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WANG, Yuan <<http://orcid.org/0000-0003-0696-7290>>

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# Uncertainty, Entrepreneurship and the Organisation of Corruption\*

Yuan Wang

*Sheffield Business School, Sheffield Hallam University, UK*

## Abstract

This paper studies an occupational choice in which risk-neutral private agents have the option of either working in costless but low-yielding activity or undertaking a costly but potentially more rewarding venture, namely, entrepreneurship. Loans must be acquired from financial intermediaries and licences must be obtained from public officials for entrepreneurship. This paper has integrated two new ingredients into the traditional occupational choice framework: financial market imperfection due to asymmetric information between entrepreneurs and financial intermediaries; public-sector imperfection due to rent-seeking induced uncertainty on bribe demand. The paper shows how corruption has different effects depending on how it is practised. Under disorganised corruption, bribe payments are uncertain, and capital market imperfections surface; under organised corruption, these features are removed. This implies that organised corruption is likely to be the lesser of the two evils in terms of deterring entrepreneurial activity, even if bribe demands are higher in this case.

**JEL Classification:** D73, D80, G10, O16.

**Keywords:** Corruption regimes, bureaucratic corruption induced uncertainty, productive entrepreneurial activity, financial market imperfection.

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\*Email: [yuan.wang@shu.ac.uk](mailto:yuan.wang@shu.ac.uk). Address: Sheffield Business School, Howard Street, Sheffield S1 1WB. Tel: +44 (0)114 225 2575. I would like to thank Professor Keith Blackburn for his insightful comments on the earlier version of this paper. Moreover, I am grateful to the editor and two anonymous referees for numerous valuable suggestions. All remaining errors are mine.

## **Research Highlights**

- A model of occupational choice: risk-neutral private individuals have an option of either working in subsistence production or undertaking entrepreneurship.
- For entrepreneurship, loans must be acquired from financial intermediaries and licences must be obtained from public officials.
- Two potential sources of imperfection: the financial market due to asymmetric information, and governance due to rent-seeking.
- Organised bureaucratic corruption allows more individuals to become entrepreneurs than does disorganised bureaucratic corruption, even if bribe demand is higher in this case.
- Reducing financial market imperfections may help to curb bureaucratic corruption.

## 1. Introduction

Corruption defined as the abuse of power by public officials for personal gain (e.g., Aidt, 2003; Jain, 2001; Treisman, 2000) is widely acknowledged as one of the most threatening, resilient and pervasive obstacles to economic growth and social development.<sup>1</sup> The most deprived countries of the world are often the most corrupt for long periods. This is seen as being more than just a coincidence, and it evokes alarm that such countries have become trapped in a vicious circle of widespread poverty and wholesale misgovernance. A considerable amount of evidence exists to support the above concerns, with numerous empirical studies identifying significant adverse effects of corruption on growth (e.g., Ades and Di Tella, 1997; Johnson *et al.*, 2011; Mauro, 1995; Mo, 2001; Swaleheen, 2011), and numerous others indicating the reverse causality from growth to corruption (e.g., Holcombe and Boudreaux, 2015; Treisman, 2000). There is also a fair amount of theoretical work which seeks to explain this evidence, together with addressing various other issues relating to the macroeconomics of misgovernance (e.g., Acemoglu and Verdier, 1998 and 2000; Blackburn *et al.*, 2006; Blackburn and Forgues-Puccio, 2009; Dzhumashev, 2014 and 2016; Ehrlich and Lui, 1999). Given all the above, it is not surprising that bureaucratic corruption has become a principal or foremost topic of debate on the international development agenda.

Despite the above, there are reasons to be cautious about the strong condemnation of corruption as being a significant impediment to growth. The damaging effects of corruption on economic performance differ significantly across countries. Many countries, including, for example, South Asian countries and many African countries, have undoubtedly suffered considerably, while others appear to have coped well with the problem. The most striking examples form the basis of what Wedeman (2002) has termed the “East Asian paradox”. This paradox relates to countries such as China, Indonesia, South Korea and Thailand, all of which have displayed exceptional growth records despite their notoriety as having thriving corruption cultures. Such observations suggest that the relationship between corruption and growth can be reasonably tenuous in some cases, and it would appear that there is slightly more to this relationship than at first meets the eye.

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<sup>1</sup> I use this definition as the paper focuses on public sector corruption. In particular, I intend to model the malfeasance of bureaucrats, which is the petty corruption (or bureaucratic corruption) but not grand corruption (or political corruption). If no bureaucrat distributes rents in the first place, there will be no corruption. However, it is important to clarify that corruption is also rampant in the private sector as discussed by many others (e.g., Bardhan, 2006; Hodgson and Jiang, 2007; Murphy *et al.*, 1993). Entrepreneurs may initiate illicit activities, such as lobbying or bribing bureaucrats which induces unproductive entrepreneurship hurting firm productivity (e.g., Baumol, 1996; Collins *et al.*, 2016).

Some existing literature suggests that corruption might be growth-enhancing by helping to circumvent cumbersome regulations and institutional hurdles in the bureaucratic process (e.g., Huntington, 1968). Corruption may improve the quality of civil service (e.g., Leys, 1970) and may allocate licences and permits to the most efficient firm which can pay the highest bribe (e.g., Beck and Mahler, 1986; Leff, 1964) – which is merely an application of the second-best theory, whereby in the presence of pre-existing distortions such as red tape, additional distortions such as bribe payments may serve to improve efficiency. This implies that the impact of corruption on growth is context-specific, depending on the particular circumstances. For example, Neeman *et al.* (2008) find that corruption and income are negatively correlated in open economies but show no relationship in closed economies. Ahlin and Pang (2008) argue that financial development matters to the relationship between corruption and growth. There exists a substitution effect between corruption control and financial development. Celimene *et al.* (2016) suggest that if illegal incomes from corruption are invested in equity markets, the usual externalities of corruption can be internalised and hence compensate for the negative impact on economic growth. More studies point towards the quality of institutions as an essential determining factor. Aidt *et al.* (2008) find that corruption has a significant negative effect on growth under high-quality political institutions, whereas the effect is muted under low-quality political institutions. In the same vein, Meon and Weill (2010) observe that corruption is less harmful to growth if institutions are weak. Dreher and Gassebner (2013) provide some empirical evidence to support the argument that corruption facilitates firms' entry into highly regulated economies.

A more promising explanation for the puzzling phenomenon of the corruption–growth nexus is the industrial organisation theory of bureaucratic corruption. The seminal contributions in this area are credited to Andvig and Moene (1990), and Shleifer and Vishny (1993). In order to conduct business, individuals must acquire various types of governmental goods (e.g., licences, permits and certificates). These governmental goods are complements to each other and are provided by different government agencies. Under such circumstances, the extent to which public officials are organised in their extraction of bribes can have an important influence on the consequences of rent-seeking. In the case of disorganised (or non-coordinated) rent-seeking, each bureaucrat acts as an independent monopolist, supplying his own governmental good in exchange for a bribe which he chooses so as to maximise his own illegal income without taking into account the negative externality imposed on the demand for other governmental goods and the bribe-taking capacity of other bureaucrats. By contrast,

in the case of organised (or coordinated) rent-seeking, bureaucrats act together as a joint monopoly, choosing bribe payments that maximise their total illegal income while internalising any externalities. The implication is that the level of bribes will be lower, the provision of governmental goods will be greater, and the scale of distortions will be smaller when corruption is organised than when it is disorganised.<sup>2</sup> This paper is in alignment with Shleifer and Vishny (1993). Disorganised corruption is defined as bureaucrats acting individualistically in demanding illegal payments from private agents in exchange for governmental goods, whereas organised corruption is defined as bureaucrats acting collectively in the same misbehaviour. The distinction between organised and disorganised corruption relates to the extent to which public officials coordinate their illegal activities amongst themselves which is closely associated with centralised or decentralised public-sector organisation. In the case of disorganised corruption, each public official acts individualistically, choosing his own illegal profiteering to maximise his own unlawful income without taking into account the potential effect of this on the unlawful earning capacities of others. In the case of organised corruption, public officials act together as a joint monopolist, choosing their illegal gains jointly to maximise their collective illegal income in a way that internalises any externalities.

