# 13 Corruption

<div align="right">

"How deep is your love?" [Bee Gees]

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**Learning Goals:**

- Understand how departing from the benevolent planner assumption alters the nature of the equilibrium

- Understand why generalized corruption can be much more detrimental to growth than centralized corruption.

- Understand why strategic complementarities may lead to endemic corruption.

- Acknowledge the critical role of institutions as a fundamental factor explaining economic development.

## 13.1 Introduction

In the previous chapters, we stressed the key role of government policies for economic development. So far, however, we have assumed that policies are designed and implemented by benevolent planners whose interests are aligned with the social interest. This chapter departs from this perspective.

In the real live, public programs are instituted in complicated political processes and implemented through complex bureaucracies. Instead of benevolent planners, political leaders often pursue their own selfish objectives, using their powers to keep themselves in office or to direct resources to their political supporters. In many countries, government officials are primary agents of diversion, seeking to maximize their own benefit through extortion, corruption fees or unduly appropriation of public assets. As a by-product, in societies with high levels of corruption, individuals tend to spend valuable resources in seeking for fast money and special favours, instead of devoting them to production and innovation. When corruption is very high, institutions become dysfunctional, paving the way for corruption to become self-sustained.

In this chapter, we enrich the Solow growth model to examine the implications of corruption and rent seeking on economic performance. This will also provide an opportunity

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to discuss the key role of political institutions in aligning the objectives of decision-makers with the public interest. In this discussion, three models of corruption will be considered. In the first model, a *non-benevolent despot* (the kleptocrat) empowered with perfect control over its bureaucracy uses his discretionary power with the aim to maximize his personal theft from the government budget. The only limits he faces are the political, administrative, and legal institutions he cannot change. The second model (*decentralized corruption*) examines the case in which a benevolent leader delegates discretionary power on a large number of non-benevolent public officials which corruption activity cannot be coordinated. In this case, the level of corruption will depend on the ability of the planner to design incentive compatible contracts. Finally, we consider the case of generalized corruption, that affects all levels of the public administration. In this case, there is no benevolent planner seeking to design optimal institutions. The likelihood of detection and punishment decreases dramatically, institutions and policies become highly dysfunctional, and corruption becomes endemic.

The chapter proceeds as follows. Section 13.2 defines corruption and gives some real life examples. Section 13.3 introduces the model with centralized corruption. Section 13.4 addresses the case where corruption is undertaken by a large number of public officers whose activity the benevolent planner cannot control. Section 13.5 briefly reviews how societies in the real-world deal with the problem of corruption and the role of institutions in shaping incentives. Section 13.6 analyses the case where institution become dysfunctional, and corruption becomes endemic. Section 13.7 concludes.

## 13.2  Corruption

### 13.2.1    *What is corruption?*

Corruption may be defined as an "act in which the power of public office is used for personal gain in a manner that contravenes the rule of the game" [255]. This includes embezzlement, the appropriation of public assets for personal use, the celebration of lucrative contracts to business owed by the public officer' relatives (actions that the public officer can carry out *alone),* bribery and extortion (actions that necessarily involve *two parties*).

Three conditions are necessary for the existence of corruption: (i) the public official must have the authority to design or administer policies and regulations; (ii) this discretionary power must allow the extraction or creation of economic rents; (iii) the incentives embodied in political, administrative, and legal institutions must be such that the official has incentive to use his discretionary power to extract or create rents[256].

The incidence of corruption varies widely across countries. Corruption is more pervasive in the developing world but is a matter of major concern all over the world. Corruption may affect both the lower level of administration and the top levels in the government. Where corruption emerges, it is not because people there are different, but because there are economic or social incentives for it. As stated by Douglas North "if the institutional matrix rewards piracy more than productive activity then learning will take the form of learning to be better pirates"[257].

### 13.2.2    *What is rent seeking?*

Government actions influence the profitability of private agents. To the extent that government officers have the power to set tariffs and subsidies, to buy goods and services, to license industrial activities and to regulate monopolies, they will face pressures from economic agents seeking to obtain favours and special regulations. Devoting potentially

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[255] Jain, A., 2001. Corruption: a review. Journal of Economic Surveys 15(1), 71-121.

[256] Aidt, T., 2003. "Economic Analysis of Corruption: a survey". The Economic Journal 113, November, 632-653.

[257] Douglas North, 1993. The new institutional economics and development", mimeo Washington University, St. Louis. WUSTL Economic Working Paper Archive (p.6).

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productive resources to persuade politicians and civil servants to take actions that generate income transfers or rents to particular individuals or groups at the cost of the general interest is called "rent seeking"[258].

Rent seeking can be either legal or illegal. At the *legal level*, organized lobbies such as trade organizations and unions influence the public decisions, by making pressures and giving financial or electoral support to those parties that better serve their interests. Such influence exists because politicians need votes and financial contributions to their campaigns. At the *illegal level*, agents may influence the decisions of bureaucrats and policymakers by offering them a bribe. Bribery is a form of *pecuniary corruption*: public servants are induced to take actions that deviate from the public interest in exchange for monetary benefit or gifts.

