2003; Andvig and Moene, 1990; Dzhumashev, 2016), it is assumed that transaction costs of corruption are low if the incidence of corruption is high. This form may fit better with “hyper-presidentialism” political corruption than with the petty corruption discussed in this paper. In particular, anti-corruption campaigns have swept the globe in recent years, even in countries with noisome reputations for corruption like China and India, and these substantially improve the strength of government monitoring. Furthermore, informal monitoring from ordinary citizens is increasing quickly in the developing world due to the diffusion of the internet and mobile phone usage. For example, in China, informal monitoring has become increasingly popular after the initiative of a group of senior residents in the *Chaoyang* district of Beijing who have voluntarily organised themselves to help police fight crime. They have made enormous contributions to gathering information and reporting illegal activities, such as drug taking, stealing, corruption, kidnapping and many others. People call them “Aunt *Chaoyang*” and “Citizens of *Chaoyang*”.¹³ Similar activities have been widely observed in many cities in China now.

Therefore, the misbehaviour of one bureaucrat imposes negative externalities on others who misbehave. The cost function is:

$$c_i = \gamma i_i^\phi I_t^\psi$$

where $\gamma, \psi > 0, \phi > 1, c'(\cdot) > 0$ and $c''(\cdot) > 0$. i_i stands for the illegal income of a corrupt bureaucrat. $I_t = \eta n i_i$, or the total illegal income of all corrupt bureaucrats. ψ implies negative externalities imposed by one corrupt bureaucrat on other misbehaving bureaucrats, which further suggests a lower degree of coordination of rent-seeking activities. Depending on whether corruption is practised through bribe demand or embezzlement, either $i_i = b_i$ and $I_t = B_t$, or $i_i = e_i$ and $I_t = E_t$. The precise way in which corruption regimes differ from each other is revealed below.

¹³ To read more about the “Aunt *Chaoyang*” and “Citizens of *Chaoyang*”, see the following news published in the *Global Times* in June 2015 (<http://www.globaltimes.cn/content/925420.shtml>) [Accessed on 14/07/2018].

4.1 Non-collusive and Disorganised Corruption

In this case, each corrupt bureaucrat engages in corruption by simply embezzling tax revenues he collects. A corrupt bureaucrat does this independently, choosing a level of embezzlement, e_i , which maximises his own income, taking the amount of embezzlement by others, E_i , as given. Recall that the income of a corrupt bureaucrat who steals public funds is $w_i + e_i - c_i + q$. The optimal choice of embezzlement under this regime, denoted by e_i^D (“D” for disorganised), is defined by the following optimisation problem.

$$e_i^D = \arg \max_{e_i} w_i + e_i - \gamma e_i^\phi E_i^\psi + q \quad (6)$$

Proposition 1. *The optimal amount of embezzlement under non-collusive and disorganised corruption is given by*

$$e^D = \left[\frac{1}{\phi \gamma (\eta n)^\psi} \right]^{\frac{1}{\phi + \psi - 1}} \quad (7)$$

Proof. The first order condition for the bureaucrat’s maximisation problem is:

$$1 - \phi \gamma e_i^{\phi-1} E_i^\psi = 0$$

In the equilibrium, $E_i = \eta n e_i$. Substituting this into the above condition gives the expression for e^D . ■

4.2 Non-collusive and Organised Corruption

As in the previous case, each corrupt bureaucrat engages in corruption by quietly embezzling tax revenues. Unlike before, corrupt bureaucrats do this by coordinating their activities, choosing a level of embezzlement, e_i , which maximises each of their incomes, taking into account the effect of this on total embezzlement E_i . The optimal choice of embezzlement under this regime, denoted by e_i^O (“O” for organised), is defined by the following optimisation problem.

$$e_i^O = \arg \max_{e_i} w_i + e_i - \gamma e_i^\phi (\eta n e_i)^\psi + q \quad (8)$$

