5. Market failures within poor institutions: the effects of bureaucrats' rent-seeking activity

Davide Infante and Janna Smirnova

5.1. INTRODUCTION

Recent research has demonstrated that institutions play a fundamental role in economic performance. The establishment of an appropriate institutional infrastructure has been shown to be essential for achieving economic development. Indeed, the presence of solid institutions such as constitutional order, political and financial stability, market securities, competition policies and solid legal systems are necessary components for successful economic growth in developed countries as well as in those undergoing development.

Empirical research has shown that institutional quality continues to improve among developing countries, mainly in transition economies (see, amongst others, Havrylyshyn and Van Rooden, 1999; Campos, 2000; Djankov, 2002). Likewise, recent studies (Campos 2000; Recanatini and Ryterman, 2000; EBRD, 2002; Di Tommaso et al., 2007) have demonstrated that institutions should be considered important determinants of economic activity since high institutional quality sustains and improves economic performance. However, while there is much agreement regarding the importance of establishing strong institutions for successful economic outcomes, the question as to how a better institutional environment might be created and what its characteristics should be remains still undefined. Indeed, many developing countries are unable to establish strong institutions which can go beyond the embedded poor institutional environment. As some authors argue (Waller et al., 2002; Djankov et al., 2003; Shi and Temzelides, 2004; Acemoglu, 2006; Rajan and Zingales, 2006), societies may continue to harbour weak institutions for various reasons, such as unsuccessful institutional adoption, poor initial distribution of factor endowments, fundamentals of society or the persistence of the elites' preference for a poor institutional environment. In such weak contexts with poor institutions and market distortions, some mechanisms which would otherwise not work for

strong economies could actually improve economic outcomes. One such controversial mechanism is the positive effect of rent-seeking activities. While, rent-seeking is normally considered harmful for economic performance, some scholars (Shleifer and Vishny, 1994; Acemoglu and Verdier, 2000; McChesney, 2001; Meon and Sekkat, 2005; Infante and Smirnova, 2007; Ahlin and Bose, 2007) have demonstrated that activities such as bribery, red tape and corruption may actually play a positive role when economic and institutional conditions are weak.

Rent-seeking activities are frequent when a weak government attempts to implement its objectives, as asymmetric information between the State and its agents leaves ample room for opportunistic behaviours. However, despite the high opportunity costs, state-sector interventions are clearly necessary due to the production of positive externalities which cannot be introduced by the private sector, particularly in the presence of market failures or in the process of public goods provision. In these situations, government failure, e.g. corruption, lobbying, bribery and red-tape, could be tolerated. The issue is therefore not so much the elimination of such opportunistic activity, but of establishing an equilibrium between State inefficiencies and market distortions (Aidt, 2003).

The purpose of the present paper is to analyse the beneficial contribution of rent-seeking activity on economic performance in the presence of a weak institutional environment. In particular, we explore how rent-seeking may influence the allocation of resources in State and production sectors in an institutional environment where bureaucrats enjoy discretional powers when the State attempts to correct market failures. Our analysis is based on two strands of literature, one dedicated to institutions and their role in economic relations and the other to the effects of rent-seeking during State intervention in the economy.

The importance of institutions for economic performance is quite a new area of research with much empirical work carried out, but little from the theoretical point of view. The main difficulties to be tackled by theoretical research dealing with institutions lie in what constitutes an institution and in the complexity of the relationship between various types of institutions and economic theory, making it complicated to introduce institutional indicators into models (Nelson and Sampat, 2001). Most papers studying institutions analyse a single institution or a set of similar institutions within an economic framework. One approach is to analyse the organisational aspect of institutions. A good example is Huang and Xu's (1999) model which shows how economic growth rates depend on whether the financial institutions are organised as merged or centralised bodies. A similar approach is the analysis of the quality of a single institution. Likewise, Skaperdas and Syropoulos (2001) modelled economic performance as a function of a single institution,

such as trade security, which can be considered an informal institute necessary for economic development.

Another way to evaluate functionality of institutions is to analyse how efficiently they have been introduced into economic systems. Using this approach, Jack (2002) demonstrated the effect the introduction of a new institution has on social welfare in transition economies, analysing the interaction between operating enterprises and a new institute introduced by government, and comparing the levels of welfare. The actual development of new institutions was considered by Grossman (2001) in terms of the creation of property rights.

Finally, an alternative way to include institutions in theoretical models is to introduce indicators that reflect not a single institution, but a set of them. This approach, although not commonly used in theoretical modelling, has proved to be a good tool in undertaking a broad analysis of the role of institutional environment in the economy. Using this approach, Esfahani (2000) introduced a parameter representing the strength of the institutional environment and showed a way whereby institutions influence the relationship between State and enterprises. The analysis demonstrated how institutional factors such as evaluation of public funds by private agents, reliability of government policies, corruption etc. influenced the ownership of enterprises and the degree of State intervention in the industrial sector. A further developed structural growth model (Esfahani and Ramírez, 2003) examined the mutual effects of infrastructure and economy, using an institutional parameter that encompasses the variables that influence the adjustment rate for capital and infrastructure. Similarly, Brezis and Verdier (2003) constructed a model that studied the diffusion of democracy as well as the process of privatization among former socialist countries, introducing parameters which measure the effectiveness of a 'repression apparatus'. In our model, this approach is applied utilising the institutional parameter, similar to that of Esfahani (2000), to demonstrate the effects of institutional environmental change on resource allocation in neutralising market failure.

The second strand of literature, on which our research is based, regards the theoretical considerations of how the presence of rent-seeking activities influences the relationship between the State and the market. Many studies have examined the effect of rent-seeking in the context of State interventions, exploring the emergence of rent-seeking, government control over rent-seeking behaviour, the interaction of rent-seeking on different levels of hierarchies, and the implication of rent-seeking in State-market relationships. The latter is of great interest to economists who have generated extensive empirical evidence and theoretical proof regarding the negative effect of rent-seeking on government intervention. However, starting from the research of Leff (1964) and Huntington (1968), some have shown that

legal and illegal rent-seeking, in certain circumstances, may have a positive influence on economic performance. We focused on theoretical models dedicated to this approach which is mainly based on situations regarding correction of market failures, provision of public goods and other processes where State intervention in the market is required.

