Growth and Development Under Alternative Corruption Regimes

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Abstract

Empirical observation suggests that not all countries of the world have suffered as a result of widespread corruption. Whilst many countries have undoubtedly been damaged considerably, others appear to have coped well – in some cases, very well – with the problem. The analysis that follows seeks to provide an explanation for this puzzle. It does so by differentiating alternative types of corruption regime according to the way that corruption is practised. Specifically, we distinguish between organised and disorganised, collusive and non-collusive corruption. This gives four possible scenarios, the implications of which are compared and contrasted to provide a ranking of regimes in terms of their impact on growth. We find that the least (most) damaging regime is one in which corruption is both organised and collusive (disorganised and non-collusive), as broadly characterises the situation in China and its fast-growing neighbours (many African countries).

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1 Introduction

Public sector corruption is pervasive throughout the world. In one form or another, and to a lesser or greater degree, it has existed, and continues to exist in all societies. There are many different ways in which public officials can abuse their powers of authority and there are many different ways in which such behaviour can impact on the economy. The general consensus is that, whatever shape it takes and whatever channel it runs through, the effect of corruption is to impede economic performance. Nevertheless, whilst it is certainly true that many countries have suffered because of high levels of corruption, it is also the case that several others appear to have coped well with the problem. This paper seeks to provide an explanation for this puzzle. It does so by differentiating alternative types of corruption regime according to the way that corruption is practised. The basic result of the analysis is that the quantitative effect of corruption on growth and development is sensitive to which of these regimes is operative in an economy.[1]

There is a large empirical literature to support the view that corruption acts as a serious obstacle to economic development. In the seminal contribution by Mauro (1995) it was found that corruption has a significant adverse effect on growth, with the principal transmission mechanism being the impact of corruption on investment. Many other studies report a similar effect (e.g., Gyimah-Brempong, 2002; Keefer and Knack, 1997; Li et al., 2000; Mo, 2001; Sachs and Warner, 1997), together with identifying other ways in which corruption may take hold, such as increasing the costs of doing business (e.g., World Bank, 2002), reducing inflows of foreign direct investment (e.g., Wei, 2000) and causing misallocations of public expenditures (e.g., Mauro, 1997; Tanzi and Davoodi, 1997). At the same time, there is also evidence to suggest that the direction of causation could go the opposite way, meaning that the incidence of corruption is, itself, determined by the level of development. In one of the first and most rigorous analyses of its kind, Treisman (2000) estimated a strong negative correlation between corruption and per capita income, with most of the variations in the former being explained by variations in the latter. Again, similar results can be found in numerous subsequent investigations (e.g., Fisman and Gatti, 2002; Husted, 1999; Montinola and Jackman, 1999; Paldam, 2002; Rauch and Evans, 2000), indi-

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[1]For surveys of the corruption literature, see Aidt (2003), Bardhan (1997), Jain (2001), Rose-Ackerman (1999) and Tanzi (1998). For an appreciation of the importance of corruption to international policy makers, see the wealth of material devoted to the issue on the websites of the World Bank (www.worldbank.org/publicsector/anticorrupt), the IMF (www.imf.org/external/np/exp/facts/gov.htm), and the United Nations (www.unodc.org/unodc/en/corruption.htm/).

cating that cross-country differences in the incidence of corruption owe much to cross-country differences in the level of prosperity.

At the theoretical level, a number of authors have sought to construct models for the purpose of explaining the above evidence, together with addressing various other issues in the macoreconomics of misgovernance. Two of the earliest contributions are credited to Ehrlich and Lui (1999) and Sarte (2000), the former of whom demonstrate how corruption can lead to a diversion of resources away from growth-promoting activities (investments in human capital) towards power-seeking activities (investments in political capital), whilst the latter of whom shows how corruption may reduce growth by causing resources to be diverted away from the formal (more efficient) sectors of the economy towards the informal (less efficient) sectors. More recently, Blackburn *et al.* (2006) reveal how corruption and development may interact with each other to produce threshold effects and multiple (history-dependent) long-run equilibria, including a poverty trap equilibrium. Similar results are established in Blackburn *et al.* (2010), Blackburn and Forgues-Puccio (2007, 2010) and Blackburn and Sarmah (2008) in connection with various other issues (contagion effects, income distribution, financial liberalisation and demographic transition).

In spite of the above, there are reasons to be cautious about the alleged strong negative association between corruption and development. A closer look at the data reveals that this relationship is not always as it seems and that there are instances in which the relationship is rather tenuous. One such instance relates to what Wedeman (2002) has termed the "East Asian Paradox" - that is, the observation that countries such as China, Indonesia, South Korea and Thailand have all enjoyed considerable growth in spite of their reputations as being mired with corruption. The experience of these countries is both striking and puzzling as it is seems to be so starkly at odds with the experiences of others and the notion that corruption is a serious impediment to growth. Indeed, it would appear that the widespread corruption in these countries has done little (if anything at all) to prevent them from prospering and attaining exceptional growth records.[2]

One possible explanation for the above is the so-called "speed money" hypothesis. According to this, corruption might actually be growth enhancing