### 13.2.3    What bribes are for?

There are many things private parties can buy from public officials with bribes or other forms of influence. This includes[259]:

- Time savings and regulatory avoidance: in many development countries excess bureaucracy and red tape rank very high as an obstacle to doing business. Often firms are given the opportunity to pay bribes to bureaucrats so as "speed up" the bureaucratic process of obtaining the required permits.

- Government revenues: bribes can be used to escape taxes or other payments to the government. A typical case is when a tax inspector accepts bribes in exchange for lower tax collection.

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[258] More generally, the term rent seeking refers to efforts to obtain wealth transfers without creating any value. A cartel of firms agreeing to raise prices, for instance, is a form of rent seeking that does not involve bribery or pressures on civil servants. In this chapter we are interested on a sub-category, relating to persuading public officers to deviate from the public interest.

[259] Gray, C. and Kaufman, D., 1998. "Corruption and Development", Finance and Development, March.

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- Government benefits: bribes can influence the allocation of benefits to the private sector. This includes monetary benefits (subsidies, pensions) or in kind (food supplies, access to medical care, access to courts, housing, privatizations). For instance, a policeman who is supposed to protect all citizens may be given a bribe to look after a particular interest, only. This comes at a cost of unfair competition, because when the officials can privately sell the protection of property rights to individual firms, they have little interest to provide the public at large with open access to this essential service[260].

- Government contracts: bribes can be given to influence the choice of private suppliers to the public sector. That is, contracts may be allocated to the firm that pays the largest bribe, instead as to the one that puts the lower bid.

- Influencing legal and regulatory outcomes: bribes can influence how existing laws, rules or regulations are *implemented* with respect to the bribe payers. For instance, bribery can be used to prevent the government from stopping illegal activities, such as pollution and drug dealing, or for a firm to obtain the consent of the competition authorities to charge a monopoly price. At a higher level, bribes can be directed to influence how laws, rules and regulations are *designed*. When bribes are given to parliamentarians to "buy" important pieces of legislation or to government officials to enact favourable regulation, a case of "state capture" is said to take place. This is a deep form of corruption.

### 13.2.4    The grease in the wheel's argument

Many people believe that corruption can be efficiency enhancing: by providing bureaucrats a pecuniary incentive (*speed money*) corruption may help overcome the excess bureaucracy and red tape. As long as bureaucrats give priority to the individuals paying the

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[260] According to Hellman et al. (2003) this mechanism of purchasing *individualized* protection of property rights became very popular in Russia, as a natural response to the general weakness in the rule of law after the collapse of the Soviet Union [Hellman, Joel S., Geraint Jones, and Daniel Kaufmann (2003), Seize the State, Seize the Day: State Capture and Influence in Transition Economies, Journal of Comparative Economics, 31, pp. 751-773].

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higher bribes and those who offer the higher bribes are those who are carrying the more promising projects, then bribery could be an efficient mechanism to allocate the bureaucrats' scarce time.

The *grease in the wheels* argument fails, however, for various reasons[261]: First, this is second-best reasoning: that is, given the rigidity created by the bureaucracy, corruption helps relaxing this rigidity. Clearly, the first best policy would be to address the rigidity itself. Second, since bribery is hidden, it is not equivalent to a competitive bid. Third, the implied "contracts" cannot be enforced by law, so nothing ensures that the higher bids will be actually attended first. Fourth, even if bribery could effectively allocate faster government decisions to those who value it more, the society would be better off if the corresponding revenues were appropriated by the government, rather than by corrupt bureaucrats. Last – but not the least - corruption is often what causes bureaucratic processes to be slowed down, not the other way around: if public officers get rewarded by the existence of red tape and regulations, they will tend to create extra red tape and regulations, just to increase their prey opportunities[262].

### Box 13.1 Corruption in the real world

"One of the most extreme real-world examples of theft of productive public infrastructure, according to Abbott (1988, p. 172) involves Luckner Cambronne, a member of the elite that ruled Haiti under the Duvaliers. He apparently had this workman pull up and carefully store the entire rail system lining Port-au-Princes to Verrettes via St. Marc; he then

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[261] Aidt (2003), op cit.

[262] Kaufman, D. and Wei, S., 2000. Does grease money speed up the wheels of commerce? IMF Working Paper 00/64. Guriev, S., 2004. Red Tape and Corruption, Journal of Development Economics 73, 489-504.

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sold the 150 kilometres of railroad as scrap metal and pocket the money for himself" [Mauro, 2004, p.5][263].