An interesting contribution, demonstrating the positive effects of rent-seeking, was made by Auriol and Benaim (2000) who analyzed the consequences of public sector corruption in a growth model, showing that equilibrium with corruption may be preferred over one where corruption is absent as corruption mechanisms bypass bureaucratic red tape. Likewise, Coppier and Michetti (2006) demonstrated that higher corruption can be associated with greater production when the State is unable to invest in proper monitoring mechanisms.

Guriev (2004) presented a model that deals with market failures, introducing corruption and red tape and evaluating the mechanism of their integration. The author showed that, at general equilibrium, the level of red tape is above the socially optimal level due to the presence of corruption. It is demonstrated that, even though corruption may have positive effects, its overall effect is destructive and it reduces social welfare. A similar result is obtained by Infante (1999) who presented a growth model in which the presence of rent-seeking is determined endogenously and depends on the different reward structures of the technologies used in the production and rent-seeking sectors.

Rent-seeking usually appears in the relationship between the principal and the agent, with the former being more often the victim of corruption, due to the financial gains the agents obtain from the principal. Olsen and Torsvik (1998) presented an alternative model, demonstrating that the prospective corruption can actually benefit the principal.

Corruption in both private and public sectors was also considered by Acemoglu and Verdier's (1998) general equilibrium model where the State has the role of reinforcing contracts in the private sector. As the authors showed, preventing corruption can actually be very costly and optimal allocation may involve some degree of corruption. This result, as they argue, confirms the experience of developing countries that do not have sufficient sources to prevent rent-seeking activities.

In addition to the abovementioned papers, particular attention is merited by Acemoglu and Verdier's (2000) seminal paper on the positive effects of corruption when the second-best equilibrium has to be chosen. In their model the government neutralises market failure by allocating agents between the State and production sectors. The model uses the principal-agent approach that involves the interaction between two kinds of agents: entrepreneurs and bureaucrats. Bureaucrats are designed as a mechanism to increase system

efficiency by controlling market externalities produced by entrepreneurs. The model demonstrates that the second-best allocation requires some level of corruption when the externality in question is considerable.

To explore the interaction between changes in the institutional environment and optimal resources allocation we build a model introducing Esfahani's (2000) institutional parameter into the Acemoglu and Verdier (2000) framework. In our model, bureaucrats are able to enjoy high rent when institutions are weak as opposed to where little rent can be derived when institutions are strong. However, while Acemoglu and Verdier (2000) deal with illegal rent-seeking such as corruption, in our model we consider bureaucrats' rent-seeking as not being necessarily illegal. Bureaucrats obtain economic rent through tools and mechanisms that do not necessarily contradict the rules of society. Although some of our findings are in line with those of Acemoglu and Verdier (2000), that is some illegal rent-seeking (corruption) activity may be preferable to a situation with no illegal rent-seeking, our model pursues a different objective and analyses the links between the strength of the institutional environment and the State intervention to correct market failures. Following the authors, we demonstrate that under a weak institutional environment self-interested bureaucrats have stronger positive effects on market failure corrections by improving the second-best allocation of agents. However, the institutional approach that we adopted permits us to go further and show that, in a weak institutional environment, rent-seeking not only stimulates the agents to opt for good production technology, but also enlarges the range of the positive externality generated by good technology adoption, increasing social surplus. We also argue that rent-seeking in a poor institutional context becomes beneficial only in the case when the State can perceive and utilise the opportunistic behaviour of agents to improve economic performance.

The remainder of the chapter is organised as follows. In Section 5.2, we discuss how the institutional environment is introduced into Acemoglu and Verdier's model (2000) and what transformations were necessary for such a modification. The basic model is presented in Section 5.3, whereas Section 5.4 discusses its implications and derives some propositions. Section 5.5 extends the model, analysing the outcome when rent-seeking activities from different sources are incorporated. In Section 5.6, conclusions are drawn.

5.2. MODEL SETTINGS

We start by constructing a model based on that of Acemoglu and Verdier (2000), where the government aims to neutralise market failure by introducing bureaucrats into the production sector. Market failure occurs due

to the fact that entrepreneurs opt for bad production technology as good technology is more costly. As a consequence, the positive externality that would have been produced through the use of good technology is not generated.

To induce the production sector to adopt good technology, some of the agents become bureaucrats when called on by the government to monitor and report on the technology choices made by entrepreneurs. The government, in turn, imposes taxes on those entrepreneurs who use bad technology and, at the same time, transfers subsidies to those who use good technology, modifying their pay-offs. This mechanism establishes an allocation of agents such that a positive externality is generated and thus social surplus is increased.

At this point, we introduce a parameter into Acemoglu and Verdier's (2000) model, which reflects the institutional environment in order to analyse how changes in the strength of the institutions influence allocations of agents and production of positive externalities. To provide the analysis, however, some of the settings in the original model need to be modified.

It is first necessary to suppose that when the institutional environment weakens, bureaucrats are prone to practise rent-seeking activity. To introduce rent-seeking into the model, it is assumed that the government gives subsidies and collects taxes through the bureaucrats, giving them direct access to funds and allowing them to extract a 'premium' or personal rent during the transfer of public funds to/from a production sector. As discussed in Section 5.1, this mechanism was proposed by Esfahani (2000) who argues that, for self-interested bureaucrats, each dollar under government control is worth more than a dollar, because it can be utilised for private purposes and thus increases the bureaucrats' rents. According to Esfahani (2000), the premium size depends on various institutional factors, such as financial and economic stability, efficiency of the legal system, market security etc.; poor institutional quality permits the extraction of high rents by bureaucrats, while within strong institutions, rent is negligible or null. The premium level also reflects the administrative capability of the government which refers to a set of bureaucratic institutions developed to control and promote the activities of entrepreneurs. If the government is administratively capable, it collects taxes and issues subsidies with less distortions and bureaucratic costs, decreasing the volume of the premium.

For the sake of simplicity, in our model the premium is expressed as in terms of the delay in the transfer of specific taxes from bad technology entrepreneurs to the government and of the subsidies from the government to good technology entrepreneurs. Hence, the subsidies and taxes become available after a time lag,[1] with a short delay considered welfare-increasing. Therefore, the bureaucrats are involved in rent-seeking activity and extract

rent from the subsidies and taxes, which does not represent an illegal action. The amount of rent that bureaucrats can extract depends on the strength of the institutional environment: in a weak institutional environment, where the government is not administratively capable and the institutional quality is poor, the bureaucrats can extract a high premium while, in a strong institutional environment, the premium is negligible. A similar approach introducing institutional quality is described by Ellis and Fender's (2006) growth model.