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[2]Aside from the East Asian experience, there is other evidence which may be seen as casting doubt on the robustness of the relationship between growth and corruption. For example, Neeman *et al.* (2006) find that the relationship is contingent on the degree of financial openness of economies, whilst Aidt *et al.* (2008) point towards the quality of institutions as an important determining factor. The implication is that the extent to which corruption impacts on growth is context-specific and depends on the particular circumstances of countries.

by helping to circmumvent cumbersome regulations and institutional hurdles in the bureaucratic process (e.g., Huntington, 1968; Leff, 1964; Leys, 1970). This is simply an application of the theory of the second best, whereby in the presence of pre-existing distortions (red tape), additional distortions (bribe payments) may serve to improve efficiency. Whilst plausible at first glance, however, the hypothesis can be challenged on both conceptual and empirical grounds. Conceptually, there are at least two main problems: first, although bribery may speed up individual transactions with bureaucrats, both the sizes of bribes and the number of transactions may increase so as to produce an overall net loss in efficiency; second, and more fundamentally, the distortions that bribes are meant to mitigate are often the result of corrupt practices to begin with and should therefore be treated as endogenous, rather than exogenous, to the bureaucratic process. Empirically, there is very little evidence to support the hypothesis: in Ades and Di Tella (1997), Mauro (1995) and Meon and Sekkat (2005) it is found that the correlation between growth and corruption is consistently negative (and particularly strong) in samples of countries with reputedly high levels of red tape, weak rules of law and widespread government inefficiencies (the type of environment where the argument is most relevant); in Kaufman and Wei (2000) it is found that the use of bribes to speed up the bureaucratic process is largely self-defeating as the amount of time negotiating bribes increases. Based on these observations, the prevailing consensus is that corruption does little, or nothing, to improve efficiency and, if anything, puts sand, rather than grease, into the wheels of bureaucracy.

An alternative explanation for why corruption appears to do less harm in some countries than in others may lie in the particular way that it is practised. There are many different forms that corruption can take and there is no reason to presume that the effects of these will be same. One important consideration is the distinction between organised and disorganised corruption. Another is the further distinction between collusive and non-collusive corruption. These terms are often used interchangeably, but they are not the same. The distinction between organised and disorganised corruption relates to the extent to which public officials coordinate their illicit activities amongt themselves. In the case of the latter, each official acts individual-istically, choosing his own level of illegal profiteering so as to maximise his own illegal income without taking into account the potential effect of this on the illegal earnings capacity of others. In the case of the former, officials act together, choosing their ill-gotten gains jointly so as to maximise their collective illegal income in such a way that internalises any externalities. By contrast, the distinction between collusive and non-collusive corruption re-lates to the extent to which public officials pursue their illegal profiteering

by conspiring with private agents. In the case of the former, there is involvement by both parties, each of whom stands to gain from their illicit joint venture. In the case of the latter, it is public officials, alone, who engage in corrupt behaviour, often at the expense of private agents. These different scenarios may be associated with different types of institutional structure and different methods of income extraction. Thus organised (disorganised) corruption is often allied to the existence of centralised (decentralised) bureaucracies, whilst collusive (non-collusive) corruption is often exemplified by bribery (embezzlement). Whatever the case, there is a clear distinction between each of these terms. For example, organised corruption is not the same as collusive corruption: the former involves some form of institionalised group behaviour for the benefit of the group as a whole, whilst the latter has no particular institutional association, but is rather allied to the bi-lateral arrangements between private and public individuals in corrupt transactions.

The idea that the effects of corruption may depend on the way in which corruption is practised was first revealed in the seminal contribution by Shleifer and Vishny (1993). These authors showed how an organised system of rent-seeking can be less damaging to an economy than a disorganised system through the internalisation of externality effects, as alluded to above. Whilst this is now fairly well-acknowledged, the relative merits of collusive versus non-collusive corruption remain a little less clear. On the one hand, collusive forms of corruption may serve to temper the greed of public officials who must rely on the compliance of private agents to pay bribes. On the other hand, collusive arrangements which benefit all parties involved may be difficult to detect as no-one has an incentive to dissent. At the same time, non-collusive corruption can be an equally difficult offence to deal with, especially when it entails the misappropriation of public funds: whilst everyone in society may be affected, the fact that no private property is stolen or exchanged means that individuals have no legal rights by which to protest and seek compensation. To our knowledge, the only analysis that deals with the issue in any systematic way is that of Foellmi and Oechslin (2007) whose theoretical and empirical investigations suggest that, on balance, it is non-collusive corruption that imposes the most damage.