Proposition 2. *The optimal amount of embezzlement under non-collusive and organised corruption is given by*

$$e^O = \left[\frac{1}{(\phi + \psi) \gamma (\eta n)^\psi} \right]^{\frac{1}{\phi + \psi - 1}} \quad (9)$$

Proof. The first order condition for the bureaucrat’s maximisation problem is:

$$1 - (\phi + \psi) \gamma (\eta n)^\psi e_i^{\phi + \psi - 1} = 0$$

Rearranging the above condition gives the expression for e^O . ■

4.3 Collusive and Disorganised Corruption

In this scenario, each corrupt bureaucrat engages in corruption by conspiring with a household taking a bribe in exchange for tax exemption. Each corrupt bureaucrat does so by choosing a bribe, b_i , which maximises his joint payoff with a household while ignoring the effect of this on the aggregate bribe payment, B_i . To focus on the impacts of different corruption regimes, it is assumed that the bribe agreed between bureaucrats and households is determined after negotiation (or bargaining) but the bargaining process is not explicitly modelled as in Dzhumashev (2014). Collusive corruption happens when there is a double coincidence. Otherwise, corrupt bureaucrats choose to steal public funds.

To formalise the decision problem in this scenario, recall from Table 1 that the net payoff of a household evading tax is $\lambda w_i - b_i + q$. The optimal choice of a bribe under this regime, denoted by b_i^D (“D” for disorganised), is defined by the following optimisation problem.

$$b_i^D = \arg \max_{b_i} \omega(\lambda w_i - b_i + q) + (1 - \omega)(w_i + b_i - \gamma b_i^\phi B_i^\psi + q) \quad (10)$$

where $\omega \in (0, \frac{1}{2})$ is the weighting factor in the objective function of joint payoff.¹⁴

Proposition 3. *The optimal amount of bribe under collusive and disorganised corruption is given by*

$$b^D = \left[\frac{1 - 2\omega}{(1 - \omega)\phi\gamma(\eta n)^\psi} \right]^{\frac{1}{\phi + \psi - 1}} \quad (11)$$

Proof. The first order condition for the maximisation problem is:

$$-\omega + (1 - \omega)(1 - \phi\gamma b_i^{\phi-1} B_i^\psi) = 0$$

In the equilibrium, $B_i = \eta n b_i$. Substituting this into the above condition gives the expression for b^D . ■

4.4 Collusive and Organised Corruption

In the final scenario, each corrupt bureaucrat engages in corruption by conspiring with a household taking a bribe in exchange for tax exemption. Unlike the previous case, bureaucrats do this by choosing a bribe, b_i , which maximises each of their joint payoffs with a household, taking into account the effect of this on the aggregate bribe payment, B_i . The optimal choice of a bribe under this regime, denoted by b_i^O (“O” for organised), is defined by the following optimisation problem.

¹⁴ The restriction $\omega < 1/2$ is necessary to rule out any possibility of transfers from bureaucrats to households.

$$b_t^O = \arg \max_{b_t} \omega(\lambda w_t - b_t + q) + (1 - \omega)[w_t + b_t - \gamma b_t^\phi (\eta n b_t)^\psi + q] \quad (12)$$

Proposition 4. *The optimal amount of bribe under collusive and organised corruption is given by*

$$b^O = \left[\frac{1 - 2\omega}{(1 - \omega)(\phi + \psi)\gamma(\eta n)^\psi} \right]^{\frac{1}{\phi + \psi - 1}} \quad (13)$$

Proof. The first order condition for the maximisation problem is:

$$-\omega + (1 - \omega)[1 - (\phi + \psi)\gamma(\eta n)^\psi b_t^{\phi + \psi - 1}] = 0$$

Rearranging the above expression, give us the expression for b^O . ■

5. An Evaluation of Corruption Regimes

The preceding analysis has established the amount of illegal income that corrupt bureaucrats optimally extract under different behavioural assumptions governing their interactions among themselves and with households. This section compares and contrasts the implications of various corruption regimes. The key results are summarised below.