In our model, another assumption must be added to overcome the problem of negative subsidy which was identified by Acemoglu and Verdier (2000). In their model, income from the State budget, which was used to pay the wages of bureaucrats and subsidies to good technology entrepreneurs, comes from the taxes extracted from bad technology entrepreneurs. Consequently, the presence of bad technology entrepreneurs is necessary to balance the State's budget. However, in the final equilibrium, bad technology is completely eliminated. Such an allocation of agents could not therefore be supported by a State which has no funds to pay the bureaucrats and good technology entrepreneurs. To overcome this problem, Acemoglu and Verdier (2000) allowed for a negative subsidy, whereby good technology entrepreneurs were also taxed. In our model, both positive and negative subsidies can be applied to achieve a final equilibrium by introducing an additional source of income for the State in the form of a general tax paid by all entrepreneurs. We suppose that the general tax is paid when the entrepreneurs are monitored by the bureaucrats,[2] i.e. it depends on the probability of bureaucrats monitoring. The State budget therefore consists of both the specific tax paid by bad technology entrepreneurs, as well as the general tax paid by all entrepreneurs.

Based on the above assumptions, we can now construct a model that analyses how changes in the strength of the institutional environment can influence the allocation of agents in both State and production sectors, supporting the neutralisation of market failure and the generation of positive externalities.

5.3. MODEL

The model considers two types of production technologies chosen by the entrepreneurs (n). Good production technology generates a positive externality (β) together with an output (y) that provides benefits for the other agents (with the total number of agents normalised to unity), and requires cost (c). Bad production technology does not produce any externality and does not require any cost, producing the same amount of output as good

technology. As the entrepreneurs are interested in maximising the pay-off that they can extract from production and since the application of bad production technology means a greater pay-off, they are not motivated to choose the good technology and no positive externality is therefore generated.

To incentivize the choice of good technology, the government induces some of the entrepreneurs to become bureaucrats $(1 - n)$ to monitor the technological choices of the entrepreneurs, transferring subsidies (s) to the entrepreneurs who use good technology (x) and collecting taxes (τ) from the entrepreneurs using bad technology $(n - x)$. By delaying the transferring of subsidies and taxes, the bureaucrats extract a premium (γ). Both types of entrepreneurs pay the government a general tax (t).

As in Acemoglu and Verdier's (2000) model, bureaucrats monitor entrepreneurs randomly with the probability given by:

$$p(n) = \frac{1-n}{n}$$

When bureaucrats monitor entrepreneurs, the pay-offs of the good and bad entrepreneurs are given by:

$$\pi_{good} = y + \beta x - c + p(n)(s - t) \tag{5.1}$$

$$\pi_{bad} = y + \beta x - p(n)(\tau + t) \tag{5.2}$$

Pay-offs thus depend on the output produced, the positive externality received and on the taxes paid or the subsidies received after being monitored.

The government is interested in maximising the social surplus (SS) that is positively correlated to the entrepreneurs' output and the positive externality. As in Acemoglu and Verdier (2000), this is:

$$SS = ny + (\beta - c)x \tag{5.3}$$

With no government intervention, when entrepreneurs do not apply good technology, the allocation of agents is given by $n = 1,\ x = 0$. Once the government intervenes, it aims to allocate agents such that $n = x$, so as to obtain the adoption of only good technology and thus maximise social surplus.

Given the above settings, the following sections analyse how changes in the premium that bureaucrats put on subsidies and specific taxes influence both the allocation of agents at the second-best equilibrium point and the amount of positive externality which can be generated by good technology entrepreneurs.

5.3.1. Allocation of Entrepreneurs Between Good and Bad Technology

We start by analysing how the premium which bureaucrats extract from public funds influences the allocation of entrepreneurs between good and bad technologies. To maximise the social surplus, the government has to respect the following set of constraints:

1. *Liability constraint.* The total amount of the general and specific taxes paid to the government does not exceed the value of entrepreneurs' output:

$$\tau \leq y - t \tag{5.4}$$

2. *Technology constraint.* To induce the entrepreneurs to use good production technology, the pay-off of good technology entrepreneurs is greater than that of bad technology entrepreneurs, implying the following inequality:

$$y + \beta x - c - \frac{1-n}{n}t + \frac{1-n}{n}s \geq y + \beta x - \frac{1-n}{n}t - \frac{1-n}{n}\tau \tag{5.5}$$

   where the good technology entrepreneurs' pay-off consists of the output produced, plus externality received and subsidies obtained, minus the cost of good technology and a general tax paid to the State, while that of bad technology entrepreneurs is given by the output produced, plus the positive externality received, minus the general and specific taxes paid to the State.
3. *Government budget constraint.* The government does not spend more than it earns; hence the amount of taxes it collects is at least equal to its total expenses:

$$\frac{1-n}{n}(n-x)\tau + \frac{1-n}{n}tn \geq (1-n)w + \frac{1-n}{n}xs \tag{5.6}$$

   where the amount of specific and generic taxes the State collects is on the left and the value of wages paid to bureaucrats plus the value of subsidies issued for good technology entrepreneurs is on the right.
4. *Allocation of talent constraint.* To induce some agents to become bureaucrats the pay-off of a bureaucrat is greater than the pay-off of a good technology entrepreneur:

$$w + \beta x + \frac{1-n}{n}(s+\tau)\gamma \geq y + \beta x - c - \frac{1-n}{n}t + \frac{1-n}{n}s \tag{5.7}$$

where on the left there is the wage and the positive externality a bureaucrat receives plus the premium γ, which is an exogenous parameter, that a bureaucrat extracts from specific taxes and subsidies.

Substituting the above inequalities (5.4, 5.5, 5.6 and 5.7) and solving them for x, we obtain the entire set of constraints the government must respect:

$$x \leq \frac{y(1-n)^2}{nc} + \gamma(1-n) \tag{5.8}$$

This constraint defines the allocation of entrepreneurs between good and bad technology and clearly shows that the number of good technology entrepreneurs is positively related to the premium which the bureaucrats can extract from subsidies and taxes.

Introducing the premium γ, i.e. the legal rent-seeking activity of bureaucrats, directly into the constraint set (5.8) makes our approach different from that of Acemoglu and Verdier's (2000), who generate a separate illegal rent-seeking (corruption) constraint. This distinction makes any further comparison of our results with those of the authors inappropriate, given that our analysis also goes in another direction, concentrating on institutional environment aspects.