The significance of the above for understanding the "East Asian Paradox" is that the countries to which this paradox refers are often cited as distinct 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 practice continue to thrive in an environment that Gong (2002) refers to as "collective corruption": that is, an environment in which corruption takes place through well-organised networks of rent-seeking public officials acting in collusion with private indi-

viduals and businesses. Indeed, recent court cases have revealed how corrupt party and government officials ply their illicit trade by conspiring not only amongst themselves, but also with people outside the government, to produce a level of corrupt activity on a massive scale. The most prevalent institution that fosters organised corruption in China is the *danwei*, or work unit, members of which are induced to comply with group norms that encourage acceptance of illegitimate activities, as well as deterring protest against these activities. This group conformance is fostered further through the existence of *xiaojinku*, or secret accounts, which are set up by work units to finance unauthorised expenditures for the benefit of the unit as a whole (e.g., Hung, 2007; Wedeman, 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 individuals both inside and outside the government. As indicated above, this may be a means by which corrupt public officials can increase their immunity from scrutiny and prosecution: the greater the number of other people involved in corruption, the fewer of those remaining to show hostility and disapproval. Wedeman (2004) has argued that one possible reason why China has prospered in the face of high corruption is that rent-seeking officials have had strong incentives to forge mutually beneficial relationships with the emerging business community in order to facilitate profit making from which both parties can benefit without hindering growth.[3]

The main concern of this paper is to examine the implications of alternative forms of corruption regime for the growth and development of an economy. Since the early contribution by Shleifer and Vishny (1993), research in this area has not progressed by very much. Of the research that does exist, Ehrlich and Lui (1999) are credited with providing the first macro-

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[3]Whilst corruption in China remains well-organised and collusive, the situation in some of the other "paradox" countries is more mixed. In Indonesia, for example, non-collusive corruption was widespread during the autocratic Soeharto regime, whereas nowadays there is much more collusion in rent extraction. At the same time, the strongly-organised and strongly-centralised form of corruption that existed under Soeharto (e.g., Kuncoro 2006) has been replaced by a more disorganised, more decentralised type. It has been argued that, during the transition from one regime to the other, Indonesia's growth performance suffered because of the weak and fragmented nature of government which allowed collusive corruption to thrive (e.g., Smith et. al., 2003). More generally, Bardhan (1997) contends that economies in transition provide a fertile ground for corruption as the liberalisation of markets, the emergence of new markets and the privatisation of state-owned enterprises create new opportunities for rent-seeking by public officials endowed with greater discretion. For these reasons, it is often claimed that the succesful development of transition economies requires strong government in order to curb the potential rapid spread of disorganised, but collusive, corrupt activity (e.g., Smith et. al., 2003).

economic analysis of the issue in a model of growth based on occupational choice. As indicated previously, the focus of that analysis is on the way in which opportunities to profit from bureaucratic malpractice create incentives for individuals to invest more of their time in non-productive (rent-seeking) activities and less of their time in productive (growth-promoting) activities. Within this context, it is shown how growth may be higher in the case of a centralised bureaucracy (whereby bureaucrats act as a joint monopolist) than in the case of a decentralised bureaucracy (whereby bureaucrats compete over relative personal power). More recently, Blackburn and Forgues-Puccio (2009) present a model of growth in which firms pay bribes to bureaucrats in exchange for licenses to undertake research and development. When bribe-taking is organised, bureaucrats take account of the fact that raising their bribe demands reduces the bribe base by reducing the number of firms that enter the research sector. This leads to a lower level of bribes, a higher level of research activity and a higher rate of growth than in the case where bureaucrats act independently and ignore the externality effects of their actions.

The analysis that follows differs from the above in a number of respects. We consider an economy where growth occurs through physical capital accumulation and where corruption takes place in the raising and disposing of public funds. Public agents (bureaucrats) are delegated the responsibility for collecting taxes from private individuals (households) on behalf of the political elite (the government). Bureaucrats can abuse their positions of authority, but they incur costs in doing so as resources must be spent if they are to conceal their malfeasance. 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 behaviour. Against this background, we distinguish not only between organised and disorganised corruption, but also between collusive and non-collusive corruption. By organised corruption, we mean a situation in which bureaucrats act together so as to maximise their illicit earnings, taking into account the potential externality effects of their actions; by disorganised corruption, we mean the opposite scenario, where each bureaucrat acts individualistically so as to maximise his own illegal income whilst ignoring the externalities imposed on others. By collusive corruption, we mean a situation in which bureaucrats and households conspire with each other in bribery and tax evasion; by non-collusive corruption, we mean the case in which bureaucrats simply pocket the tax revenues that they collect. This taxonomy gives rise to four types of corruption regime, the implications of which are compared and contrasted. We find that, in terms of growth, the least harmful regime is one in which corruption is both organised and collu-

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sive, whilst the most harmful is one in which corruption is both disorganised and non-collusive. The ranking of the remaining two regimes is more ambiguous and depends on parameters configurations. These results allow us to explain why the effects of corruption may vary markedly across economies and why, in particular, the effects seem to have been so muted in China and elsewhere.

The remainder of the paper is as follows. Section 2 sets out the basic framework. Section 3 provides a characterisation of alternative corruption regimes. Section 4 presents an evaluation of these regimes. Section 5 contains some concluding remarks.