"(…) The bank owned a large stake in one of the country's most profitable companies. But when the management attempted to sell the stake to the biggest bidder, it was advised by the government to sell the shares to the company's founder at a quarter of the market price instead. The founder turned out to be a close friend of the country's president. Where is this bank? It happens to be Crédit Lyonnais in France (…)"  [Shleifer and Vishny, 1998, p 1][264].

### Box 13.2 The TI Corruption Perceptions Index

The recognition that fighting against corruption and monitoring its progress requires some form of measurement motivated the development of various measures of corruption. A famous indicator is the Corruption Perceptions Index (CPI), produced by Transparency International. The CPI measures corruption perceptions as seen by businessman and country analysts. The index ranges from 0 (highly corrupt) to 10 (highly clean).

Figure 13.1 displays the results of the 2005 survey (159 countries), crossed with per capita income. The positive correlation in the figure reveals a general tendency for the incidence of corruption to be larger in poorer economies. For instance, the Scandinavian bureaucracies rank as the cleanest in the World, while most of the sub-Saharan African bureaucracies rank at the bottom. Whether this reflects a causality from corruption to pr capita income or from per capita income to corruption, we don't know. Arguably, a higher incidence of corruption will give rise to more resources wasted and bad policies, lowering per

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[263] Mauro, P., 2004, "The persistence of corruption and slow economic growth". IMF Staff Papers 51 (1), 1-18

[264] Shleifer, K., Vishny, W., 1998. The Grabbing Hand. Harvard University Press.

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capita income[265]; but on the other hand, fighting corruption and building strong institutions requires resources that may not be easy to rise wherever per capita output is low[266].

*Figure 13.1 – Corruption perceptions and per capita GDP*



$R^2 = 0,799$
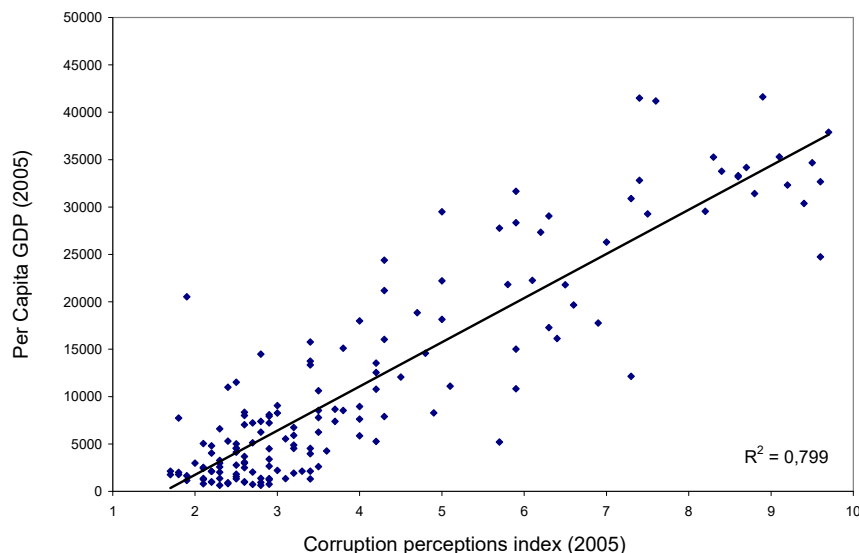
Source: Transparency International, http://www.transparency.org/.

## 13.3　A model of centralized corruption

This section examines the case of a *non-benevolent leader* (the Kleptocrat), whose only aim is to maximize its personal expenditure. The analysis assumes that the Kleptocrat faces no electoral constraints and is blessed with perfect information and perfect control over

[265] Mauro (1995) investigated the correlation between corruption and economic performance, controlling for the possible endogeneity. Using cross-section data for 70 countries in the early 1980s, the author found a strong causality from corruption to economic growth. The author also found corruption to be strongly correlated with other indices of bureaucratic and institutional inefficiency, including "political instability" and "inefficiency of the legal system" [Mauro, P., 1995. Corruption and Growth. Quarterly Journal of Economics 110 (3), 681-712].

[266] United Nations (2005, p.16): "Many poor countries without adequate resources for decent salaries - or the checks on political abuse that provide the incentives for performance and the ability to weed out the inept and corrupt – are unable to afford an effective public sector (…)". [United Nations, 2005. Millenium Development, Project Report, United Nations, New York].

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the bureaucracy. The underlying model is the Solow model augmented with public inputs already examined in Chapter 10.

### 13.3.1   Main assumptions

In the private sector, the individual firm production function is given by:

$$Y_i = A_t K_i^{\beta} N_i^{1-\beta} \quad . \quad\quad\quad (13.1)$$

The productivity term has two components: an exogenous rate of technological progress and an efficiency term related to the ratio of (productive) government expenditures to GDP:

$$A_t = Ae^{gt}, \text{ with } A = \left(\frac{G}{Y}\right)^{\eta} \text{ and } \eta > 0 \text{ (13.2)}$$

It is assumed that government revenues are raised through a production tax ($\tau$).