5.3.2. Allocation of Agents Between State and Production Sectors

To analyse how the premium extracted by bureaucrats affects the allocation of agents between entrepreneurs and bureaucrats, we first consider a State which is attempting to neutralise market failure given constraint (5.8). As in the Acemoglu and Verdier (2000) model, the constraint set is non-convex in x and the social surplus is linear in x, such that maximisation of the social surplus has two solutions (see Figure 5.1). The first is given by $n = 1$ and $x = 0$, where none of the entrepreneurs uses good technology. This solution gives the level of social surplus that presumes market failure is inevitable:

$$SS_{MF} = y \tag{5.9}$$

The second solution corresponds to equality $n=x$, where all the entrepreneurs use good technology. In this case the social surplus is given by:

$$SS = n(y + \beta - c) \tag{5.10}$$

Clearly, the State intervenes in the production sector only when $SS_{MF} \leq SS$.

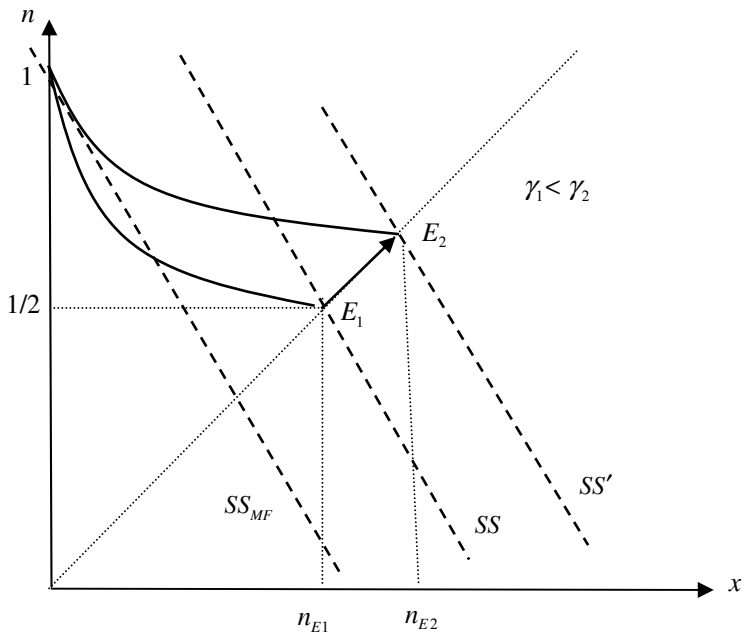

Figure 5.1. The second-best allocation of agents in a weakening institutional environment

As optimal outcome from State intervention requires $n=x$, substituting x for n in (8) we obtain the second-best allocation of agents (n_E):

$$n_E = \frac{-2y + c\gamma + \sqrt{4cy + c^2\gamma^2}}{2(c - y + c\gamma)} \tag{5.11}$$

Since $\partial n_E / \partial \gamma \geq 0$, the premium on public funds (γ) is positively related to the size of the production sector at the second-best allocation point. Clearly, the level of social surplus that corresponds to this allocation is also positively related to the premium γ.

5.3.3. Positive Externality Produced by Good Technology Entrepreneurs

Here we analyse the relationship between the level of positive externality produced by the adoption of good technology and the premium. To do so, we compare the level of social surplus when market failure has been neutralised (SS) to that with market failure (SS_{MF}) and define the *threshold* level of

positive externality (β_{TH}) over which any level of β gives a level of social surplus that is greater than SS_{MF}:

$$\beta_{TH} = \frac{cy\gamma + c^2\gamma + (c-y)\sqrt{4cy + c^2\gamma^2}}{-2y + c\gamma + \sqrt{4cy + c^2\gamma^2}} \tag{5.12}$$

Since $\partial\beta_{TH}/\partial\gamma \leq 0$, a higher premium the bureaucrats put on subsidies and specific taxes actually decreases the threshold level of positive externality over which State intervention in the economy is optimal.

5.4. ANALYSIS OF THE MODEL'S OUTCOMES

The above results now allow us to derive some propositions. We first suppose that the institutional environment becomes weaker (γ increases) around the time the state intervenes in the production sector by introducing some bureaucrats, such that the bureaucrats can have more discretionary power and thus extract higher rents. Inequality (5.8) suggests that the increase in γ leads to an upward shift of the constraint curve (Figure 5.1). While point $n = 1$, $x = 0$ (that defines market failure) remains unchanged in such a shift, the point of second-best solution moves up along the line $n = x$, passing from E_1 to E_2, demonstrating that there is an increase in the number of good technology entrepreneurs (n_E) in accordance with (5.11). Therefore, the increase in γ leads to a better allocation of agents ($n_{E2} > n_{E1}$).

We can now analyze the mechanism of government intervention in detail. In order to operate with parameters the government controls, (5.11) can be re-written as:

$$n_E = \frac{\gamma(\tau + s) + (t + s)}{\gamma(\tau + s) + (s + t) + 2\tau} \tag{5.13}$$

Careful examination shows that since $n = x$, any increase in γ requires changes in some endogenous parameters if an increase in n_E is needed. To prove this, we rearrange the terms of the constraints the government must respect to satisfy (5.13). The technology constraint (5.5) thus takes the following form:

$$n \leq \frac{s + \tau}{c + (s + \tau)} \tag{5.14}$$

The budget constraint (5.6) can be presented as:

$$x \le n\frac{\tau + t - w}{\tau + s} \tag{5.15}$$

The talent constraint (5.7) becomes:

$$w \ge y - c + \left(s(1-\gamma) - t - \tau\gamma\right)\frac{1-n}{n} \tag{5.16}$$

As (5.16) shows, growth in γ reduces w. At the same time, from (5.15), it follows that the decrease in w implies higher x. Since the State searches for $n = x$, when x increases, n increases automatically. However, as (5.14) shows, an increase in n suggests changes in s, τ, and/or c (τ, in turn, depends on the levels of y and t).[3] As a result, increasing γ in equation (5.13) does not suggest an automatic increase in n_E, but a change in government policy that leads to an increase in n_E.

Obviously, there is a wide range of policies the State may implement, such as changing general taxation, bureaucrats' wages and the value of subsidies. It is worth noting that the constraint set imposes precise links between some of these parameters, and changing one of them would automatically change others. For example, with an increase in γ, one of the reasonable strategies the State may choose is to reduce bureaucrats' wages.[4] In fact, in countries suffering from an 'institutional vacuum', the government has little control over increasing disorder and bureaucrats' rent-seeking become significantly profitable. Therefore, in such weak institutional contexts, government policy may use the increase in γ to lower bureaucrats' wages, increasing subsidies in the production sector.