2   A Generic Framework

The basic structure of our model economy is similar to that used in other analyses (e.g., Blackburn *et al.* 2006, 2010; Blackburn and Forgues-Puccio 2007). Time is discrete and indexed by $t = 0, ..., \infty$. There is a constant population of two-period-lived agents belonging to overlapping generations of dynastic families. Agents of each generation are divided into two groups of citizens - private individuals (or households), of whom there are m, and public servants (or bureaucrats), of whom there are $n < m$.[4] Households work for firms in the production of output, and are differentiated in terms of their labour endowments which determine their relative incomes and their relative propensities to be taxed. Specifically, we assume that a fraction, $\mu \in (0, 1)$, of households are endowed with $\lambda > 1$ units of labour and are liable to pay tax, whilst the remaining fraction, $1 - \mu$, are endowed with only one unit of labour and are exempt from paying tax. Bureaucrats work for the government as collectors of taxes and are also differentiated according to their (privately-known) proclivities to engage in corruption. Specifically, we assume that a fraction, $\eta \in (0, 1)$, of bureaucrats are always corrupt, whilst the remaining fraction, $1 - \eta$, are never corrupt.[5] For simplicity, we further

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[4]We assume that agents are differentiated at birth according to their abilities and skills. A population of m agents lack the skills necessary to become bureaucrats, while a population of n agents possess these skills. The latter are induced to become bureaucrats by an allocation of talent condition established below. This set-up allow us to simplify the analysis in a number ways, most notably by abstracting from issues of occupational choice and the possible implications thereof (such as endogenous changes in the size of the bureaucracy and endogenous changes in the incidence of corruption that may result from this).

[5]Such differences may reflect differences in proficiencies at being corrupt or differences in moral attitudes towards being corrupt. The main purpose of this assumption is simply to ensure that the government receives at least some tax revenue with which to make

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assume that bureaucrats are endowed with only one unit of labour (and so do not pay taxes) and that $n = \mu m$ so that each bureaucrat is responsible for collecting taxes from only one high-income household. Corruption takes place either through bribery and tax evasion, or through the embezzlement of tax revenues. We denote by $\pi \in (0, 1)$ the fraction of corrupt bureaucrats who engage in the former, $1 - \pi$ being the remaining fraction who engage in the latter. All agents are risk neutral, working only when young and consuming only when old. Firms, of which there is a unit mass, hire labour from households and rent capital from all agents in perfectly competitive markets. In more detail, the model is as follows.

2.1   Government

We suppose that the government provides public goods and services which contribute to the efficiency of output production. Expenditure on these services, g_t, is assumed to be a fixed proportion, $\theta \in (0, 1)$, of output. The government also incurs expenditures on the salaries of bureaucrats. In terms of growth and capital accumulation, the precise value of these is unimportant since they cancel out in the general equilibrium of the model. As indicated earlier, however, one may think of them as being determined as follows. Any bureaucrat (whether corrupt or non-corrupt) can work for a firm to receive a non-taxable income equal to the wage paid to households. Any bureaucrat who is willing to accept a salary less than this wage must be expecting to receive compensation through illegal earnings and is therefore immediately identified as being corrupt. Suppose that a bureaucrat who is discovered to be corrupt is subject to the maximum fine of having all of his income confiscated (i.e., he is dismissed without pay). Given this, then no corrupt bureaucrat would ever reveal himself in the way described above. As such, the government can minimise its labour costs, while ensuring complete bureaucratic participation, by setting the salaries of all bureaucrats equal to the wage paid by firms to households. Denoting this wage by w_t, the government's total labour cost is thus given by nw_t.

The government finances its expenditures each period by running a continuously balanced budget. It derives revenue from the taxation of high-income houeholds under the administration of bureaucrats. We denote by τ_t the lump-sum tax levied on each of these households so that the maximum potential amount of tax revenue is $\mu m \tau_t$. Because of corruption, however, the government does not receive all of this revenue: there is a population,

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public expenditures. As indicated later, the assumption may also be used to determine bureaucrats' salaries in a relatively straightforward way that does not demand additional assumptions about how public sector pay is determined.

$\pi\eta n$, of bureaucrats who allow high-income households to evade paying their taxes in return for bribes, implying a reduction in public funds of $\pi\eta n\tau_t$; additionally, there is a population, $(1-\pi)\eta n$, of other bureaucrats who each steals an amount e_t of the taxes that he collects, implying a further reduction in public funds of $(1-\pi)\eta n e_t$. The precise determination of bribe payments and stolen revenues is a matter that we address later.

Given the above, it follows that the government's budget constraint is

$$\mu m\tau_t - \pi\eta n\tau_t - (1-\pi)\eta n e_t = g_t + nw_t. \tag{1}$$

Evidently, for any given g_t and w_t, the effect of corruption is to increase τ_t by virtue of the need to compensate for the evasion of tax payments and/or the embezzlement of tax revenues such that (1) is satisfied.