Another aspect of the industrial organisation theory merits equal credit and is increasingly attracting attention. It is often claimed that an inevitable consequence of corruption is the creation of uncertainty. Perpetrators of corrupt practices have good cause to conceal their intentions and shroud their behaviour in secrecy. The same bureaucrats may themselves be unsure of the likelihood of being monitored and apprehended. Illicit deals and agreements are inherently risky because they lack the enforceability of legally binding contracts. Free entry into the rent-seeking sector can make bribe demands erratic and unpredictable. Hence, corruption is seen as introducing arbitrariness and randomness into the costs of doing business. Such considerations have been the focus of several empirical studies which suggest that corruption-induced uncertainty has significant positive effects on

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<sup>2</sup> It is possible to obtain the opposite result if governmental goods are substitutes for each other, or if the same governmental good is provided by more than one bureaucrat (e.g., Drugov, 2010). In this case competition between bureaucrats without collusion could drive down the level of bribes relative to the monopoly outcome in the presence of collusion. However, as noted by others (e.g., Bliss and Di Tella, 1997; Bose, 2004), the conditions for ensuring a competitive equilibrium, such as zero search costs for individuals in their acquisition of information about bribe payments, and zero capacity constraints on bureaucrats in their supply of governmental goods, are fairly stringent and not obviously satisfied in practice. Drugov (2010) also shows that competition may not be good for detecting corrupt bureaucrats, whereas monopoly achieves a better *ex post* licence allocation, particularly for goods with high costs.

bargaining frictions in the bribe negotiating process (e.g., Fisman and Gatti, 2006), and significant adverse effects on rates of investment, including foreign direct investment (e.g., Campos *et al.*, 1999) and total bribe payments (e.g., Olken and Barron, 2009). Diaby and Sylwester (2014) find some empirical evidence that bribe payment is likely to be lower when corruption-induced uncertainty is lower. An implication of these findings is that institutional structures under which corruption is more predictable are likely to be less harmful to efficiency and growth. One may imagine that more organised bureaucracies eliminate or alleviate the need for individuals to engage in a myriad of separate bilateral negotiations with different public officials. Thus, an individual's total bribe payment may be more transparent and predictable when it is decided and received by a single consortium of bureaucrats pursuing a common objective than when it is the sum of independent payments made to a number of bureaucrats acting on their own. In the case of the former, the size of the bribe payment may be well-known in advance, and only one such payment may be needed in order to acquire all licences. In the case of the latter, the amount and frequency of kickbacks may be much less clear and there may be no guarantee that other licences will be obtained from the rest of the bureaucrats. These analyses point to a strong presumption that the more organised corruption is, the less uncertainty it generates and the less damage it inflicts.

The factors I have alluded to above are particularly relevant in the context of the East Asian paradox countries as discussed by many others (e.g., Khan, 1998; Rock, 2009; Vial and Hanoteau, 2010; Wang, 2019; Wedeman, 2012). China, Indonesia, South Korea and Thailand experience high-corruption and high-growth economies in which organised corrupt activities have thrived. At the same time, in South Asia and Africa, countries are commonly observed with high-corruption and low-growth in which disorganised corrupt behaviour has flourished. Why different corruption regimes exist is an interesting question that may well find an answer in the particular cultures, ideologies and institutions of countries. Shleifer and Vishny (1993) state that more ethnically diverse countries are likely to form disorganised corruption, which is consistent with the empirical finding in Mauro (1995). Wang (2019) argues that Confucian ethical philosophy is likely to breed organised corruption networks in East Asia, evidenced by similar corruption-growth puzzles observed in relation to most East Asian countries' economic development path. One prominent example is China. Lu (2000) and Gong (2002) describe it as an environment in which corruption takes place through well-organised networks of rent-seeking public officials. Within the bureaucracy, it is normal practice for subordinate officials to share their illegal income with superiors in return for

obtaining tacit approval to engage in rent-seeking. Working together, bureaucrats establish an agreed and predictable pattern of rent extraction. Another important factor that is more distinctly Chinese is the traditional affiliation of work units. Work units are still powerful and flourishing in the public sector and among state-owned enterprises even after more than forty years economic reform. The role of work units fosters organised illicit behaviours, a process which is enhanced by the existence of numerous off-book accounts kept by government agencies (e.g., Hung, 2008). These “secret accounts” are used to finance unauthorised or illegitimate expenditure for the benefit of the work unit as a whole, which is in the same vein as Lu (2000)’s argument that corruption in China is a well-organised activity based on a strong degree of cohesion and cooperation amongst rent-seeking public officials.

Corruption in Thailand exhibits similar organised features due to the historical influence from China, but with some variations. Khan (1998) documents that Chinese have been ethnically and politically well integrated into Thai society. Thai-born Chinese capitalists share a deep-rooted network with local public officials with Chinese ethnicity. Rock (2009) argues that the bureaucratic structure is well coordinated amongst politicians, senior bureaucrats and army officials in Thailand. In South Korea, corruption is interpreted as “money politics” (see Kang, 2002) during and after the growth miracle, which highlights the relationship between public officials and large private enterprises. Khan (1998) argues that the illegal money transactions between public officials and entrepreneurs 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 in the public sector to ensure the reallocation of privileges and rent collections. The organised structure creates strong incentives for the state to reallocate resources to maximise long term growth. Likewise, Kuncoro (2006) describes how corruption in Indonesia under the Suharto (the former president of Indonesia) regime was carefully organised and controlled by the first family and military leadership and was generally accepted by businesses because of its predictability and also the protection it gave against harassment from lower-level bureaucrats. A similar idea can also be seen in Vial and Hanoteau (2010) who argue that corruption in Indonesia was like a pyramid with Suharto on the top, with many layers of public officials beneath.

In contrast, corruption exhibits disorganised feature in many South Asian and African countries. One typical example is India. Bureaucrats there are given great powers of discretion in daily practice. Bardhan (2006) argues that the bureaucrats in India are given the

discretion to judge “case by case”, while it then ends up as “suitcase by suitcase”. A similar phenomenon is also observed in Pakistan and Bangladesh (e.g., Khan, 1998). Gyimah-Brempong (2002) argues that corruption in Africa is more disorganised and less centralised than in other developing countries. It seems that these countries in general are not unusual in that they fit into the classical story that high corruption is associated with bad economic performance.

This paper aims to provide a theoretical contribution in the same vein as the industrial organisation theory of corruption, considering the effects of uncertainty in the presence of corruption on doing business. A key feature is the “treatment” of uncertainty that may arise as a result of corrupt behaviour. Bribe-taking in entry regulation may be viewed as a tax on business activity. Unlike other forms of taxation, however, the costs to individuals are often unpredictable for various reasons alluded to earlier. Although much has been written about this, there remains very little by way of a formal theoretical investigation that would lend rigour and precision to the arguments involved. This paper studies how the degree of uncertainty might be contingent on the type of corruption regime. This has been done by considering the case in which perpetrators of corrupt practices face a random probability of being caught, which depends on both their own individual actions and the joint actions of them all. This leads to an optimal bribe payment that may or not be random according to the extent to which bureaucrats coordinate their rent-seeking. The closest related works are Blackburn and Forgues-Puccio (2009) and Dzhumashev (2016). Blackburn and Forgues-Puccio (2009) find that when bribe-taking is organised, bureaucrats take account of the fact that raising their bribe demands reduces the total bribe collected 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. Dzhumashev (2016) provides a further contribution by explicitly modelling income uncertainty induced by corruption. However, corruption-induced uncertainty is modelled by merely assuming that rent extraction is a random variable which follows some exogenous stochastic process. He finds that under collusive corruption, if reduced income uncertainty is not accompanied by higher bribe demands, economic growth may be promoted. Both studies rely on the assumption that more organised bureaucracy is likely to demand a lower bribe. If so, it is not surprising that more organised bureaucracy would induce a smaller negative impact on growth than its counterpart. In my paper, by contrast, more organised bureaucracy may or

may not request a tempered bribe payment given the fact that a monopolist is likely to charge a higher price. The novelty is that even though the organised corruption asks for a higher bribe, the number of individuals able to become entrepreneurs is higher compared to the disorganised corruption scenario, and that is the first contribution of this paper.