Applying our model, we can demonstrate the application of such a policy. Using the four constraints (5.4, 5.5, 5.6, 5.7 and the requirement $x = n$), the dependence of w on γ can be obtained for the second-best point:

$$w = y - \frac{c\gamma + \sqrt{(c\gamma)^2 + 4cy}}{2} \tag{5.17}$$

The second term of the above equation is positive, thus confirming that increasing γ may permit a decrease in bureaucrat's wage.

It is now possible to evaluate whether a decrease in w can lead to an increase in s. Rearranging the set of constraints, we derive the equation for s:

$$s + \tau = \frac{c\gamma + \sqrt{(c\gamma)^2 + 4cy}}{2} \tag{5.18}$$

which simply becomes $s + \tau + w = y$. Indeed, in lowering w, the State chooses a higher s, and the remaining variables are adjusted respectively.

Therefore, a decrease in bureaucrats' wages can be used to support an increase in the subsidies for good technology entrepreneurs.

We have demonstrated that a policy which reduces bureaucrats' wages to increase subsidies may represent a solution for neutralising market failure in a weakening institutional environment. This means that, in using an appropriate response to the increase in rent-seeking activity, the government can neutralise market failure with a better allocation of agents. Within rent-seeking activities and weak institutions, it is possible to increase the number of good technology entrepreneurs, employing fewer bureaucrats who are also paid lower wages. Such policy goes in the same direction as that outlined by McChesney (2001) who argues that the surest way to respond to rent-seeking activity is to reduce the size of the public sector. Having fewer bureaucrats, necessary for achieving a second-best allocation of agents, also reduces the bureaucratic costs resulting from the loss of output produced by entrepreneurs. It is therefore possible to give the following proposition:

Proposition 1. *In a weak institutional environment, the increase in rent-seeking activity of bureaucrats may enable the government, through suitable policies, to neutralise market failure with a larger production sector, lower bureaucratic costs thus increasing social surplus.*

Now we can analyse how rent-seeking influences the threshold level of positive externality which is required to induce the government to intervene in the production sector. As shown in Section 5.3, a higher premium put by bureaucrats on public funds implies a lower threshold level of positive externality produced by good technology (5.12). This mechanism is described by Figures 5.2 and 5.3. Figure 5.2 demonstrates that increasing bureaucrats' discretionary power ($\gamma_2 > \gamma_1$) leads to a better final allocation of agents $n_{E2} > n_{E1}$, shifting from point E_1 to E_2. This change leads to a higher social surplus, i.e. SS_2, instead of SS_1 (Figure 5.3), that corresponds to a lower threshold level of positive externality ($\beta_{TH2} < \beta_{TH1}$). In fact, Figure 5.3 shows that the threshold level of positive eternality, over which State intervention becomes optimal, decreases with the rise in social surplus lines, generated by the premium increase.

This occurs since even with a lower level of β_{TH}, an increase in the number of good technology entrepreneurs, resulting from an increase in premium, establishes the level of social surplus beyond SS_{MF}. Therefore, in a weak institutional environment, it is possible to actually enlarge the range of feasible good technology adoption, such that even technologies offering a low positive externality become worthwhile for State intervention. The following proposition can thus be formulated:

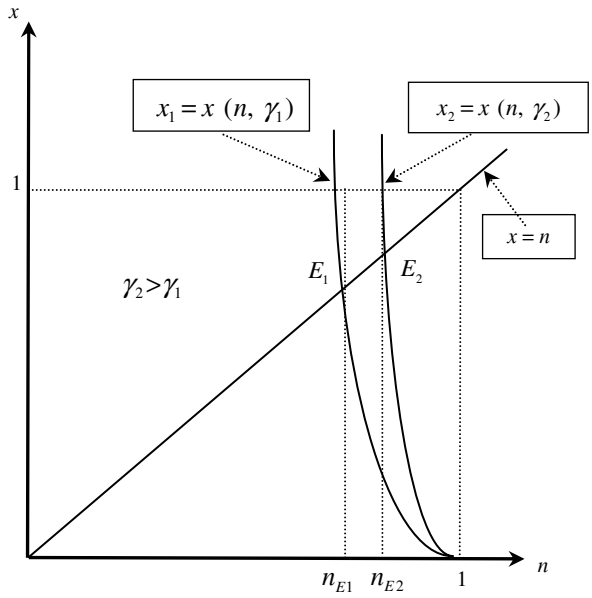

Figure 5.2. Allocation of agents in a weak institutional environment

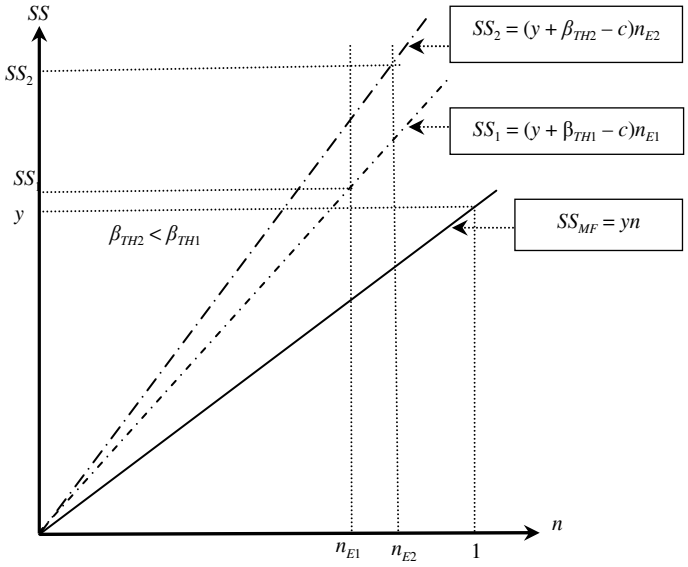

Figure 5.3. Production of positive externalities in a weak institutional environment

Proposition 2. *In a weak institutional environment, suitable government policies can use the rent-seeking activity of bureaucrats to lower the positive externality threshold level at which State intervention in the production sector is optimal, thus extending the range of feasible good technology adoption.*

5.5. EXTENSIONS OF THE MODEL: DIFFERENT PREMIUMS ON PUBLIC FUNDS

In the previous section, γ was considered the sole parameter describing bureaucrats' behaviour. To obtain a more detailed analysis of the impact of the institutional environment upon the allocation of agents, γ can be expressed by two new parameters λ and δ that respectively represent the premium bureaucrats put on subsidies and on specific taxes. Clearly, distinct premiums may represent different sets of institutions involved in the mechanism of extracting taxes or granting subsidies and may thus influence the second-best allocation of agents differently.