In this model, corruption takes the form of *theft from government revenues*, i.e, the planner decides to spend a proportion $\phi$ of the government revenues "for political reasons". This translates into a lower provision of productive public inputs:

$$G = \tau(1-\phi)Y \quad\quad \text{with} \quad \phi \geq 0 . \quad\quad (13.3)$$

The total amount of theft is therefore:

$$\Phi = \phi \tau Y . \quad\quad\quad\quad\quad (13.4)$$

In practice, corruption does not need to take the form of theft on the government budget. Corrupt leaders may confiscate assets from the private sector or impose briberies to allocate government resources. From the individual' firm point of view, however, what matters is the total amount paid. Modelling corruption as theft on the government budget is simple way of capturing many forms of extortion.

### 13.3.2   The clever Kleptocrat

Assume that, instead of a benevolent planner, you were a kleptocrat whose only objective was to use the government budget for personal expenses. Would you divert *all* tax proceeds to yourself? Clearly, the answer is no: if you were a clever kleptocrat, you would

realize that failing to provide essential infrastructure to the economy would impact too badly on aggregate output, and therefore on your tax base.

As an extreme case, just think what would happen if you set $\phi$=1: in that case, there would be no public provision at all (*G=0*). Since government services are essential to production (equation 13.2), there would be no private economy either and you would end up as a bankrupt despot. A clever Kleptocrat must take into account that stealing too much *you may end up eating the egg and the chicken, too*.

Formally, the Kleptocrat problem is to maximize the amount of theft, taking into account how theft impacts on per capita income and by then on government revenues. To see this in terms of our model, just remember the formula for the steady state level of per capita income in the Solow model and adapt it for the existence of a public input. This is equation (10.13), that we reproduce here:

$$y_t^* = \left[\left(\frac{G}{Y}\right)^{\eta}(1-\tau)^{\beta}\right]^{\frac{1}{1-\beta}}\left(\frac{s}{n+\delta+\gamma}\right)^{\frac{\beta}{1-\beta}}e^{\gamma t}. \qquad (13.5)$$

Substituting (13.5) and (13.3) on our variable of interest, (13.4), we get:

$$\Phi = \tau\phi\left[((1-\phi)\tau)^{\eta}(1-\tau)^{\beta}\right]^{\frac{1}{1-\beta}}\left(\frac{s}{n+\delta+\gamma}\right)^{\frac{\beta}{1-\beta}}L_t. \qquad (13.6)$$

Now, choosing $\tau$ and $\phi$ to maximize $\Phi$ (this is a bit tedious, though not difficult), we obtain (the superscript *K* stands for the *kleptocrat* solution):

$$\tau^K = \frac{\eta+1-\beta}{\eta+1} \qquad\qquad ; \qquad\qquad (13.7)$$

$$\phi^K = \frac{1-\beta}{\eta+1-\beta} \qquad\qquad . \qquad\qquad (13.8)$$

Comparing to the benevolent planner' case (10.9), you see that the tax rate is now higher. In terms of Figure 10.3, the equilibrium when the ruler is a fully empowered kleptocrat is represented by point K, with a positive $\phi$.

Now, if we substitute (13.7) and (13.8) into (13.3), we realize that there is an agreement between the kleptocrat and the benevolent planner regarding the proportion of output to be spent in public inputs[267]:

$$\left(\frac{G}{Y}\right)^K = \left(\frac{G}{Y}\right)^G = \frac{\eta}{1+\eta} \qquad (13.9)$$

Remember that this fraction corresponds exactly to the contribution of the public input to production, as stated in equation (10.3). The conclusion is that, once you act as a clever kleptocrat, you want resources in your economy to be allocated efficiently. Using Easterly (2001)'s words, you become "solicitous of your victim' prosperity"![268]

Of course, consumers in this economy will be worse off than in the benevolent planner case. This can easily be demonstrated substituting (13.7) and (13.8) in (10.13) and (10.14).

### 13.3.3    Dynamic considerations

The above analysis assumes that the kleptocrat maximizes the *steady state* level of theft. However, in the real world, despots do not stay in power forever. Either through democratic elections or through revolutions, non-benevolent leaders may lose their power. Thus, the optimal misappropriation policy from the kleptocrat point of view should also take into account the transition dynamics and length of time in office. Solving such a problem is however beyond the scope of this book.

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[267] Barro, R., 1990. "Government spending in a simple model of endogenous growth". Journal of Political Economy  98, 103-125.

[268] Easterly, W., 2001. "The Elusive Quest for Growth: economist's adventures and Misadventures in the Tropics, Massachusetts Institute of Technology.

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Also note that incorporating inter-temporal considerations into the model opens the door for another trade-off: the re-election probability may itself depend on the extent of the theft. That is, if the kleptocrat extorts too much today, he may face a higher probability of losing the chicken of the golden eggs tomorrow (either through democratic elections or through a coup d'état). In this case, the kleptocrat must balance the benefits of more extraction during a shorter period of time with those of less extraction during a longer period of time. Intuitively, this decision shall be dependent on its subjective discount rate: if the kleptocrat is very impatient, he will tend to increase current misappropriation[269].