2.2 Firms

The representative firm uses labour, l_t, capital, k_t, and public goods, g_t, to produce output y_t, according to the following technology:

$$y_t = A l_t^\alpha k_t^{1-\alpha} g_t^\alpha. \tag{2}$$

($A > 0$; $\alpha \in (0,1)$). The firm hires labour from households at the competitively determined wage rate w_t and rents capital from all agents at the competitively determined rental rate r_t. Profit maximisation implies $w_t = \alpha A l_t^{\alpha-1} k_t^{1-\alpha} g_t^\alpha$ and $r_t = (1-\alpha) A l_t^\alpha k_t^{-\alpha} g_t^\alpha$. Recall that $g_t = \theta y_t$ and note that equilibrium in the labour market implies $l_t = l = [\mu\lambda + (1-\mu)]m$.[6] Then the profit maximising conditions can be re-written as

$$r_t = r = a(1-\alpha)$$
$$w_t = \frac{a\alpha k_t}{l}. \tag{3}$$

where $a = [A(l\theta)^\alpha]^{\frac{1}{1-\alpha}}$. Thus the equilibrium interest rate is constant and the equilibrium wage is proportional to the capital stock.

2.3 Households

Each young household receives an income of s_t^h which it saves at the market rate of interest, r_{t+1}, to obtain a final level of wealth of $(1 + r_{t+1})s_t^h$ when

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[6]This condition merely states that the total demand for labour by firms, l_t, is equal to the total fixed supply of labour from households, which is the supply labour from high-income households, $\lambda\mu m$, plus the supply of labour from low-income households, $(1-\mu)m$.

it reaches old-age. A household consumes part of this wealth and bequeaths the remainder to its offspring. Its lifetime utility is given as $(1 + r_{t+1})s_t^h - q_{t+1} + u(q_{t+1})$, where $(1 + r_{t+1})s_t^h - q_{t+1}$ is consumption, q_{t+1} is the bequest and $u(\cdot)$ is a concave function.[7] It follows that utility is maximised by setting $u'(\cdot) = 1$, implying an optimal fixed size of bequest from one generation to the next: that is, $q_{t+1} = q$ for all t. Since r_{t+1} is also constant from above, then the utility of a household is fully determined once its income, or saving, is determined.

Each houehold, when young, receives a wage of w_t by supplying inelastically its labour endowment to firms. A household endowed with one unit of labour earns a total wage income of w_t, implying a level of savings of $s_t^h = w_t + q$. A household endowed with λ units of labour earns a total wage income of λw_t and is obliged to pay taxes of τ_t. If the household pays these taxes, its level of savings is $s_t^h = \lambda w_t - \tau_t + q$. Alternatively, the household may pay a bribe, b_t, to a bureaucrat in return for being exempt from taxes, in which case its level of savings is $s_t^h = \lambda w_t - b_t + q$. Evidently, the household has an incentive to engage in tax evasion if $\lambda w_t - \tau_t + q \leq \lambda w_t - b_t + q$, or $b_t \leq \tau_t$: intuitively, tax evasion pays if the bribe demanded by a bureaucrat is no greater than what the household would have to pay in taxes otherwise. In our subsequent analysis of the determination of b_t, we assume that this condition is always satisfied so that high-income households will always engage in tax evasion whenever the opportunity arises.

2.4 Bureaucrats

Each young bureaucrat receives an income of s_t^b which he saves at the interest rate r_{t+1} to acquire a final wealth of $(1 + r_{t+1})s_t^b$ during retirement. For simplicity, we assume that a bureaucrat consumes all of this wealth (i.e., he is non-altruistic), deriving lifetime utility of $(1 + r_{t+1})s_t^b$. As above, since r_{t+1} is fixed in equilibrium, a bureaucrat's utility is fully determined once his income, or saving, is determined.

Each bureaucrat, when young, is paid the salary w_t from supplying inelastically his unit labour endowment to the government. For a non-corrupt bureaucrat, this salary is equal to his savings, $s_t^b = w_t$. For a corrupt bureaucrat, the income earned legally is augmented by any income earned illegally, net of any costs incurred from his illicit behaviour. These costs may be thought of in a number of ways, such as the effort and resources that must be spent on trying to conceal corrupt activity (e.g., by hiding illegal income, by

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[7]This function captures the 'warm-glow', or 'joy-of-giving', motive for making bequests. We choose this simple way of modelling altruism since the main role of bequests in our model is merely to ensure the existence of a well-defined steady state equilibrium.

investing this income differently from legal income and by altering patterns of expenditure), and even the moral shame or social stigma attached to this activity. To the extent that there is some pecuniary element to these costs, a bureaucrats' income will be reduced by some amount which we shall denote by c_t in our analysis and which we shall specify in more detail later. Given this, then the savings of a corrupt bureaucrat can be deduced as follows. For a bureaucrat who conspires with a household in bribery and tax evasion, the amount of savings is $s_t^b = w_t + b_t - c_t$. For a bureaucrat who simply pockets the taxes that he collects, the amount of savings is $s_t^b = w_t + e_t - c_t$.

2.5   Capital Accumulation

The final component in our description of the economy is the process by which growth and development takes place. This process 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 agents.