My model shows that the higher the incidence of corruption is, when it is disorganised, the more pronounced are the effects of financial market imperfections, and that the greater the extent of these imperfections is, the more pronounced are the effects of corruption. This brings the second contribution of this paper. A further distinguishing feature is the role played by financial markets in providing a channel through which corruption may take effect. A country's financial development plays an important role in promoting economic growth (e.g., Guiso *et al.*, 2004; Levine, 1997). Corruption increases the cost of doing business (e.g., Aghion *et al.*, 2008; Djankov *et al.*, 2002) and further increases the risk of businesses defaulting, since corruption tends to shift resources to bad project investment, which fosters bad loans (e.g., Beck *et al.*, 2006). The extra costs of doing business that corruption imposes can be particularly important when individuals are resource constrained and require external finance for their operations. Under such circumstances, the need to pay bribes may mean a higher amount of borrowing, while uncertainty about bribes may mean a higher risk of default. In either case, the functioning of financial markets is likely to be important in determining the effects of corruption. For example, when these markets work imperfectly because of informational asymmetries between borrower and lender in the financial sector and weak powers of contract enforcement, an increase in uncertainty for lenders about the repayment of loans may lead to an increase in the cost of borrowing and an increase in the amount of credit rationing. Berger and DeYoung (1997) argue that financial intermediaries compromise lending contracts as they cannot properly assess the quality of borrowers and their collaterals. The empirical results in Ahlin and Pang (2008) show that corruption control and financial development both improve economic performance and act as substitutes for each other. Given all of this, this paper seeks to incorporate some of these ideas into the analysis by considering the case in which corruption-induced uncertainty gives rise to an *ex post* informational asymmetry between lenders and borrowers, the former of whom are unable to directly observe the bribe payments of the latter. The moral hazard problem associated with this is solved through costly state verification under the terms and conditions of mutually agreeable loan contracts. To the best of my knowledge, no existing theoretical

work explicitly models the interaction between bureaucratic corruption and financial market fractions to affect entrepreneurial activities.

The third contribution of this paper then follows naturally. Corruption deters entrepreneurship.<sup>3</sup> Anokhin and Schulze (2009) find that better control of corruption is likely to increase innovation and hence enhance entrepreneurship. Dutta and Sobel (2016) argue that corruption prevents entrepreneurial activities through its direct effect of creating hurdles, in the rules and regulations of starting a business, for example, and its indirect effect of lowering the efficiency of public goods provision. However, the existing theoretical literature has done little to explain how corruption affects the survival rate of enterprises through its impact on risks of loan default. In particular, to my knowledge, no studies to date have explored this relationship from the perspective of an industrial organisation of corruption, namely, different types of bureaucratic corruption affecting the birth and survival rates of new businesses. This paper aims to fill the gap by modelling the interaction of the incidence of corruption, corruption-induced uncertainty and loan default rates. It further derives the populations of entrepreneurs under the alternative types of corruption regime. The paper implicitly assumes that entrepreneurial activities are growth-promoting in alignment with existing empirical evidence (e.g., Anokhin and Schulze, 2009; Glaeser *et al.*, 2010 and 2015; Lee, 2017).<sup>4</sup> The analysis shows that greater bribe demands have a negative influence on entrepreneurship. However, lower uncertainty of bribe demand is likely to offset some negative impact on entrepreneurial activities. A larger population of entrepreneurs leads to higher labour productivity and faster economic growth in developing countries, which further implies smaller detrimental effects caused by corruption.

The remainder of the paper is organised as follows. Section 2 presents a general environment for the model. Section 3 exhibits the outcomes that transpire under disorganised corruption. Section 4 does the same for the case of organised corruption. Section 5 compares the implications of the two corruption regimes, and a few concluding remarks are provided in Section 6.

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<sup>3</sup> This paper discusses productive entrepreneurship in the classification of Baumol (1996). Unproductive entrepreneurship implies the fact that entrepreneurs are corrupt. To generate profit, the corrupt entrepreneurs are actively searching for opportunities for rent-seeking instead of conducting productive activities. Collins *et al.* (2016) find that corruption is negatively associated with productive entrepreneurship, whereas it is likely to be positively correlated with unproductive entrepreneurship. However, unproductive entrepreneurship is beyond the scope of this paper.

<sup>4</sup> Naude (2011) argues that entrepreneurship is not a binding constraint on economic development in poor countries, but it is necessary for economic growth.

## 2. The Basic Setup

### *General Environment*

The model used is similar to the ones in Banerjee and Newman (1993) and Murphy *et al.* (1991). The analysis is based on an occupational choice in which private individuals decide on whether or not to engage in entrepreneurial activity for which various licences must be obtained from public officials. These licences are complementary, in line with Shleifer and Vishny (1993), in the sense that all of them must be procured; otherwise entrepreneurship is not an available option. All officials are assumed to be corrupt, and each one of them exploits his monopoly over the issue of a licence by demanding a bribe in exchange for it.<sup>5</sup>

In the economy, there is a constant population of agents who are divided into two groups: private individuals and public officials (or bureaucrats).<sup>6</sup> To save notation, the size of each group is normalised to 1. Each agent, both private and public, has the same risk-neutral preference and zero initial endowment of wealth. Private individuals engage in productive activities based on a choice of occupation, which gives access to the alternative technology for generating output.<sup>7</sup> For certain types of project to be undertaken and completed, loans must be acquired from financial intermediaries and licences must be acquired from bureaucrats. There are two sources of imperfection in the economy. The first is an imperfection in capital markets due to problems of enforcement and moral hazard that influence the terms and conditions of financial contracts. The second is an imperfection in the public sector due to the opportunity for bureaucrats to extract bribes from private individuals.

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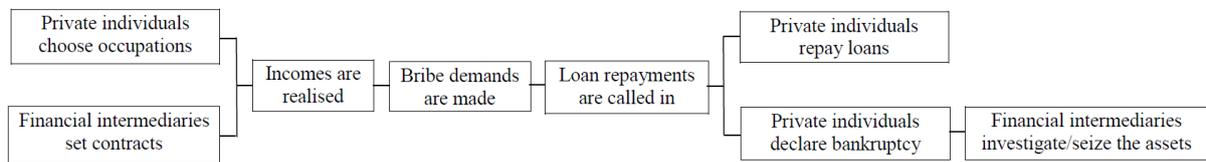
<sup>5</sup> The assumption mainly serves the purpose of simplifying notation. In addition, the aim of this paper is to reveal how different corrupt practices may affect entrepreneurial activities differently and hence affect economic growth at the aggregate level under a bad business environment. The primary idea is to provide some recommendations against specific forms of misgovernance, first considering that corruption cannot be eliminated completely, at least in the short-run. The highest entrepreneurship and fastest growth are undoubtedly achieved without the present of corruption. It is possible to assume that a proportion of bureaucrats are incorruptible and the main results stay the same.

<sup>6</sup> This paper does not consider the allocation of the alternative citizenships initially. This abstraction serves to simplify and focus the analysis. It may be thought of as reflecting an allocation process that is either purely random or based on differences in individual attributes.

<sup>7</sup> Note that if private agents are risk averse (or risk loving), this may affect their decisions in choosing occupations. Cultural norms like individualism and fear of failure may also affect entrepreneurial activities. Thanks to one of the referees for pointing this out. The study of Pinillos and Reyes (2011) finds that individualism may affect entrepreneurship differently conditional on economic development. That countries have a higher degree of individualism may not necessarily imply higher entrepreneurial activities. Linan *et al.* (2016) further conclude that national culture and personal values jointly affect entrepreneurial activities. In particular, positive individualist values such as achievement, pleasure, self-direction, or an exciting and stimulating lifestyle, are likely to trigger entrepreneurial engagement. Morgan and Sisak (2016) argue that fear of failure negatively affects an individual's decision about engaging in entrepreneurship and may produce various effects on the subsequent investment plan conditional on the individual's aspiration level. In this paper, on the other hand, private agents are assumed to be risk neutral, and the choices between subsistence production and entrepreneurship purely depend on the individual's technical capabilities, a factor which is exogenous.

Before any income is realised and any bribes are demanded, each individual chooses an occupation to maximise the expected utility, given the loan contract offered by intermediaries. At the same time, intermediaries set the terms and conditions of contracts based on their expected returns from lending. Subsequently, incomes are realised, bribe demands are made, and loan repayments are called in. Private individuals either repay their loans or declare bankruptcy. Finally, financial intermediaries investigate the faithfulness of bankruptcy declarations and seize the remaining assets. Figure 1 exhibits the sequence of events.

Figure 1. Sequence of Events



### Occupational Choice

Each individual faces a choice between two types of the production project. The first type involves the use of basic (or traditional) technology in some routine activities that are costless. This is a subsistence occupation that requires zero capital outlay and zero effort and yields  $s > 0$  units of output.<sup>8</sup> The second type entails the operation of a more advanced (or modern) technology in a venture that is more productive but also costly. This is an entrepreneurial occupation that requires  $I > 0$  units of capital outlay and  $e > 0$  units of effort and yields  $A > s$  units of output.