Modifying the settings of the model with respect to the talent constraint, bureaucrats' pay-off is changed as follows:

$$w+\beta x+\frac{1-n}{n}\left(s\lambda+\tau\delta\right)\geq y+\beta x-c-\frac{1-n}{n}t+\frac{1-n}{n}s \tag{5.19}$$

Combining constraints (5.4), (5.5) and (5.6) with (5.19), the new constraint set is now given by:

$$x^{*}\leq\frac{y\left(1-n\right)^{2}}{nc}+\frac{\left(1-n\right)^{2}\left(y-t\right)\left(\delta-\lambda\right)}{nc}+\lambda\left(1-n\right) \tag{5.20}$$

The above constraint set leads to the following second-best allocation of agents between State and production sectors:

$$n_{E}^{*}=\frac{-2y+c\lambda-2\left(y-t\right)\left(\delta-\lambda\right)+\sqrt{4cy+c^{2}\lambda^{2}+4c\left(y-t\right)\left(\delta-\lambda\right)}}{2\left[c-y+c\lambda-\left(\delta-\lambda\right)\left(y-t\right)\right]} \tag{5.21}$$

The above expressions thus present a more complete model which allows for a more detailed analysis of bureaucrats' behaviour. The following section applies these settings to the development of State policies that aim to find responses to the rent-seeking activity of bureaucrats.

5.5.1. Rent-seeking as a Function of Premiums on Public Funds

Here we describe the comparative static of government intervention in the production sector to neutralise market failure, as a function of the different premiums which bureaucrats can extract from taxes and subsidies.

We first suppose that the government controls n and x by establishing w, τ, s and t, such that (5.21) is satisfied and the allocation of agents can reach point E_1 (Figure 5.4). In the initial stage where the allocation of agents moves from point A to point B and the number of bureaucrats starts growing, these bureaucrats first face bad technology entrepreneurs who must pay the specific tax τ to the government. The increasing number of bureaucrats, through the monitoring process, augments the pay-off of good technology entrepreneurs, incentivizing their emergence. As seen from Figure 5.4, moving from point A to point B, the number of good technology entrepreneurs would thus increase from 0 to x_B.

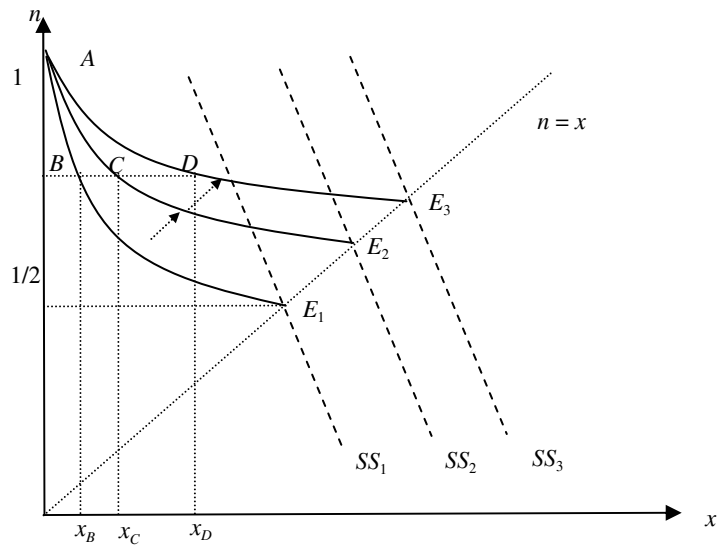

Figure 5.4. The second-best allocation of agents in a weak institutional environment: a positive effect of rent-seeking, given different premiums on specific taxes and subsidies

Subsequently, the bureaucrats increase their discretionary power since the institutional environment at point B becomes weaker (i.e. δ increases). Rearranging inequality (5.20) to mirror this increase in rent-seeking behaviour, we obtain:

$$x^* \leq \frac{y(1-n)^2}{nc} + \delta\frac{(1-n)^2(y-t)}{nc} + \lambda\left[(1-n) - \frac{(1-n)^2(y-t)}{nc}\right] \quad (5.22)$$

Therefore, $\partial x^*/\partial\delta \geq 0$ which means that the constraint curve moves forward with an increase in δ. Hence, the allocation moves to point C where the number of good technology entrepreneurs increases (x_C). The shift of the constraint curve also implies that point E_1 moves upward along line $n = x$ to the point E_2, as shown in Figure 5.4, representing a higher level of social surplus.

Once good technology entrepreneurs appear, the bureaucrats also begin to extract rent from subsidies. Referring to equation (5.22) and analysing the derivative $\partial x^*/\partial\lambda$, it becomes evident that the premium on subsidies may have either a positive or a negative influence on the allocation of entrepreneurs. In fact, $\partial x^*/\partial\lambda \geq 0$ when

$$c \geq \frac{1-n}{n}(y-t) \quad (5.23)$$

Applying appropriate substitutions, condition (5.23) actually represents the condition of positive subsidy, $s \geq 0$.

The case of negative subsidy will be discussed below. In the condition where (5.23) is valid, an increase in λ shifts the constraint set curve upwards and corresponds to a more intensive use of good technology which would shift the allocation of agents to point D (Figure 5.4). At point D, the bureaucrats continue extracting premiums λ and δ, prompting entrepreneurs to switch to good technology that offers a greater pay-off. Moreover, the State uses bureaucrats' rent-seeking activity to modify the exogenous parameters, allocating agents to $x_E = n_E$ and reducing the number of bureaucrats (e.g. the situation moves to point E_3). Therefore, the more intensive the rent-seeking activity of bureaucrats,[5] the greater the x_E, and market failure actually becomes neutralised at a higher level of social surplus.

Clearly, the process of extraction premium from taxes and subsidies is not necessarily a gradual one. Indeed, the premium from subsidies may be already extracted at point B, as well as the premium on taxes, thus shifting the constraint set curve, after the increase in λ and δ, towards the equilibrium point E_3.