Of course, the probability of dismissal will be more or less sensitive to the extent of the theft, depending on how strong the political regime is: when the kleptocrat leads a strong dictatorship supported by the military cupules, the likelihood of dismissal is lower - and hence theft opportunities are higher - than when the regime is democratic or when generals have not a share in the cake. In a democratic system, the planner may improve the probability of re-election by directing transfers to groups of voters with political influence.

In this judgement it may be wise to find some foreign allies. For instance, suppose you were running an economy endowed with an important mineral resource, such as petroleum. In that case, it would be a good idea to buy extra political stability sharing the cake with a foreign nation with strong military power. You could do so by allowing foreign companies to extract some oil in your territory, in exchange for a military cooperation agreement. If you forgot to do so - and if indeed your mineral resources were significant - then you would most probably face an internal guerrilla, supported by a foreign nation. Being solicitous of your chicken longevity may have a foreign affairs dimension, too.

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[269] Because government expenditures depend on *contemporaneous* taxation, the model does not allow the kleptocrat to "take all the money and run" ($\phi=1$). But the model could easily be adapted, postulating a one-year delay in the transformation of taxes into government services (e.g, government inputs need one period to enter in the production function). In that case, increasing misappropriation today would impact on the economic performance only tomorrow, giving the Kleptocrat time to take all the money before leaving his post . Such possibility was considered by Ventlou (2002), who analyses the choices of the planner (who maximizes sequential flows of budget misappropriations) and of private agents (who seek to maximize consumption and try to control politicians with voting assessment) [Ventelou, B., 2002. Corruption in a model of growth: political reputation, competition and shocks. Public Choice 110, 23-40].

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### 13.3.4    *Shaping the incentives of the leader*

The theft opportunities of a non-benevolent leader depend on the incentives embodied in institutions that he cannot change. Wherever political, administrative, and legal institutions are not strong enough to persuade politicians from pursuing their own interests, they may take actions that deviate from their constituencies' point of view. Thus, it is the interest of the public to design institutions that reduce the corruption opportunities of non-benevolent leaders.

The most basic instrument to protect citizens from the arrival of selfish political leaders baked by full majority in the parliament id the Constitutional Law. The constitution determines how the different political powers are separate, how high-level public officers are appointed, and what they are allowed to do. Constitutional laws typically can only be changed with a large majority of votes in the parliament, or sometimes with a referendum. At lower levels, different laws can be designed to frame the executive power in different dimensions, and auditing institutions can be created to monitor the compliance of the different political decisions with the law. If the various political institutions are independently appointed and remain uncoordinated, this will favour mutual control.

In complement to formal institutions, there is a role for the *civil society*. A strong civil society backed by a free press that brings watchdogs to the fore helps monitoring the implementation of public policies and in maintaining a continuous pressure on governments to follow policies that best address the people's needs. In some countries, civil society has an explicit consultation role in the decision-making process. Surveillance by civil society will be more effective if there is transparency in decision-making. If government decisions and expenditure programs are publicly known, there will be a further source of social scrutiny over policymakers, inducing them to remain honest. In many countries, government officials are required to make periodic declarations of assets and income sources. This makes more difficult for them to hide illegal revenues.

In general, democracies with strong political institutions, transparent decision making, and a participative civil society tend to be less permeable to corruption than dictatorships where the policy decisions are hidden from public view and the civil society is repressed.

### 13.4  The model with decentralized corruption

#### *13.4.1    Decentralized corruption and the "tragedy of the commons"*

We learned that, under centralized (or organized) corruption, the Kleptocrat looks after the prosperity of its constituencies.  In his maximization problem, he takes into account that stealing too much will drive the economy down along the Laffer curve, reducing the tax base. He therefore has incentive to coordinate all the extraction activity, defining the shares each official can have, so that the overall level of corruption does not affect the economy too badly[270].

A different case occurs when the leader has no control over his bureaucracy. When corruption is undertaken by *a large number* of uncoordinated civil servants, the overall level of corruption will be much higher. The reason is that each corrupt official, being too small to influence the overall outcome, has the incentive to impose as many bribes as he can, without taking into account the shape of the Laffer curve. Like in the "tragedy of the commons": when the law enforcement becomes to weak, it becomes virtually impossible to preclude any public servant from entering the extraction activity (non-exclusion). However, as more and more people engage in bribery, the amount extracted by each corrupt officer decreases (rivalry). Thus, competition over the common resource would lead to its depletion: in the limit, $\phi$ would approach 1 and the economy would disappear.