Capital is provided from the savings of all agents, the total value of which is determined as follows. Consider, first, the savings of households. There is a population of $(1 - \mu)m$ low-income households, each of whom saves an amount $w_t + q$. There is a population of $(1 - \eta)\mu m + (1 - \pi)\eta\mu m$ high-income households who do not evade taxes (because they are assigned either to non-corrupt bureaucrats or to corrupt bureaucrats who simply embezzle public funds) and who each saves an amount $\lambda w_t - \tau_t + q$. And there is a population of $\pi\eta\mu m$ high-income households who evade taxes in return for bribes and who each saves an amount $\lambda w_t - b_t + q$. Next, consider the savings of bureaucrats. There is a population of $(1 - \eta)n$ non-corrupt bureaucrats, each of whom saves an amount w_t. There is a population of $\pi\eta n$ bribe-taking bureaucrats, each of whom saves an amount $w_t + b_t - c_t$. And there is a population of $(1 - \pi)\eta n$ embezzling bureaucrats, each of whom saves an amount $w_t + e_t - c_t$. Collecting these terms together, and recalling that $n = \mu m$, one arrives at the following expression for the total value of savings in the economy as a whole:

$$s_t = lw_t + nw_t - (1 - \pi\eta)\mu m\tau_t + mq - \eta n c_t. \tag{4}$$

The dynamic equation governing capital accumulation is now obtained by imposing the equilibrium condition $k_{t+1} = s_t$. In doing this, we make use of (1) and (3), together with the fact that $g_t = a\theta k_t$. After some straightforward manipulation, the final result is

$$k_{t+1} = lw_t - g_t + mq - \eta nc_t$$
$$= a(\alpha - \theta)k_t + mq - \eta nc_t. \tag{5}$$

where we assume that $a(\alpha - \theta) > 0$.[8] This expression shows how corruption reduces capital accumulation through the costly concealment of illicit activity. This cost, c_t, amounts to a deadweight loss of resources that could have otherwise been used productively.[9] Suppose that $c_t = c$ (a constant), which turns out to be the case in our subsequent analysis of bureaucrats' optimisation problem. Then under the assumptions that $a(\alpha - \theta) \in (0,1)$ and $mq > \eta nc$, (5) describes a capital accumulation path that converges to a unique stationary point at a positive steady state level of capital, $k^* = \frac{mq - \eta nc}{1 - a(\alpha - \theta)}$.

3 Corruption Regimes

Having described the basic set-up of the model, the remainder of our analysis is concerned with studying the effects of alternative types of corruption regime. These regimes differ in the extent to which bureaucrats interact both with each other and with households in their corrupt activities. As regards the former, we distinguish between organised and disorganised corruption. As regards the latter, we differentiate between collusive and non-collusive corruption. The precise ways in which these regimes differ from each other are revealed below. Briefly, organised (disorganised) corruption refers to the case in which bureaucrats act together (independently) in maximising their illegal income, whilst collusive (non-collusive) corruption refers to the situation in which bureaucrats conspire (do not conspire) with households in extracting this income. In total there are four scenarios to consider, representing the various possible combinations of regimes.

In all of the scenarios corrupt bureaucrats face the problem of maximising their illegal income subject to the costs, c_t, of engaging in corrupt behaviour.

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[8] Obviously, this restriction requires that $\alpha > \theta$, a condition that is satisfied empirically by virtue of the fact that α (θ) is the share of labour (government expenditure) in national income.

[9] Of course, this is not the only channel through which corruption may affect growth (there are many others), but it is possibly the most direct and has figured in several other analyes (e.g., Blackburn *et al.* 2006, 2010; Blackburn and Forgues-Puccio 2007). Note that neither bribe payments, b_t, nor stolen tax revenues, e_t, appear in (5) since both cancel out in general equilibrium - the former because it is merely a transfer between agents, and the latter because it affects the level of taxes needed to balance the government's budget. For the latter reason, the salaries of bureaucrats are also irrelevant for aggregate savings and capital accumulation (as mentioned to earlier).

Following others, we assume that these costs are increasing in both a bureaucrat's own illegal income and the illegal income of all other transgressors. The idea behind this is that a greater intensity of corrupt activity makes such activity more visible and less easy to conceal, implying extra costs for everyone in trying to avoid detection.[10] In this way misbehaviour by one public official imposes a negative externality on all others who misbehave. To formalise this, we denote by i_t the illegal income of a corrupt bureaucrat, and specify $c_t = \gamma i_t^\phi I_t^\psi$ ($\gamma, \psi > 0$, $\phi > 1$), where $I_t = \eta n i_t$, the total illegal income of all corrupt bureaucrats. Depending on whether corruption is practised through bribery or embezzlement, either $i_t = b_t$ and $I_t = B_t$, or $i_t = e_t$ and $I_t = E_t$. We are now in a position to describe more fully the circumstances that characterise our different corruption regimes.

3.1   Non-collusive and Non-organised Corruption

The key characteristics of this scenario are as follows: first, each bureaucrat engages in corruption by simply embezzling the tax revenues that he collects; second, each bureaucrat does this by acting independently, choosing a level of embezzlement, e_t, that maximises his own income, taking as given the amount of embezzlement by others, E_t.