5.5.2. Negative Subsidy for Good Technology Entrepreneurs

In the situation where the subsidy is negative, i.e. the case where (5.23) does not hold, modifying the constraints the government must respect (the liability constraint $\tau \leq y - t$ is maintained, since $s \leq \tau$), the constraint set becomes:

$$x^* \leq \frac{y(1-n)^2}{nc} + \delta\frac{(1-n)^2(y-t)}{nc} + \lambda\left[\frac{(1-n)^2(y-t)}{nc} - (1-n)\right] \quad (5.24)$$

The second term in inequality (5.24) shows that the increase in premium on bad technology for which entrepreneurs are taxed (δ) increases the number of good technology entrepreneurs (x^*). At the same time, a rise in premium on subsidies of good technology entrepreneurs (λ) increases x^* if the third term of inequality (5.24) is positive. Elaborating this expression and applying appropriate substitutions, we find that, as in the above case of positive subsidy, the condition of $\partial x^*/\partial\lambda \geq 0$ is only possible when $s \geq 0$. Hence, regardless of whether the subsidy on good technology entrepreneurs is negative or positive, the mechanism of rent-seeking may actually contribute to achieving a better allocation of agents (a greater x) in the production sector when institutions are weak.

While this result confirms that of Acemoglu and Verdier (2000), showing that it is possible to apply a negative subsidy to neutralise market failure, our model also shows that when good technology entrepreneurs are taxed, the number of good technology entrepreneurs is reduced compared to the case where good technology entrepreneurs are given subsidies. The following equality that describes the final allocation of agents in the case of negative subsidy demonstrates this result, compared to that in the case of positive subsidy, where all signs remain positive:

$$n^*_E = \frac{\tau - s}{c + \tau - s} \quad (5.25)$$

Therefore, using negative subsidies rather than positive ones with good technology entrepreneurs, the final allocation of agents is given by a lower number of good technology entrepreneurs and a greater number of bureaucrats. The following proposition can thus be formulated:

Proposition 3. *The State may use rent-seeking to improve the second-best allocation of agents, regardless of whether the subsidies on good technology entrepreneurs are positive or negative. However, a better second-best allocation of agents is obtained when the State gives positive subsidies.*

Interestingly, the second-best allocation of agents behaves differently to the change of the premium on subsidies or specific taxes. To demonstrate this, from (5.24) we find the ratio of the first derivative of both premiums:

$$\frac{\frac{\partial x^*}{\partial \lambda}}{\frac{\partial x^*}{\partial \delta}} = \frac{s}{\tau} \tag{5.26}$$

Equation (5.26) demonstrates that changes in λ or δ do not elicit the same response in x^*, indicating that the State may have various policies at its disposal for correcting market failure since the second-best allocation of agents behaves differently to the change of the premium placed by bureaucrats on specific taxes or subsidies. This could be valuable in a situation when different institutions are involved in subsidization and taxation. For example, subsidizing may be given a primary role if the State does not intend to improve the corresponding institution in the near future, but intends to impose as much good technology as possible.

5.6. CONCLUSIONS

This chapter, starting from Acemoglu and Verdier's (2000) model, explored how changes in institutional environment strength affect the allocation of resources in both State and production sectors when the government intervenes to correct market failure. We treat the changes in the institutional environment with a parameter that accounts for both the rent-seeking activity of bureaucrats and the administrative capability of the government. It is supposed that bureaucrats, introduced to neutralise market failure, are involved in transferring subsidies or taxes to/from entrepreneurs who apply good or bad production technology. Subsidies and taxes therefore become a source of rent for bureaucrats. In a weak institutional environment, an increase in bureaucrats' discretionary power influences the choice of agents to become entrepreneurs or bureaucrats, as well as to adopt bad or good technology.

While our findings regarding the positive influence of rent-seeking activity are in line with those of Acemoglu and Verdier (2000), the institutional approach adopted in the present model makes it inappropriate to compare our overall results with those of the above authors. Our model demonstrates that, in a weak institutional environment, the State may actually use the bureaucrats' rent-seeking activity to achieve a second-best agents allocation, wherein more entrepreneurs opt for good technology. Indeed, by implementing suitable State policies as a feedback mechanism to guide rent-seeking behaviour, market failure can be neutralised with lower bureaucratic

costs and with a higher level of social surplus. We show that the State may use bureaucrats' rent-seeking activity to extend the range of feasible good technology adoption in the production sector.

The model provides a detailed analysis that considers how differences in the rent which bureaucrats extract from taxes and subsidies influences the second-best agents allocation. In fact, we find that the second-best allocation of agents changes as a function of the rent which bureaucrats manage to obtain from different sources. Therefore, to neutralise market failure, the State may choose among various policies, depending on the strength of the institutions involved in taxation and subsidization. Finally, our model demonstrates that while both positive and negative subsidies can be applied to good technology entrepreneurs to neutralise market failure, higher levels of good technology adoption and greater social surplus are achieved when the subsidy is positive.

As shown, in a weak institutional environment, bureaucrats' rent-seeking activity can actually work as a constructive mechanism to achieve a better allocation of resources. However, the positive effect of rent-seeking is not everlasting. Once the institutional environment is strong, the search for rent becomes a negative factor that exhausts economic resources and is detrimental to economic performance. The analysis of this aspect goes beyond our model. Further research would be required to consider how new institutional parameters can be incorporated so as to overcome this limit. As it is, the model offers a framework for guiding empirical research to test the propositions regarding the effect of rent-seeking on economic performance in a weak institutional environment.

NOTES

1. An example of such rent-seeking activity can be the interest rate gained from delay in payments of subsidies and in the transfer of taxes, a common practice of government agencies in developing and transition countries (Saha, 2001).
2. The introduction of such taxes is in response to the reality surrounding weak institutions where tax evasion is common practice (Choi and Thum, 2005).
3. The cost of good technology (c) and the level of entrepreneur's output (y) cannot be considered under the State's policy.
4. Although, a usual policy response to the increase in bureaucrats' rent-seeking activities is to apply higher wages (Rose-Ackerman, 1999), Waller et al. (2002) demonstrate in their theoretical paper that the increase in bureaucrats' wages may neither reduce corruption itself, nor the number of corrupt state officers. Van Rijckeghem and Weder (2001) empirically prove that the increase in bureaucrats' wages must be very substantial to decrease the level corruption, which is hard to achieve in a context of weak institutions.
5. The premium cannot increase indefinitely to reach the first-best allocation of agents ($n = x = 1$), since it would require bureaucrats to receive a negative wage. The maximum possible level of premium at the second-best allocation point is given by substituting $w = 0$ in the constraint set and setting $n = x$; therefore $\gamma_{\max} = (y/c) - 1$.