Fortunately, rent seeking is not a costless activity. Bribing, lobbying, matching corrupt officials and corruption opportunities require time and effort. These costs imply that individuals will devote time to rent seeking only to the extent that the reward exceeds the opportunity cost. This mechanism will in general prevent the economy from being totally "exterminated". The other side of the coin is that rent seeking diverts valuable resources

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[270] Wade (1982) found an interesting example of *organized corruption* in South India: the author observed that each level of the hierarchy in the administration of the irrigation system obtained a fixed percentage of the total bribe [Wade, R., 1982. The system of administrative and political corruption: canal irrigation in Soth India. Journal of Development Studies 18, pp. 287-328].

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away from production. Private agents, instead of devoting resources to production, will invest part of their talents in seeking for special favours and easy profits. So the economy will be operating below its productivity frontier. The following model addresses these ideas formally.

### 13.4.2   *Rent seeking as a diversion activity*

To examine the consequences of people devoting part of their effort to rent seeking, let's go back to the Solow model augmented with a public good[271]. As in the Kleptocrat case, the extraction activity targets the government revenues, $\tau Y$. The Kleptocrat is however replaced by a *benevolent* leader that cannot control the bureaucracy.

Let $\psi$ be the fraction of time each individual devotes to rent seeking and $1-\psi$ the time devoted to legal work. Output will be determined according to:

$$Y = A_t K^\beta N_Y^{1-\beta},\qquad\qquad (13.10)$$

where A is defined as (13.2) and

$$N_Y = (1-\psi)N \qquad\qquad (13.11)$$

is the quantity of working-time allocated to production. Since rent seeking takes time, the opportunity cost of rent seeking will be the wage rate.

The difference between (13.10) and (13.1) is that the production function is now parametric in the proportion of labour devoted to rent seeking, $\psi$. In the extreme case in which $\psi=0$, a benevolent planner optimally deciding the tax rate would be able to achieve the first-best outcome, as given by (10.16). Our quest is to find out how much will the production function shift down when the planner has no control over its bureaucracy.

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[271] The following is an adaptation of the AK model proposed by Mauro (2004), op. cit.

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In this model, we assume that the proportion $\phi$ of resources deviated from public provision accrues to households, as a reward of rent-seeking. The flow income chart of the economy is displayed in Figure 13.2.

*Figure 13.2: The income flow chart with decentralized corruption*
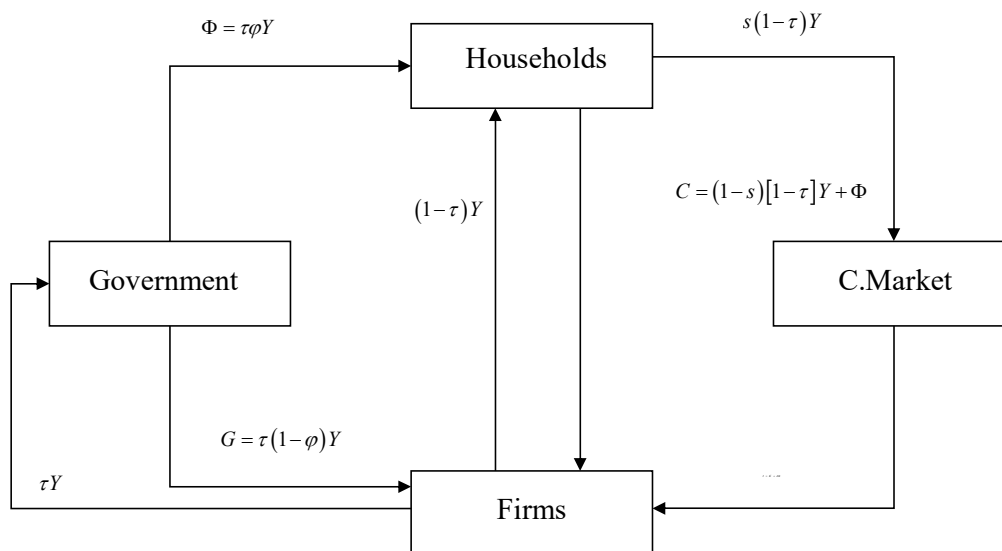


### 13.4.3 The rent-seekers' production function

To find out the equilibrium level of rent seeking, one needs to specify a "production function" relating the time spent in rent seeking to the amount of extraction achieved. To be simple, let's assume that the proportion $\phi$ of government resources extracted by rent-seekers is a linear function of the proportion of time devoted to rent seeking, $\psi$:

$$\phi = b\psi \qquad (13.12)$$

where $b$ is an exogenous parameter measuring the *effectiveness* of the rent seeking time. In a minute we will discuss how this parameter shall relate to the quality of an economy's institutions.