Proposition 5. *The amount of illegal income extracted by bureaucrats is always lowest when corruption is collusive and organised.*

Proof. From (7), (9), (11) and (13), we have $b^O < \{b^D, e^O, e^D\}$. ■

Proposition 6. *The amount of illegal income extracted by bureaucrats is always highest when corruption is non-collusive and disorganised.*

Proof. From (7), (9), (11) and (13), we have $e^D > \{b^D, b^O, e^O\}$. ■

Proposition 7. *The amount of illegal income extracted by bureaucrats may be more significant, equal or less when corruption is collusive and disorganised compared with when corruption is non-collusive and organised.*

Proof. From (7), (9), (11) and (13): $b^D > e^O$ if $(1 - 2\omega)\psi > \omega\phi$; $b^D = e^O$ if $(1 - 2\omega)\psi = \omega\phi$; $b^D < e^O$ if $(1 - 2\omega)\psi < \omega\phi$. ■

The intuition for these results is as follows. Consider first the case of collusive and organised (or disorganised) corruption versus non-collusive and organised (or disorganised) corruption. In the following discussion, the second half of the corruption regime is assumed to stay the same, which

enables a comparison of the impacts of collusive versus non-collusive corruption. *Ceteris paribus*, the amount of bribe that corrupt bureaucrats demand under collusive corruption is lower than the amount of tax revenue that they would embezzle under the non-collusive corruption. This is because bribes, unlike embezzlements, are chosen jointly with households. In other words, the demand for a bribe is tempered by the need to satisfy households' interests, which does not apply to embezzlement.¹⁵

Consider next the case of organised and collusive (or non-collusive) corruption versus disorganised and collusive (or non-collusive) corruption. *Ceteris paribus*, corrupt bureaucrats choose a lower level of illegal income under organised corruption than under disorganised corruption. This is because coordinated decision making, unlike non-coordinated behaviour, entails the internalisation of negative externalities and corruption-induced uncertainty. In other words, the demand for illegal income is tempered by the recognition that each corrupt bureaucrat imposes a cost on others, a factor that is ignored when corrupt bureaucrats act independently.

Altogether, these observations imply that the amount of illegal income extracted by bureaucrats is always lowest in a collusive and organised corruption regime, and consistently highest in a non-collusive and disorganised corruption regime, as stated in Propositions 5 and 6, respectively. The outcomes in the two remaining regimes are ambiguously ranked. These two regimes involve a mixture of interactions and non-interactions among public and private agents. When corruption is collusive but disorganised, the extraction of illegal income is moderated by the interaction between bureaucrats and households, but fostered by the non-interaction among bureaucrats, and *vice versa*. Whichever regime produces the lowest extraction depends on which of these effects dominates. That can be seen in the conditions described in Proposition 7 depending on the underlying parameters.

Given the above, it is straightforward to deduce the implications for growth. Recall that the process of capital accumulation takes place according to (5). The effect of corruption on this process is captured through the costs of concealing illicit activity, $c_t = \gamma i_t^\phi I_t^\psi$. In the equilibrium, $c_t = \gamma(\eta n)^\psi i_t^{\phi+\psi}$ where $i_t = b_t$ (or e_t), depending on the amount of illegal income extracted by bureaucrats. Since the illegal income varies under different corruption regimes, so does the cost and the path of capital accumulation, which leads to:

Corollary 1. *Capital accumulation is always the highest when corruption is collusive and organised, and always the lowest when corruption is non-collusive and disorganised.*

The result above derives from the fact that bureaucrats tend to extract the least amount of illegal income under collusive and organised corruption regimes, and always extract the most illegal income under non-collusive and disorganised corruption regimes. The cost for the former, $\gamma(\eta n)^\psi (b^O)^{\phi+\psi}$, is always the lowest, while the cost for the latter, $\gamma(\eta n)^\psi (e^D)^{\phi+\psi}$, is always the highest. The ranking of the other two regimes remains ambiguous. Capital accumulation may be higher, lower or identical when corruption is collusive and disorganised, compared with what it would be if it were non-collusive and