The formal characterisation of a bureaucrat's decision problem is as follows. Recall that the income of a bureaucrat who pilfers public funds is $w_t + e_t - c_t$. The optimal (non-organised) choice of e_t, denoted e_t^N, is then defined by

$$e_t^N = \arg\max_{e_t} w_t + e_t - \gamma e_t^\phi E_t^\psi. \tag{6}$$

Given the above, we arrive at

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

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

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[10]For example, it is presumably more difficult for individuals to dispose of large, rather than small, amounts of illegal income without this income being traced by the government. Similarly, one may imagine that the more corrupt people there are, the more difficult it will be for each one of them to launder his ill-gotten gains in ways that the government does not know about. For the purposes at hand, one may wish to fix ideas by thinking simply of each bureaucrat as having access to some costly laundering technology, where the cost increases with the amount of illegal funds that both he and others are trying to conceal.

Proof. The first-order condition for the bureaucrat's maximisation problem is

$$1 - \phi\gamma e_t^{\phi-1} E_t^{\psi} = 0.$$

In equilibrium $E_t = \eta n e_t$. Substituting this into the above condition gives the expression for e^N. ∎

3.2 Non-collusive and Organised Corruption

The key features of this scenario are as follows: first, like before, each bureaucrat engages in corruption by embezzling tax revenues; second, unlike before, bureaucrats do this by coordinating their behaviour, choosing a level of embezzlement, e_t, that maximises each of their incomes, taking into account the effect of this on E_t.

Formally, the optimal (organised) choice of e_t, denoted e_t^O, is defined by

$$e_t^O = \arg\max_{e_t} w_t + e_t - \gamma e_t^{\phi}(\eta n e_t)^{\psi}. \tag{8}$$

We now have

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

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

Proof. The first-order condition for the bureaucrat's maximisation problem is

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

Rearranging this condition gives the expression for e^O. ∎

3.3 Collusive and Non-organised Corruption

The next scenario we consider is based on the following behavioural assumptions: first, each bureaucrat engages in corruption by conspiring with a household in bribery and tax evasion; second, each bureaucrat does so by choosing a bribe, b_t, that maximises his joint payoff with the household, whilst ignoring the effect of this on the aggregate bribe payment, B_t.

To formalise the decision problem, recall that a tax-evading household's net payoff is $\lambda w_t - b_t + q$. The optimal (non-organised) choice of b_t, denoted b_t^N, is then defined by

$$b_t^N = \arg\max_{b_t} \omega(\lambda w_t - b_t + q) + (1 - \omega)(w_t + b_t - \gamma b_t^{\phi} B_t^{\psi}) \tag{10}$$

where $\omega \in (0, \frac{1}{2})$ is the weigthing factor in the joint payoff function.[11] Given the above, we have

Proposition 3 *The optimal size of bribe under collusive and non-organised corruption is given by*

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

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

$$-\omega + (1 - \omega)(1 - \phi\gamma b_t^{\phi - 1} B_t^{\psi}) = 0.$$

In equilibrium $B_t = \eta n b_t$. Substituting this into the above condition gives the expression for b^N. ∎

3.4 Collusive and Organised Corruption

Finally, we have the scenario in which corrupt behaviour takes place as follows: first, as in the previous case, each bureaucrat engages in corruption through soliciting bribes from a tax-evading household; second, unlike the previous case, bureaucrats do this by choosing a bribe, b_t, that maximises each of their joint payoffs with a household, taking into account the effect of this on B_t.

The optimal (organised) choice of b_t, denoted b_t^O, is defined formally by

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

This leads to

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

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

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 this gives the expression for b^O. ∎

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[11] As we shall see, the restriction $\omega < \frac{1}{2}$ is necessary to rule out the the perverse situation of negative bribes (i.e., payments from bureaucrats to households).

4 An Evaluation of Corruption Regimes

The foregoing analysis has established the amount of illegal income that bureaucrats optimally extract under different behavioural assumptions that govern their interactions with each other and with households. In the final part of our analysis we compare and contrast the implications of these different corruption regimes.

Our 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), $b^O < \{b^N, e^O, e^N\}$. $\blacksquare$

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), $e^N > \{e^O, b^N, b^O\}$. $\blacksquare$

Proposition 7 *The amount of illegal income extracted by bureaucrats may be greater or less when corruption is collusive but disorganised than when corruption is non-collusive but organised.*

Proof. From (7), (9), (11) and (13), $b^N \gtrless e^O$ according to whether $(1 - 2\omega)\psi \gtrless \omega\phi$. $\blacksquare$

The intuition for these results is as follows. Consider, first, the case of collusive versus non-collusive corruption. *Ceteris paribus*, the size of bribe that bureaucrats demand under the former is lower than the amount of tax revenue that they would embezzle under the latter because bribes, unlike stolen revenues, are chosen jointly with households. In other words, the demand for bribes is tempered by the need to satisfy households' interests, a consideration that does not apply to embezzlement.[12] Consider, next, the case of organised versus disorganised corruption. *Ceteris paribus*, bureaucrats choose a lower level of illegal income under the former than the latter because coordinated decision making, unlike non-coordinated behaviour, entails