REFERENCES

Acemoglu, D. and T. Verdier (1998), 'Property Rights, Corruption and Allocation of Talent: a General Equilibrium Approach', *Economic Journal*, **108**(450), 1381–1403.

Acemoglu, D. and T. Verdier (2000), 'The Choice Between Market Failures and Corruption', *American Economics Review*, **90**(1), 194–211.

Acemoglu, D. (2006), 'A Simple Model of Inefficient Institutions', *Scandinavian Journal of Economics*, **108**(4), 515–46.

Ahlin, C. and P. Bose (2007), 'Bribery, Inefficiency, and Bureaucratic Delay', *Journal of Development Economics*, **84**(1), 465–86.

Aidt, T.S. (2003), 'Economic Analysis of Corruption: A Survey', *Economic Journal*, **113**(11), F632–52.

Auriol, E. and M. Benaim (2000), 'Standardization in Decentralized Economies', *American Economic Review*, **90**(3), 550–70.

Brezis, E.S. and T. Verdier (2003), 'Political Institutions and Economic Reforms in Central and Eastern Europe: A Snowball Effect', *Economic Systems*, **27**(3), 289–311.

Campos, N. (2000), 'Context is Everything: Measuring Institutional Change in Transition Economies', *World Bank Policy Research Working Paper*, no. 2269.

Choi, J.P. and M. Thum (2005), 'Corruption and the Shadow Economy', *International Economic Review*, **46**(3), 817–36.

Coppier, R. and E. Michetti (2006), 'Corruption vs Production. A Non-linear Relationship', *Economic Modelling*, **23**(4), 622–37.

Di Tommaso, M., M. Raiser and M. Weeks (2007), 'Home Grown or Imported? Initial Conditions, External Anchors and the Determinants of Institutional Reform in the Transition Economies', *Economic Journal*, **117**(520), 858–81.

Djankov, S., E.L. Glaeser, R. La Porta, F. Lopez-de-Silanes and A. Shleifer (2003), 'The New Comparative Economics', *NBER Working Papers Series*, no. W9608.

EBRD (2002), *Transition Report*, London: EBRD.

Ellis, C. and J. Fender (2006), 'Corruption and Transparency in a Growth Model', *International Tax and Public Finance*, **13**(2–3), 115–49.

Esfahani, H.S. (2000), 'Institutions and Government Controls', *Journal of Development Economics*, **63**(2), 197–229.

Esfahani, H.S. and M.T. Ramirez (2003), 'Institutions, Infrastructure, and Economic Growth', *Journal of Development Economics*, **70**(2), 443–77.

Grossman, H.I. (2001), 'The Creation of Effective Property Rights', *American Economic Review*, Papers and Proceedings of the Hundred Thirteenth Annual Meeting of the American Economic Association, **91**(2), 347–52.

Guriev S. (2004), 'Red Tape and Corruption', *Journal of Development Economics*, **73**(2), 489–504.

Havrylyshyn, O. and R. van Rooden (2003), 'Institutions Matter in Transition, But So Do Policies', *Comparative Economic Studies*, **45**(1), 2–24.

Huang, H. and C. Xu (1999), 'Institutions, Innovations, and Growth', *American Economic Review*, **89**(2), 438–43.

Huntington, S.P. (1968), *Political Order in Changing Societies*, New Haven: Yale University Press.

Infante, D. (1999), 'Entrepreneurship, Rent-seeking and Economic Development', Federico Caffè Centre, Roskilde University, *Research Report*, 9/1999.

Infante, D. and J. Smirnova (2007), 'Institutional Environment and Transition Economies' in *Proceedings of the Sixth International Scientific and Practical Conference 'State Regulation of the Economy. A Regional Aspect'*, University of Nizhni Novgorod – Russia.

Jack W. (2002) 'Institutional Design and the Closure of Public Facilities in Transition Economies', *Economics of Transition*, **10**(3), 619–35.

Leff, N. (1964), 'Economic Development through Bureaucratic Corruption', *American Behavioral Scientist*, **8**(3), 6–14.

McChesney, F.S. (2001), 'Ever the Twain Shall Meet', *Michigan Law Review*, **99**(6), 1348–69.

Méon, P.G. and K. Sekkat (2005), 'Does Corruption Grease or Sand the Wheels of Growth?', *Public Choice*, **122**(1–2), 69–97.

Nelson, R.N. and B.N. Sampat (2001), 'Making Sense of Institutions as a Factor Shaping Economic Performance', *Journal of Economic Behavior and Organization*, **44**(1), 31–54.

Olsen, T. and G. Torsvik (1998), 'Collusion and Regulation in Hierarchies: A Case of Beneficial Corruption', *International Economic Review*, **39**(2), 413–38.

Rajan, R.G. and L. Zingales (2006), 'The Persistence of Underdevelopment: Institutions, Human Capital or Constituencies', *CEPR Discussion Papers*, no. 5867.

Recanatini, F. and R. Ryterman (2000), 'Disorganization or Self-organization?', *FEEM Working Paper*, no. 26.

Rose-Ackerman, S. (1999), *Corruption and Government. Causes, Consequences and Reform*, Cambridge: Cambridge University Press.

Saha, B. (2001), 'Red Tape, Incentive Bribe and the Provision of Subsidy', *Journal of Development Economics*, **65**(1), 113–33.

Shi, S. and T. Temzelides (2004), 'A Model of Bureaucracy and Corruption', *International Economic Review*, **45**(3), 873–908.

Shleifer, A. and R.W. Vishny (1994), 'Politicians and Firms', *Quarterly Journal of Economics*, **109**(4), 995–1025.

Skaperdas, S. and C. Syropoulos (2001), 'Guns, Butter, and Openness: On the Relationship between Security and Trade', *American Economic Review*, **91**(2), 353–57.

Van Rijckeghem C., Weder B. (2001), 'Bureaucratic Corruption and the Rate of Temptation: Do Wages in the Civil Service Affect Corruption, and by how much?', *Journal of Development Economics*, **65**(2), 307–31.

Waller, C.J., T. Verdier T. and R. Gardner (2002), 'Corruption: Top Down or Bottom Up?', *Economic Inquiry*, **40**(4), 688–703.