The amount of effort needed to operate the advanced technology is assumed to be inversely correlated to an individual's technical capabilities (e.g., skills, knowledge and expertise), whereas these attributes are unimportant for subsistence production. Private individuals are randomly endowed with these attributes, implying a distribution of  $e$  accounting for individual heterogeneities. For simplicity,  $e$  is assumed to be uniformly distributed on the interval  $[0,1]$  with probability density function  $g(e)=1$ . Thus

$$\int_{e_0}^{e_1} g(e)de = e_1 - e_0 \text{ provides a measure of private individuals for whom } e \in (e_1, e_0).$$

To engage in entrepreneurial activity, an individual must acquire a loan of size  $I$  as

<sup>8</sup> The assumption of neither capital outlay nor effort in subsistence production can be relaxed without altering the results of the analysis. This assumption serves merely as a normalisation to save notation.

external finance for the fixed capital outlay. Loans are made by competitive financial intermediaries that have access to a perfectly elastic supply of funds at the exogenous world interest rate,  $r$ . Let  $R > 0$  be the interest rate of loans. Hence, the debt repayment of an entrepreneur is  $(1 + R)I$ . Additionally, an entrepreneur must obtain licences or permits from bureaucrats to conduct his business. These licences or permits are complementary in the sense that all of them are required, though each one is issued separately by a different bureaucrat. For example, an entrepreneur needs to visit several government departments, such as taxation, public security, labour and environment, to gather all documents.

In the absence of any rent-seeking, licences are issued free of charge. In the presence of rent-seeking, licences are granted only in exchange for the promise of bribe payments once the output of a project has been realised. The total bribe payment that is extorted from an entrepreneur is  $B > 0$ , which leaves  $A - B$  units of output for the entrepreneur to dispose of in other ways (loan repayments and consumption). The modelling of corruption can be likened to the case in which public officials receive kickbacks *ex post* in the form of a share of a company's profits. Such arrangements existing in practice implies that, for one reason or another, firms find it worthwhile to adhere to their *ex ante* bribe promises.<sup>9</sup> One reason might be the threat of being closed down or having licences refused in future if bureaucrats' demands are not met. Another reason might be the fact that the output from a project is realised in stages, with bribe payments at one stage being a condition for progressing to the next stage. A further possibility is that bribes are promised to avoid costly rules and regulations, in which case bureaucrats could retaliate against those who renege on their promises by threatening to report them for running a business illegally, having failed to comply with official procedures.<sup>10</sup>

Kickbacks are one of the most common forms of corruption, and are sometimes considered as a part of country's culture in business transactions. Khan (1998) argues that capitalists in India and Pakistan pay kickbacks in exchange for scarce resources and government subsidies. The kickbacks extracted from business are important sources of finance for local officials' political survival. The "money politics" in South Korea are largely

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<sup>9</sup> Note that private individuals do not know the exact type of bureaucrats in advance, though they know bureaucrats are corrupt given the assumption of the general environment.

<sup>10</sup> The enforcement of illegal agreements between private and public agents is an issue worth pursuing (e.g., Dzhumashev 2014; Kessler, 2000; Mauro, 2004), but it is not the one this paper explicitly addresses. This paper focuses on the question of how corruption might influence occupational choice and how the extent to which it might do so depends on how corruption is practised. One possible effect of corruption is to create uncertainty about the returns from entrepreneurship, as in Blackburn and Forgues-Puccio (2009) and Dzhumashev (2016). Consequently, it creates capital market imperfections due to information asymmetry between lenders and borrowers, which has not been explicitly modelled in the industrial organisation of corruption literature.

conducted throughout by large enterprises contributing to public officials' secret funds, something which is known by entrepreneurs as regular "quasi-taxes" and tolerated as it is mutually beneficial for both parties to keep a smooth long-term relationship as discussed in Kang (2002). Elsewhere, it is common to see the so-called contribution frequently made through other means such as bringing bureaucrats to parties, clubs and luxury holidays. The Chinese story is no longer a secret (see Cai *et al.*, 2011). Senior managers spend time and money entertaining local bureaucrats regularly in return for all sorts of favours, such as better government services, protection and lower tax rates. Good performance of local enterprises contributes to local GDP, which is one of the most important promotion criteria for public officials. All these expenses to cover eating, drinking, holidays and so on, are kickbacks, which happen gradually or by stages after realisation of enterprises' incomes. At the same time, entrepreneurs have strong incentives to keep their *ex ante* bribe promises. In the study of Ufere *et al.* (2012), a Nigerian CEO claimed that if he promised to pay a kickback at a later date to a public official but decided to pull back when income was realised, people would get to know quickly, and he would be ostracised forever.

The criteria governing an individual's occupational choice are given as follows. Let  $y$  stand for the net return from entrepreneurship. The expected utility derived from this occupation is  $E(y) - e$ , while the utility derived from subsistence production is  $s$ . The entrepreneurship will be chosen if  $E(y) - e \geq s$ . Let  $\tilde{e}$  denote the value  $e$  for which the condition holds with equality:

$$\tilde{e} = E(y) - s \quad (1)$$

This condition determines the total population of entrepreneurs. The entrepreneurship is chosen by private individuals for whom  $e \in [0, \tilde{e}]$ . The total population of entrepreneurs is

$$\int_0^{\tilde{e}} g(e) de = \tilde{e}.$$

#### *Rent-seeking activity*

The behaviour of public officials is characterised as follows. Each one of them demands a bribe,  $b$ , from an entrepreneur. This implies a potential total bribe income of  $b_T = \int_0^{\tilde{e}} b g(e) de = \tilde{e}b$ . There is a cost ( $c > 0$ ) to such behaviour as is discussed by many others (e.g., Andvig and Moene, 1990; Cerqueti and Coppier, 2011; Litina and Palivos, 2016). This

may be thought of as arising in a number of ways. For example, the people who engage in corruption may need to devote effort, time and resources to concealing their illegal transactions, which induces loss or disutility from having to alter their pattern of consumption. They may experience some moral shame and social stigma from abusing their privileges. It is plausible to imagine that the larger the scale of the particular offence is, the higher the costs are.<sup>11</sup> This implies that the costs increase with each bribe extracted from each entrepreneur. A convenient formulation is  $c = b[1 - \exp(-\frac{1}{\phi}b)]$ , where  $\phi > 0$ . A bureaucrat's net payoff (or utility) is:

$$b_N = \int_0^{\tilde{e}} b \exp(-\frac{1}{\phi}b) g(e) de = \tilde{e} b \exp(-\frac{1}{\phi}b)$$

Assuming that each bureaucrat faces a random probability,  $p \in (0,1)$ , of successfully avoiding prosecution for his rent-seeking behaviour, there is a probability of  $1-p$  that the bureaucrat is caught, and his bribe income is confiscated. The randomness of  $p$  may be thought of as reflecting a random intensity, effectiveness and coverage of government monitoring. Further, let the model assume that this probability is a decreasing function of a bureaucrat's own total bribe income,  $b_T$ , relative to the average bribe income of all bureaucrats,  $\bar{B}$ . This feature aims to capture the idea that a bureaucrat is more likely to expose himself as being corrupt if he is more corrupt than his peers. Hence:

$$p = \pi \exp[-x(\frac{b_T}{\bar{B}})]$$

where  $\pi \in (0,1)$ .<sup>12</sup>  $x$  is a positively valued random variable following a uniform distribution on the interval  $[\chi - X, \chi + X]$  with probability density function  $f(x) = \frac{1}{2X}$  ( $\chi, X > 0$ ).<sup>13</sup> The

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<sup>11</sup> In some other studies (e.g., Andvig and Moene, 1990; Dzhumashev, 2016; Mauro, 2004), it is assumed that the 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. For example, a massive anti-corruption campaign has been under way in China since 2013 under the current leadership of President Jinping Xi.

<sup>12</sup>  $\pi \in (0,1)$  is for mathematical modelling purposes only, which ensures that the probability of successfully avoiding prosecution ( $p$ ) is a fraction.  $\pi$  does not have an economic meaning.

<sup>13</sup>  $x$  serves the purpose of mathematical modelling only, and does not have an economic meaning.  $x$  is always positive under the parameter restriction  $\chi - X > 0$ . For reasons that will become clear shortly, I also assume that  $\chi + X < 1$ .

value of  $x$  is realised at the time that bribes are demanded, which is unobservable to private individuals and intermediaries when loans are made, and occupations are chosen.  $X$  is a measure of uncertainty. An increase in  $X$  implies an increase in the variance of  $x$ .<sup>14</sup>

Let  $z$  denote a bureaucrat's actual net payoff from taking bribes.  $z = b_N$  with probability  $p$  and  $z = 0$  with probability  $1 - p$ . The bureaucrat's expected net payoff is:

$$E(z) = \pi \tilde{e} b \exp \left\{ - \left[ x \left( \frac{\tilde{e} b}{\bar{B}} \right) + \frac{1}{\phi} b \right] \right\} \quad (2)$$

The optimisation problem for each bureaucrat is to choose a value of  $b$  that maximises (2).