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[12]It may be noted that the distinction between collusive and non-collusive corruption vanishes when $\omega = 0$. Under such circumstances, bureaucrats choose the size of bribe payment in the same way that they choose the amount of embezzlement (i.e., to maximise their own payoff) so that $b^N = e^N$ and $b^O = e^O$. One could debate whether bribery constitutes collusion in this case: on the one hand, there is still a conspiracy between corrupt bureaucrats and tax-evading households; on the other hand, households have no say in the amount of kickbacks they must give.

the internalisation of negative externalities. In other words, the demand for illegal income is tempered by the recognition that each bureaucrat imposes a cost on others, a factor that is ignored when bureaucrats act independently. Taken together, these observations imply that the amount of illegal income extracted by bureaucrats is always lowest in a collusive and organised corruption regime, and always highest in a non-collusive and disorganised corruption regime. For the same reasons, the outcomes in the two remaining regimes are more ambiguously ranked. These regimes involve a mixture of interactions and non-interactions among public and private individuals. When corruption is collusive (non-collusive) but disorganised (organised), the extraction of illegal income is moderated (fostered) by the interaction (non-interaction) between bureaucrats and households, but fostered (moderated) by the non-interaction (interaction) among bureaucrats. Whichever regime produces the lowest extraction depends on which of these effects dominate.[13]

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 c_t, the costs of concealing illicit activity. In equilibrium, this cost is given by $c_t = \gamma(\eta n)^\psi i_t^{\phi+\psi}$ $(i_t = b_t, e_t)$ which depends on the amount of illegal income that bureaucrats extract. Since this income is different under different corruption regimes, then so too is the cost and so too is the path of capital accumulation. In particular, we have

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

This result follows immediately from the fact that bureaucrats always extract the least amount of illegal income in a collusive and organised corruption regime, and always extract the most illegal income in a non-collusive and disorganised corruption regime. As such, the resource cost in the former, $\gamma(\eta n)^\psi (b^O)^{\phi+\psi}$, is always the lowest, whilst the resource cost in the latter, $\gamma(\eta n)^\psi (e^N)^{\phi+\psi}$ is always the highest. For reasons given above, the ranking of the two remaining regimes is ambiguous: depending on parameter values, capital accumulation may be higher or lower when corruption is collusive but disorganised than when it is non-collusive but organised.

The foregoing results show how the effects of corruption can depend on

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[13]This is seen in the condition that $b^N \gtrless e^O$ according to whether $(1-2\omega)\psi \gtrless \omega\phi$. For example, a higher value of ω and/or a lower value of ψ makes $b^N < e^O$ more likely by strengthing the effect of collusion between bureaucrats and households and/or weakening the effect of coordination among bureaucrats.

the way in which corruption is practised. Of the different scenarios that we have studied, the one in which corrupt activity does least damage to growth is the regime in which this activity is undertaken in a collusive and organised fashion. Such a regime is well-known to have existed, and to continue to exist, in certain countries (most notably, China and some of its neighbours) that have experienced, and continue to experience, high growth performance. This is to be contrasted with other countries (especially those in sub-Saharan Africa) where corruption involves relatively little collusion and organisation, a combination which, according to our analysis, is the most detrimental to growth prospects.

5 Conclusion

Corruption is difficult to define and measure precisely, but there is no doubt that it exists and no question that it can have adverse effects on economic growth and development. Nevertheless, empirical evidence shows that not all countries with high levels of corruption have suffered poor economic performance. Bad quality governance has clearly been much less damaging (if at all) in some economies than in others. Against this background, the present paper has sought to demonstrate how corruption can have different effects depending on the way that it is perpetrated.

Our analysis has been based on a simple dynamic general equilibrium model in which corruption reduces capital accumulation through a depletion of aggregate savings. The amount by which it does so depends on the particular form that it takes. We distinguished between different types of corrupt practice along two dimensions - the extent to which such activity is organised within a bureaucracy and the extent to which it involves collusion between public and private agents. This gives rise to four possible combinations of behaviour which define four different corruption regimes. According to our results, the least damaging regime for growth is one in which corruption is both organised and collusive, whilst the most damaging regime is one in which corruption is both disorganised and non-collusive. The other two regimes are ranked ambiguously. These findings may help to explain why the effects of corrupt activity appear to vary so markedly across countries.

Our results are not meant to be taken as a policy prescription for encouraging organised and collusive corruption. Whether organised or not, collusive or not, corruption is always bad for growth in our model and the first-best policy is to eliminate it altogether. Having said this, it is possible to view our results as offering a cautionary note against embarking on anti-corruption strategies merely for the sake of it. If such strategies are costly (e.g., because

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they use up resources that could have been employed more productively elsewhere), then the merits of them may need careful evaluation under certain forms of corruption that may be worth enduring rather than fighting.

Another issue that arises from our analysis is the question as to why different corruption regimes exist in the first place: what is it that causes one regime to manifest in one country and another regime to emerge in another country? This is an interesting question which has largely been neglected and which is likely to find an answer in the broader cultural, social, political and institutional make-up of nations, rather than in purely economic considerations. Investigating such matters is a potentially rewarding avenue for further research.

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