¹⁵ Note that the distinction between collusive and non-collusive corruption vanishes when the weighting factor $\omega = 0$. Under such circumstances, bureaucrats choose bribe payments in the same way that they choose embezzlements, i.e., $b^D = e^D$ and $b^O = e^O$. One may still think that a conspiracy between corrupt bureaucrats and tax-evading households exists. In this case, households have no bargaining power, which is an extreme case.

organised. Arguably, the “East Asian Paradox” countries managed to accumulate more capital than their counterparts during the early economic development stage.

The preceding results show how the effects of corruption can depend on the way in which corruption is practised. Amongst different scenarios, the one in which corruption is least damaging to growth is the regime in which fraudulent activities are undertaken in a collusive and organised fashion. Such a regime is known to have existed and to still exist in East Asia. As discussed previously, collusive and organised corruption culture continues, most notably, in China and South Korea; a strong collusive corruption culture can be observed in Indonesia and Thailand. This is to be contrasted with other developing countries, especially those in Sub-Saharan Africa, where corruption involves relatively little collusion and coordination, a combination which, according to the analysis, is the most detrimental to growth prospects.

Corruption is widespread in the less developed counties due to poorly developed institutions. Collusive and organised corruption regimes serve to stabilise the political and economic environment and are thus less harmful to investment and growth at the early stage of economic development. As economic development proceeds, the cost of corruption rises, and hence, the adverse effect induced by corruption on growth dramatically increases. Corruption is likely to be reduced as institutional improvement continues. The recent data from both Transparency International and the World Bank show the improvement of corruption control in the “East Asian Paradox” countries. It is reasonably observed that corruption in Japan is much lower now than in the second half of the last century. The same evidence is also observed in South Korea. In China, the average corruption measured using the CPI from 2012 to 2016 is 3.84, which is better than the one calculated using the CPI from 1995 to 1999, which is 2.87. This evidence seems to suggest that the persistent collusive and organised corruption culture can be improved if economic development and institutional improvement are coupled, though it may take a long journey to achieve.

6. Conclusion

Corruption is difficult to define and measure precisely, but there is no doubt that it exists and has adverse effects on the economy. Nevertheless, empirical evidence shows that not all countries with high levels of corruption have suffered poor economic performance. Against this background, this paper has sought to demonstrate how corruption can have different effects depending on the way in which it is perpetrated. The analysis has been based on a simple dynamic general equilibrium model in which corruption reduces capital accumulation through depletion of total savings, where the exact amount depends on a particular corruption regime that a country exhibits. This paper distinguishes between different types of corrupt practice along two dimensions: the extent to which such activity is organised within a bureaucracy, and the degree to which it involves collusion between bureaucrats and households. This gives rise to four possible combinations of behaviour which define four different corruption regimes. According to the results, the least damaging regime for growth is the one in which corruption is both collusive and organised; while the most damaging regime is the one in which corruption is non-collusive and disorganised. The remaining two regimes (non-collusive and organised corruption, collusive and disorganised corruption) are ranked ambiguously. These results could help to explain why the impacts of corruption on growth appear to vary markedly across developing countries.

These findings are not meant to be taken as a policy prescription for encouraging collusive and organised corruption. Zero corruption implies zero cost in the model. The best policy is to eliminate

corruption in the first place. However, it is possible to view the results as offering a cautionary note against embarking on anti-corruption campaigns merely for the sake of it. If such policies are costly, as they use up resources that could have been employed more productively elsewhere, then their merits may need careful evaluation under specific forms of corruption that may be worth fighting as a priority. The clear message delivered from this paper is to tackle stealing of public funds and discretionary rent-seeking first.

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