The rest of the analysis is concerned with studying the implications of rent-seeking under alternative behavioural assumptions. This paper considers two alternatives: disorganised (or non-coordinated) corruption and organised (or coordinated) corruption. The key difference between these is the extent to which bureaucrats take account of the externality effects of their own actions. These effects work through the average bribe payment ( $\bar{B}$ ) and the number of entrepreneurs ( $\tilde{e}$ ), variables on which a bureaucrat's expected payoff depends. The effect on  $\bar{B}$  is self-evident as an increase in a bureaucrat's own bribe demand raises the average value of bribes. The effect on  $\tilde{e}$  revealed in the subsequent analysis is due to the fact that an increase in individual bribe payments raises the total bribe payments that an entrepreneur must make, leading to fewer private individuals choosing to become entrepreneurs. The rest of the analysis considers each of the corruption regimes in turn.

### 3. The Economy with Disorganised Corruption

#### *Optimal Bribe Demand*

By disorganised corruption is implied the case in which each bureaucrat acts as an independent monopolist, choosing a level of bribe that maximises his own expected payoff without consideration of the aggregate implications of bribe-taking. More precisely, each bureaucrat selects a  $b$  to maximise  $E(z)$  in (2), taking  $\bar{B}$  and  $\tilde{e}$  as given. The solution of the optimisation problem is stated as follows.

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<sup>14</sup> The variance of  $x$  is  $X^2/3$ , which increases in  $X$ .

**Proposition 1** *The optimal bribe under disorganised corruption is given by:*

$$b^D = \phi(1-x) \quad (3)$$

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

$$-\left[ x\left(\frac{\tilde{e}b}{\bar{B}}\right) + \frac{1}{\phi}b \right] \exp\left\{-\left[ x\left(\frac{\tilde{e}b}{\bar{B}}\right) + \frac{1}{\phi}b \right]\right\} + \exp\left\{-\left[ x\left(\frac{\tilde{e}b}{\bar{B}}\right) + \frac{1}{\phi}b \right]\right\} = 0$$

In equilibrium,  $\bar{B} = b_r = \tilde{e}b$ . Substituting it into the above condition gives the expression for  $b^D$ . ■

The result in (3) indicates that a bureaucrat will choose a larger size of bribe for higher values of  $\phi$ , which implies a higher net payoff from rent-seeking, or for lower values of  $x$ , which implies a higher probability of avoiding detection.<sup>15</sup> Since all bureaucrats end up by choosing the same bribe,  $\bar{B} = \tilde{e}b$  in equilibrium, so that the probability of detection is the same for each one of them,  $p = \pi \exp(-x)$ .

The key feature of (3) is the appearance of the random variable  $x$  which apparently makes the bribe random, and hence the return to entrepreneurship. In this way, corruption creates uncertainty for private individuals about the relative payoffs from the advanced occupation. For future reference, the expected bribe payment is:

$$E(b^D) = \phi \left[ 1 - \int_{\chi-X}^{\chi+X} xf(x)dx \right] = \phi(1-\chi)$$

where the measure of uncertainty is provided by the parameter  $X$ , as previously discussed. An increase in  $X$  implies an increase in the variance of  $x$  corresponding to a mean-preserving spread in the distribution of this variable.

### *Credit Market Imperfection*

An individual's net return from the entrepreneurship is  $A - B - (1+R)I$ , where  $B$  is the total bribe payment made to all bureaucrats. Since  $B = b^D$ , this expression can be rewritten by using (3) as  $A - \phi(1-x) - (1+R)I$ , where  $A - \phi(1-\chi+X) > 0$  as a sufficient

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<sup>15</sup> The parameter restriction  $\chi + X < 1$  ensures that  $b > 0$  for all  $x$ .

condition for ensuring that  $x$  is never so low as to imply a full appropriation of output by bureaucrats.

If  $A - \phi(1-x) \leq (1+R)I$ , an entrepreneur is unable to make the loan repayment and must declare bankruptcy. Such a possibility complicates the design of financial contracts because of an *ex post* informational asymmetry between borrowers and lenders: only the former know how much they must pay in bribes when bribes are demanded; the latter cannot directly observe these payments. This creates a problem of moral hazard as an entrepreneur may seek to default on his loan repayment by falsely claiming that he is bankrupt due to a high realisation of  $b^D$ . The solution to this problem involves costly verification, whereby a lender spends resources on investigating a borrower whenever bankruptcy is declared with the view to observing the borrower's remaining income and seizing as much of this as possible (e.g., Gale and Hellwig, 1985; Townsend, 1979). Due to imperfect enforcement, a lender can seize only a fraction,  $\delta \in (0,1)$ , of this income, being unable to lay his hands on the remainder before the borrower "consumes" it.<sup>16</sup>  $\delta$  here serves two purposes. On the one hand, it is in line with the literature on costly verification. A large  $\delta$  represents a more efficient verification process which indicates better enforcement and hence implies a smaller capital market imperfection. On the other hand,  $\delta$  helps to explain why entrepreneurs would honour their promises of delivering kickbacks after the realisation of incomes from a different point of view. For example, if the penalty for reneging is the closing down of his business, then an entrepreneur is always better off paying a bribe and retaining a fraction of income for himself before banks seize the remaining income even in the event of bankruptcy. This highlights a severe problem of poor-quality financial institutions.

The payoff of the borrower when he declares bankruptcy is, therefore,  $(1-\delta)[A - \phi(1-x)]$ . Given this, bankruptcy will be declared either truthfully or falsely if  $(1-\delta)[A - \phi(1-x)] \geq A - \phi(1-x) - (1+R)I$  or  $\delta[A - \phi(1-x)] \leq (1+R)I$ . When holding with equality, this condition determines a critical value of  $x$  denoted by  $\tilde{x}$ , such that loans are repaid if  $x \in (\tilde{x}, \chi + X]$ , and are not repaid if  $x \in [\chi - X, \tilde{x}]$ . That is:

$$\delta[A - \phi(1 - \tilde{x})] = (1 + R)I \quad (4)$$

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<sup>16</sup> Note that the assumption of  $\delta \in (0,1)$  is not compulsory for the analysis. It is possible to set  $\delta=1$  without altering the results which will become clear soon.

Correspondingly, there exists a critical size of bribe payment,  $\tilde{b}^D = \phi(1 - \tilde{x})$ , such that loans are paid back in the event of  $b^D < \tilde{b}^D$ , whereas defaulting occurs if  $b^D \geq \tilde{b}^D$ .  $\tilde{x}$  is increasing in  $R$ , and hence  $\tilde{b}^D$  is decreasing in  $R$ , *ceteris paribus*. This implies that the higher the interest rate on loans, the smaller must be the amount of bribe payment if an entrepreneur is to be able to repay his loan and not claim bankruptcy. The probability of making a claim is  $\int_{\chi-X}^{\tilde{x}} f(x) dx = \frac{\tilde{x} - \chi + X}{2X}$ . Hence, an individual's net income from entrepreneurship is:

$$y = \begin{cases} A - \phi(1-x) - (1+R)I & \text{if } x \in (\tilde{x}, \chi + X] \\ (1-\delta)[A - \phi(1-x)] & \text{if } x \in [\chi - X, \tilde{x}] \end{cases} \quad (5)$$

Accordingly, the expected income from entrepreneurial occupation is:

$$E(y) = \int_{\tilde{x}}^{\chi+X} [A - \phi(1-x) - (1+R)I] f(x) dx + \int_{\chi-X}^{\tilde{x}} (1-\delta)[A - \phi(1-x)] f(x) dx \quad (6)$$

Financial intermediaries make loans to private individuals in the knowledge that bankruptcy may be declared. If so, private individuals' proclamations are verified, and intermediaries appropriate whatever income they can, less the costs of verification. The verification cost,  $k$  ( $k > 0$ ), can be interpreted as a measure of the extent of capital market imperfections.<sup>17</sup> It follows that if bankruptcy is declared, an intermediary's net return from lending is  $\delta[A - \phi(1-x)] - k$ . Conversely, if bankruptcy is not declared, the intermediary is paid back in full, earning a return of  $(1+R)I$ . Competition between intermediaries drives their expected profits to zero. Since the cost of borrowing is  $(1+r)I$ , the break-even condition is:

$$(1+r)I = \int_{\tilde{x}}^{\chi+X} (1+R)I f(x) dx + \int_{\chi-X}^{\tilde{x}} \{\delta[A - \phi(1-x)] - k\} f(x) dx \quad (7)$$

For any given  $\tilde{x}$ , (7) determines the contractual interest rate on loans,  $R$ . (7) can be rewritten differently by combining it with (4) to obtain:

$$(1+R)I - (1+r)I = \int_{\chi-X}^{\tilde{x}} \delta[A - \phi(1-\tilde{x})] f(x) dx - \int_{\chi-X}^{\tilde{x}} \{\delta[A - \phi(1-x)] - k\} f(x) dx \quad (8)$$

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<sup>17</sup> The other measure is given by  $\delta$ , the enforcement parameter. However, this source of capital market imperfection is unimportant for the analysis as it vanishes in the general equilibrium. For this reason, this paper focuses on  $k$ , which does matter for the results.