The total amount of resources deviated from the government budget by rent seekers will be therefore:

$$\Phi = \phi\tau Y = \psi b\,\tau Y\,. \qquad (13.13)$$

### 13.4.4 Optimal rent seeking at the individual level

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Households' income in this economy is the sum of the wage bill with total theft:

$$[(1-\psi)w + \psi bty]N.$$ 
(13.15)

Each household is endowed with a unit amount of time. Thus, the household will allocate its time to legal work or to rent seeking (i.e, he chooses $\psi$ ) so as to maximize the term inside brackets in (13.15), taking the wage rate as given. In this model, individuals do not internalise the adverse effect of their appropriative activities on aggregate income and on the wage rate. Abstracting from corner solutions, this leads to the following arbitrage condition:

$$w = b\tau y.$$ 
(13.16)

This condition states that in the optimal allocation of time, spending one extra hour in formal work must pay the same as one extra hour of rent seeking.

### 13.4.5 *The equilibrium level of rent seeking*

To determine the impact of individual decisions in the aggregate, we need to determine the wage rate. The wage rate is determined by the labour supply and the labour demand. The labour demand is such that the marginal product of labour is equal to the wage rate. Taking into account the income tax, this is:

$$(1-\tau)\frac{\partial Y}{\partial N_Y} = \frac{(1-\beta)(1-\tau)Y}{N_Y} = \left[\frac{(1-\beta)(1-\tau)}{(1-\psi)}\right]y = w$$ 
(13.14)

Substituting the wage rate (13.14) in (13.16) and dividing (for convenience) both sides by *y*, the (macro-level) arbitrage condition becomes:

$$\tau b = \frac{(1-\beta)(1-\tau)}{1-\psi}.$$ 
(13.17)

The left-hand side of (13.17) gives the *marginal product of rent seeking* per unit of per capita income. The right-hand side gives the marginal benefit of working time (that is, wages) per unit of per capita income. The equilibrium level of $\psi$ is the one that leaves workers indifferent between the two activities in the margin and solves equation (13.17).

Figure 13.3 illustrates the trade-off between formal work and rent-seeking, as implied by this model. The downward sloping curve WR gives the marginal benefit of working time

(the wage rate wages, scaled by per capita income). The curve named MPRS gives the marginal product of rent seeking per unit of per capita income. The equilibrium level of *1−ψ* is obtained at the intersection of the two curves.

*Figure 13.3. The optimal proportion of time devoted to formal work*
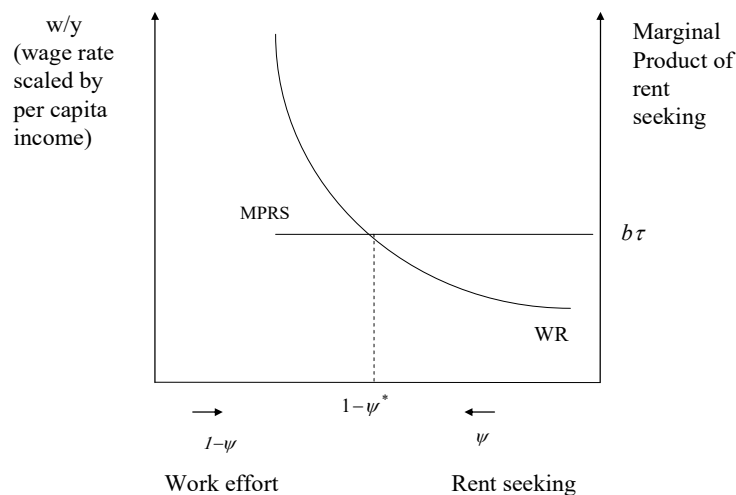


The equilibrium level of rent seeking obeys to an arbitrage condition whereby the foregone wage rate in the formal sector (that is a decreasing function or the aggregate working time) must equal the marginal product of rent seeking.

In general, the equilibrium level of rent seeking shall be less than one. The reason is that, as more resources are allocated to rent seeking (the economy moves to the left), the reward of formal work rises, because the aggregate production function exhibits diminishing returns. Diminishing returns to labour in the formal sector prevent the scenario of "extermination".

### 13.4.6    *What happens if the effectiveness of rent seeking time declines?*

In this model, any policy or institution affecting the effectiveness of a given intensity of rent seeking is captured by a change in the parameter *b*. For instance, suppose that the government is well succeeded in replacing fifty per cent of their corrupt bureaucrats by honest citizens. In this case, one expects the effectiveness of rent seeking to decline: because rent seekers have a lower chance of being matched to corrupt officials, the time necessary to find a corrupt official increases, on average (or the chance of being caught increases).

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The implication of a fall in parameter $b$ is analysed in Figure 13.4. The fall in the marginal product of rent seeking turns formal work more attractive in the margin, so more time will be dedicated to formal work. Then, because of diminishing returns, the equilibrium wage rate falls until it gets equal to the marginal product of rent seeking.

Note that, because individuals devote more time to production, per capita income will rise. In terms of Figure 13.4, the equilibrium moves from 0 to 1. In terms of Figure 3.6, the country switches to a higher parallel growth path, approaching the technological frontier.