The expression in (8) exhibits the interest rate spread between lending and borrowing.<sup>18</sup> The size of spread depends on how much a lender expects to lose when a borrower claims bankruptcy and defaults on his loan. The first integral term on the right-hand-side of (8) equals  $\int_{\chi-X}^{\tilde{x}} (1+R)If(x)dx$ , which measures the expected amount of non-repayment when bankruptcy is declared. Conversely, the second integral term on the right-hand-side of (8) gives the expected amount of income that is seized from a defaulter net of verification costs. Accordingly, (8) implies that the contractual interest rate  $R$  is set as a simple markup over intermediaries' cost of borrowing, where the size of markup is equal to the expected net income lost due to non-repayment of loans. The markup rule can be simplified to:

$$(1+R)I = (1+r)I + \frac{\delta\phi(\tilde{x}-\chi+X)^2}{4X} + \left(\frac{\tilde{x}-\chi+X}{2X}\right)k \quad (9)$$

There is a positive relationship between  $R$  and  $\tilde{x}$  as indicated in (9). Financial intermediaries set a higher contractual interest rate if bankruptcy is more likely to be declared, *ceteris paribus*. The term  $\left(\frac{\tilde{x}-\chi+X}{2X}\right)k$  is the expected verification cost of intermediaries. It increases with the probability of default,  $\left(\frac{\tilde{x}-\chi+X}{2X}\right)$ , and the actual cost,  $k$ , that would be incurred if such an event were to occur.

The expressions in (4) and (9) define a simultaneous equations system in  $\tilde{x}$  and  $R$ . An analysis of this system leads to the following result.

**Lemma 1** *Given that  $(1+r)I+k \leq \delta[A-\phi(1-\chi)] \leq (1+r)I+\delta\phi X$ , there exists a unique  $\tilde{x} \in [\chi-X, \chi+X]$  and unique  $R > r$  that solve (4) and (9). The expression for  $\tilde{x}$  is:*

$$\tilde{x} = \chi + X - \frac{k}{\delta\phi} - \frac{\sqrt{4X\delta\phi\{\delta[A-\phi(1-\chi)]-(1+r)I-k\}+k^2}}{\delta\phi} \quad (10)$$

**Proof.** Combining (4) and (9) yields:

$$0 = \delta\phi\tilde{x}^2 - 2[\delta\phi(\chi+X) - k]\tilde{x} - [4X\delta(A-\phi) - \delta\phi(\chi-X)^2 - 4X(1+r)I + 2(\chi-X)k]$$

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<sup>18</sup> Results of this kind are fairly standard for the type of uncertain financial environment considered in this paper (e.g., Agenor and Aizenman, 1998; Aizenman and Powell, 2003).

Solving it gives  $\tilde{x} = \chi + X - \frac{k}{\delta\phi} \pm \frac{\sqrt{\cdot}}{\delta\phi}$ , where  $\sqrt{\cdot} = \sqrt{4X\delta\phi\{\delta[A - \phi(1 - \chi)] - (1 + r)I - k\} + k^2}$ . A sufficient condition for ruling out complex roots is  $\delta[A - \phi(1 - \chi)] \geq (1 + r)I + k$ . Given this, together with the fact that  $\tilde{x} \leq \chi + X$ , the only possible solution for  $\tilde{x}$  is when  $\frac{\sqrt{\cdot}}{\delta\phi}$  enters negatively. Under the further restriction  $\delta[A - \phi(1 - \chi)] \leq (1 + r)I + \delta\phi X$ , then  $\tilde{x} \geq \chi - X$  is ensured as well. Since the solution for  $\tilde{x}$  is unique, so too is the solution for  $R$ . ■

Both  $\tilde{x}$  and  $R$  depend on  $X$  and  $k$ . As discussed previously,  $X$  determines the spread of the distribution of  $x$ , which provides a measure of uncertainty about bribe payments.  $k$  is the cost of verification incurred by intermediaries, which acts as an indicator of capital market friction. The effects of these are established in the next result.

**Proposition 2** *Under disorganised corruption, the greater the degree of uncertainty about bribe payment is and the greater the extent of capital market imperfection, the higher the contractual interest rate on loans is and the higher the probability of defaulting on loans.*

**Proof.** Given  $\tilde{x}$  in (10), the contractual interest rate  $R$  can be determined from (4), whereas the probability of defaulting is given by  $\frac{\tilde{x} - \chi + X}{2X}$ . Based on Lemma 1,  $\frac{\partial \tilde{x}}{\partial X} > 0$  and  $\frac{\partial \tilde{x}}{\partial k} > 0$ . It follows that both  $R$  and  $\frac{\tilde{x} - \chi + X}{2X}$  are increasing in  $X$  and  $k$ . ■

The effects of uncertainty are due to the fact that loan repayment is a concave function of  $x$ . Recall that the loan repayment is  $\delta[A - \phi(1 - x)]$  if  $x \in [\chi - X, \tilde{x}]$ , but  $(1 + R)I$  if  $x \in (\tilde{x}, \chi + X]$ . The expected repayment is therefore reduced by a mean-preserving spread in the distribution of  $x$ . Intermediaries compensate for this by charging a higher interest rate on loans, which increases the likelihood that defaulting will occur. The effects of financial market imperfection operate similarly. An increase in  $k$  increases the expected verification cost, which raises the contractual interest rate and makes default more likely.

### *Population of Entrepreneurs*

Based on the above analysis, the occupational choice is determined as follows. Recall that (6) gives an expected individual income from entrepreneurship. Using (7), rewrite (6) as:

$$\begin{aligned}
E(y) &= \int_{\chi-X}^{\chi+X} [A - \phi(1-x)]f(x)dx - (1+r)I - \int_{\chi-X}^{\tilde{x}} kf(x)dx \\
&= A - \phi(1-\chi) - (1+r)I - \left(\frac{\tilde{x}-\chi+X}{2X}\right)k
\end{aligned} \tag{11}$$

From (11), an entrepreneur's expected payoff is a decreasing function of  $\phi(1-\chi)$ , the expected bribe payment to bureaucrats, and a decreasing function of  $\left(\frac{\tilde{x}-\chi+X}{2X}\right)k$ , the expected verification cost of intermediaries.<sup>19</sup> As indicated earlier,  $\left(\frac{\tilde{x}-\chi+X}{2X}\right)k$  is passed on to entrepreneurs through the contractual interest rate,  $R$ , which is higher for higher values of  $k$  or for larger values of  $\frac{\tilde{x}-\chi+X}{2X}$ . Higher  $k$  means that more resources must be spent in the event of verification; higher  $\frac{\tilde{x}-\chi+X}{2X}$  indicates that verification is more likely to happen. The likelihood of verification (i.e., the probability of defaulting) increases with an increase in the cost itself, and an increase in the degree of uncertainty about bribe payments.

Entrepreneurship is chosen by any individual for which the required level of effort,  $e$ , is no higher than the threshold level,  $\tilde{e}$ , defined in (1). The threshold gives a measure of the total population of entrepreneurs. Using (11), the total population of entrepreneurs under disorganised corruption is:

$$\tilde{e}^D = A - \phi(1-\chi) - (1+r)I - \left(\frac{\tilde{x}-\chi+X}{2X}\right)k - s \tag{12}$$

Some important properties of (12) are immediately identified and summarised as follows.

**Proposition 3** *Under disorganised corruption, the lower the number of private individuals choosing to become entrepreneurs is, the greater is the expected value of bribe payments, the greater is the degree of uncertainty about bribe payments and the greater is the extent of capital market imperfection.*

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<sup>19</sup> Note that the direct effect of  $\phi(1-\chi)$  is reinforced by an indirect effect through its impact on  $\left(\frac{\tilde{x}-\chi+X}{2X}\right)k$ .

**Proof.** The term  $\frac{\tilde{x} - \chi + X}{2X}k$  in (12) increases in  $\phi(1 - \chi)$ ,  $X$  and  $k$ . Thus,  $\frac{\partial \tilde{e}^D}{\partial \phi(1 - \chi)} < 0$ ,

$$\frac{\partial \tilde{e}^D}{\partial X} < 0 \text{ and } \frac{\partial \tilde{e}^D}{\partial k} < 0. \blacksquare$$

These properties are a direct reflection of the observations made above. An individual expects to receive less profit from entrepreneurship if it is necessary pay more bribes, if bribe demands are more uncertain and if bankruptcy claims are more costly to verify. Under any of these circumstances, there will be fewer private individuals for whom entrepreneurship is chosen. A final result worth noting is the following.

**Proposition 4** *Corruption exacerbates the effects of capital market imperfections, which exacerbate the effects of corruption.*

**Proof.** From (10),  $\frac{\partial}{\partial \phi(1 - \chi)} \left( \frac{\partial \tilde{x}}{\partial k} \right) > 0$  and  $\frac{\partial}{\partial k} \left[ \frac{\partial \tilde{x}}{\partial \phi(1 - \chi)} \right] > 0. \blacksquare$

Existing empirical evidence suggests that there are meaningful interactions between corruption and financial development (e.g., Ahlin and Pang, 2008; Cooray and Schneider, 2018). The result of Proposition 4 is in the same vein, that the more severe the corruption measured in expected bribe payments is, the worse is the marginal effect of an increase in financial market imperfection regarding the cost of verification, and so the higher is the marginal benefit from an improvement in financial development. Analogically, the worse financial market imperfection is, the worse the marginal effect of an increase in corruption is, and so the higher the marginal benefit from an improvement in governance is.

#### 4. The Economy with Organised Corruption

##### *Zero Uncertainty and Bankruptcy*

Organised corruption implies the case in which bureaucrats act together as a joint monopoly, choosing a level of bribe that maximises their expected payoffs in acknowledgement of the aggregate effects of their behaviour. This eliminates the discretionary power of bureaucrats and hence corruption-induced uncertainty.<sup>20</sup> These effects

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<sup>20</sup> Tonoyan *et al.* (2010) argue that it is a common problem for entrepreneurs when overlapping corrupt bureaucrats exist as it is difficult to understand who to go to and if beneficial treatment is guaranteed. This

work through  $\bar{B}$  and  $\tilde{e}$  in (2), variables which bureaucrats no longer treat as given when solving the maximisation problem. On the contrary, bureaucrats take into account that  $\bar{B} = \tilde{e}b$ , and that  $\tilde{e}$  depends analogically on their bribe-taking activities. One immediate implication of the change in behavioural assumption about rent-seeking is exhibited below.

**Proposition 5** *Under organised corruption, the uncertainty of bribe payments is eliminated.*

**Proof.** Since  $\bar{B} = \tilde{e}b$ , (2) becomes  $E(z) = \pi \tilde{e}b \exp[-(x + \frac{1}{\phi}b)] = \pi \exp(-x) \tilde{e}b \exp(-\frac{1}{\phi}b)$ . It is straightforward that any  $b$  maximising  $E(z)$  is independent of  $x$ . ■

By choosing bribes collectively, bureaucrats recognise that they are determining the average bribe income,  $\bar{B}$ , which is the amount of bribe income for each one of them. They are therefore aware that whatever choice they make, each one of them faces the same random probability,  $p = \pi \exp(-x)$ , of not being caught. This is identical to the probability that emerged in the case of disorganised corruption, but it is now entirely exogenous to the bureaucrat's decision making and does not influence the optimal size of bribe. Whatever the amount of this bribe turns out to be, it is utterly predictable and is known with certainty by private individuals and financial intermediaries at the time of making their own decisions.

Given the above, it is possible to identify a further notable aspect of organised corruption, namely, eliminating any risk of bankruptcy associated with entrepreneurship. As before, an individual's net return from entrepreneurship is  $A - B - (1 + R)I$ . Unlike before, bureaucrats take into account that  $B = b$ . Let  $b^o$  denote the bribe that is chosen by the organised bureaucracy. In pursuit of its objective, the bureaucracy would never choose a  $b^o$  for which  $A - b^o < (1 + R)I$ . Otherwise, no bribes could be extracted since there would be no entrepreneur. Financial intermediaries would never grant loans to individuals who are certain of going bankrupt. Thus, any  $b^o$  that is chosen is the one that allows loans to be repaid.<sup>21</sup> An obvious implication of this is that the interest rate on loans is driven down to the world interest rate,  $r = R$ , by the zero profit condition. It follows that an individual's net return from entrepreneurship is:

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reflects the typical corruption-induced uncertainty. In an organised corruption network, this problem is eliminated due to coordinated rent-seeking by bureaucrats.

<sup>21</sup> As in the proceeding, the solution to the maximisation problem of the joint monopoly implies an optimal bribe that satisfies this criterion.

$$y = A - b^o - (1+r)I \quad (13)$$

Compared to (11), the payoff is still decreasing in the bribe payment, but it is independent of any intermediation costs. These costs associated with the verification of bankruptcy claims in the presence of asymmetric information do not surface under organised corruption because the uncertainty about bribe payments and the prospect of defaulting are eliminated. In this way, coordinated rent-seeking prevents latent capital market imperfections.

#### *Optimal Bribe Demand and a Cohort of Entrepreneurs*

When disorganised corruption is present, entrepreneurship is chosen by any individual for which the required level of effort,  $e$ , is no higher than the threshold level,  $\tilde{e}$ , given in (1). In contrast, the threshold level of effort in the case of organised corruption using (13) is:

$$\tilde{e}^o = A - b^o - (1+r)I - s \quad (14)$$

An obvious implication of (14) is similar to the one delivered from (12) and is described as follows.

**Proposition 6** *Under organised corruption, the number of private individuals who choose to become entrepreneurs is lower if the value of bribe payments is higher.*

**Proof.**  $\frac{\partial \tilde{e}^o}{\partial b^o} < 0$  in (14). ■

The fundamental difference between (14) and (12) is that (14) is independent of any hassles of uncertainty and capital market imperfection. When corruption is organised, the only aspect of it that influences occupational choice is the actual bribe payments that private individuals know they will need to pay if they decide to become entrepreneurs.

The optimal bribe payment for an organised bureaucracy is determined as follows. This is the value of  $b$  that maximises  $E(z)$  in (2), taking into account that  $\bar{B} = \tilde{e}b$  and that  $\tilde{e}$  is determined by (14).

**Proposition 7** *The optimal bribe under organised corruption is given by*

$$b^o = \frac{[A - (1+r)I - s + 2\phi] - \sqrt{[A - (1+r)I - s]^2 + 4\phi^2}}{2} \quad (15)$$

**Proof.** The first order condition of the optimisation problem yields:

$$b^2 - [A - (1+r)I - s + 2\phi]b + \phi[A - (1+r)I - s] = 0$$

Hence  $b = \frac{[A - (1+r)I - s + 2\phi] \pm \sqrt{\cdot}}{2}$ , where  $\sqrt{\cdot} = \sqrt{[A - (1+r)I - s]^2 + 4\phi^2}$ . It is straightforward to verify that  $\sqrt{\cdot}$  must enter negatively for the second order condition to be satisfied. It is obvious that  $b^o > 0$  under such circumstances. ■

As in the case of disorganised corruption, Proposition 7 shows that if the optimal bribe demand is more substantial, the value of  $\phi$  is higher, since the cost of corruption is lower. One may also note that  $A - b^o > (1+r)I$ , which verifies the earlier claim that the bribe is never so high as to drag entrepreneurs into bankruptcy.

## 5. Evaluation of the Alternative Corruption Regimes

The previous analysis has revealed some significant differences between the organised and disorganised corruption networks. This section explores the differences further by comparing and contrasting the outcomes under the two scenarios. In particular, this paper identifies conditions for which the incidence of corruption and the level of entrepreneurial activity are either higher or lower under one type of corruption regime than under the other. The first important result is described as follows.

**Proposition 8**  $b^o > E(b^D)$  when  $A - (1+r)I - s > \frac{\phi(1-\chi^2)}{\chi}$ , and vice versa.

*Proof.* From the previous result,  $E(b^D) = \phi(1-\chi)$ . Comparing  $E(b^D)$  with  $b^o$  in (15), gives the result. ■

Proposition 8 indicates that bribe payments under organised corruption may be larger or smaller than the average bribe payments under disorganised corruption. Evidently, since the number of corrupt bureaucrats is assumed to be the same in each case, the result implies that the incidence of corruption measured by the total value of bribes is generally different between corruption regimes.

Whether the optimal bribe is higher in one regime or the other depends on two competing influences. On the one hand, when corruption is disorganised, each bureaucrat is wary that raising his own bribe demand will increase the probability of being caught. This

tends to lower the bribe demand relative to the case in which bureaucrats act collusively and recognise at the outset that each of them faces the same risk of being detected whatever the size of bribe. On the other hand, when corruption is organised, bureaucrats have a different reason to temper their joint bribe demand, which is the mitigation of a reduction in the bribe base due to a fall in the number of entrepreneurs. This effect is absent when bureaucrats act independently and take the population of potential bribe-payers as given. These competing influences are reflected in the parameter condition that determines whether  $b^o$  is greater or less than  $E(b^D)$ . For example, a more significant value of  $\chi$  makes it more likely that  $b^o > E(b^D)$  by inducing a lower value of  $E(b^D)$  as bureaucrats moderate their non-coordinated rent-seeking in response to a higher expected probability of being detected. However, a smaller value of  $A$  makes it more likely that  $b^o < E(b^D)$  by inducing a lower value of  $b^o$  as bureaucrats temper their coordinated rent-seeking in response to a lower number of potential entrepreneurs.

The second result below is the principal finding of this paper.

**Proposition 9** *There exists a  $\tilde{b}^o > E(b^D)$  such that entrepreneurial activity is greater under organised corruption than under disorganised corruption if  $E(b^D) < b^o < \tilde{b}^o$ .*

**Proof.** From (12) and (14),  $\tilde{e}^o \geq \tilde{e}^D$  if  $b^o \leq \phi(1-\chi) + \left(\frac{\tilde{x}-\chi+X}{2X}\right)k$ . Since  $E(b^D) = \phi(1-\chi)$ , this implies  $b^o \leq E(b^D) + \left(\frac{\tilde{x}-\chi+X}{2X}\right)k \equiv \tilde{b}^o$ . Evidently,  $\tilde{b}^o > E(b^D)$ . ■

Proposition 9 implies that  $b^o$  may be greater or less than  $E(b^D)$  depending on the relative strengths of the negative and positive externality effects of disorganised rent-seeking. If the negative externality dominates, the internalisation of externalities when rent-seeking is organised means that  $b^o < E(b^D)$  which tends to rise  $\tilde{e}^o$  relative to  $\tilde{e}^D$ . If the positive externality dominates, on the other hand, it tends to be the case that  $b^o > E(b^D)$ , which would lower  $\tilde{e}^o$  relative to  $\tilde{e}^D$ . However, this is not the only effect of organised corruption. There is also the removal of uncertainty about bribe payments which eliminates the prospect of bankruptcy and, with this, the expected cost of verifying bankruptcy claims,  $\left(\frac{\tilde{x}-\chi+X}{2X}\right)k$ . This has a separate tendency to raise  $\tilde{e}^o$  relative to  $\tilde{e}^D$ .

If  $b^o < E(b^D)$ , organised corruption is unambiguously less damaging to entrepreneurship than disorganised corruption. Strikingly, Proposition 9 shows this may still be true even if  $b^o > E(b^D)$ , which is the core finding of this paper. This implies that even if the amount of bribes paid to an organised bureaucracy is higher than what would be paid on average to a disorganised bureaucracy in alignment with empirical evidence (e.g., Ades and Di Tella, 1999; Albornoz and Cabrales, 2013; Fisman and Gatti, 2002), organised corruption is still less detrimental to entrepreneurship than disorganised corruption. The reason behind this is that organised rent-seeking removes the disincentives to engage in entrepreneurship that arise when private individuals and financial intermediaries are uncertain about bribe payments. These disincentives are reflected in the reduction of entrepreneurial income associated with the cost to intermediaries of having to verify bankruptcy claims. This is a cost which financial intermediaries pass on through a higher interest rate on loans. The consequence is that fewer private individuals may choose to become entrepreneurs under disorganised corruption, even though the average bribe paid is lower than the bribe demanded under organised corruption. The quantity  $\tilde{b}^o$  defines the maximum size of the latter for which such an outcome is real.

The emphasis of the above results is not meant to be seen as a prescription for the organisation of corruption to be a policy objective. Whether organised or not, corruption is always bad for entrepreneurship in the model. The best policy is to eliminate corruption ultimately. However, the analysis in this paper shows that the effects of corruption may be very different under different circumstances, which may help to explain why some East Asian countries exhibit higher entrepreneurial activities than Latin American and African countries despite the equally poor quality of governance. Given the limited resources available to developing countries' governments and the persistent nature of corruption, this paper urges developing countries to curb disorganised corruption in the short-run. This policy recommendation will dramatically reduce efficiency loss and resource misallocation in the society, and hence promote entrepreneurial activities.

## 6. Conclusion

In theory, corruption can take many different forms, such as bribe payment, kickback as a share of the firm's profit, embezzlement of public funds, submission of fraudulent

information. In practice, corruption can go through various channels and different organisations. It can be an abuse of authority by political leaders or illegal profiteering by bureaucrats. It can be a coordinated strategy amongst a well-connected network of public officials, or a non-coordinated set of actions in a more fragmented bureaucracy. Accordingly, it is evident that the effects of corruption on entrepreneurship and hence growth are not the same. The diverse experience of countries with a similar corruption record suggests that the effects of corruption may be very different under different circumstances. This paper has sought to illustrate this.

The focus of this paper has centred on the distinction between organised and disorganised corruption regimes. By the former, it means the situation in which bureaucrats coordinate their illegal activities to maximise the benefits to all. By the latter, it means the opposite scenario in which each bureaucrat acts independently to others, maximising personal payoff. There is a strong presumption that a more organised system of corruption is less damaging to entrepreneurial activities because of two essential features. First, it internalises externality effects that bear on bribe-demanders. Second, it reduces the corruption-induced uncertainty that impacts on bribe-payers. This paper highlights other important aspects which have not received the same degree of rigorous exposition.

The specific context of this paper has been the role of rent-seeking in entry regulation and occupational choice. It has considered a familiar scenario in which public officials demand bribes from private agents in return for issuing licences that agents require in order to conduct business. However, this paper has added two extra ingredients: the potential for bribe demand to be random and, with this, the possibility of informational asymmetry between entrepreneurs (borrowers) and financial intermediaries (lenders). To my knowledge, these have not been explicitly integrated into the occupational choice framework with a general equilibrium setup, which is a new initiative.

The analysis has shown how disorganised rent-seeking allows both corruption-induced uncertainty and capital market imperfections to surface, while organised rent-seeking prevents such outcomes. The implication is that the latter type of corruption regime is most likely to be less harmful to entrepreneurial activity even if organised bureaucracy demands higher bribe payments than the average of disorganised bureaucracy. This gives some insights into the economics and entrepreneurship literature, and calls for empirical

investigation in future. Significantly, it is precisely those countries in which corruption is reputedly well-organised that appear to have coped better with bureaucratic malfeasance.

Furthermore, the preceding analysis has highlighted the substitution effect, between curbing corruption and stimulating financial market liberalisation, influencing entrepreneurial activities. Financial development plays a vital role in economic growth in developing countries as it triggers investment and encourages entrepreneurship. Corruption may not be a severe constraint on entrepreneurial activities if financial markets are underdeveloped, whereas pervasive corruption harms entrepreneurial activities in the presence of well-developed financial markets. The worse either one of these is, the greater is the marginal benefit from an improvement in the other. This provides a theoretical justification for empirical findings in banking and finance literature. It may also provide an indirect prescription to cope with corruption, by liberalising financial markets, that leaves little scope for corrupt practices.

There are some potential areas for future research. Entrepreneurial activity across countries may also be affected by culture and subculture. Countries that put a high valuation on entrepreneurship are likely to encourage more people to become entrepreneurs, and *vice versa*. It may also be true that people who do not share the dominant cultural values are most likely to choose entrepreneurship, which is in line with the so called “dissatisfied individuals” in Hofstede *et al.* (2004). However, given the theoretical setup in this paper, I cannot identify personal characteristics of private agents who choose the entrepreneurial occupation. Individual risk preferences could also play a vital role in occupational choice in the first place. In this paper, each individual is assumed to be risk neutral. It would be interesting to attempt various types of utility functions that capture different versions of risk preferences. All of these would be rewarding to exploit further from both theoretical and practical perspectives.

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