*Figure 13.4. The effect of a fall in the effectiveness of rent seeking*
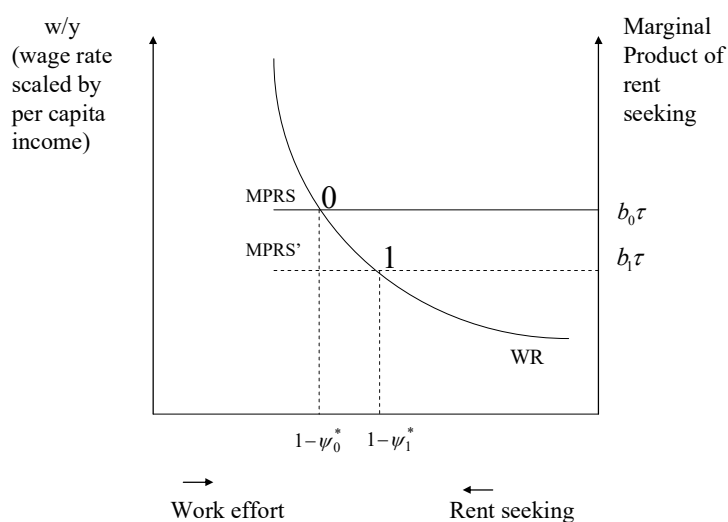


When the quality of legal institutions deteriorates, delivering a higher marginal product of rent seeking time, the proportion of time deviated away from production increases.

The model thus stresses the relationship between rent seeking and the quality of domestic institutions: the greater the ability of public servants to interpret creatively the law, to apply regulations selectively, to repudiate contracts, to confiscate property or to delay decisions, the more the private agents will be compelled to briber the officials to guarantee some special treatment. All the rest constant, these countries are expected to observe larger deviation of talents away from production and to enjoy lower levels of per capita income in the steady state.

### 13.4.7    *What happens if the tax rate increases?*

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In this model, we are assuming that the tax rate is chosen by a benevolent leader. To see the implications of setting different levels of taxation, let's see what happens when the leader increases the tax rate from $\tau_0$ to $\tau_1$. This case is analysed in Figure 13.5.

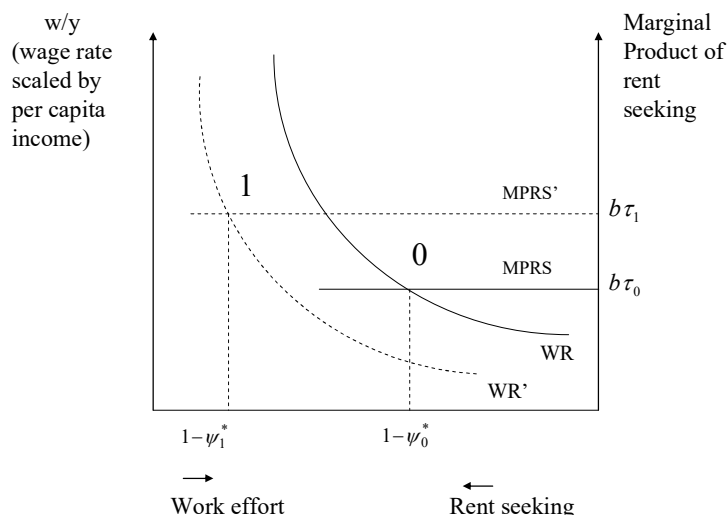In light of equation (13.17), there are two distinct effects:

On one hand, the increase in the tax rate increases the marginal return of rent seeking (as given in 13.16). In Figure 13.5, this effect is represented by an upward shift in the marginal product of rent seeking. On the other hand, the tax increase causes a decline in the proportion of income that accrues to households in the form of (net) wages. In Figure 13.5 this is represented by a downward shift of the WR locus. Both effects induce individuals to move further towards informality. In Figure 13.5, the equilibrium moves from 0 to 1.

A different question is whether the increase in the tax rate is still desirable. In this model, taxes are necessary to finance the public input, which is essential to production. Hence, a benevolent planner would choose a positive tax rate for sure. The problem is that a higher tax rate will also induce a higher level of rent seeking. As usual, the optimal policy shall obey to a balance between the benefit of a higher public provision and the negative impact of taxation. In the simple model with public inputs (chapter 10), the only negative impact of taxation was a slower capital accumulation. With corruption, taxes also have the effect of inducing more rent seeking. Intuitively, if a higher tax rate implies a deviation of talents away from production, a benevolent planner will opt to tax less (and hence to provide less public inputs) than in the case without rent seeking. In order to deter corruption, the optimal policy is to set the tax rate and a level of public provision below the first best case (10.9)[272].

*Figure 13.5. The effect o*f a rise in the production tax

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[272] Park, H., Philippopoulos, A., Vassilatos, V., 2003. The optimal size of public sector under rent seeking competition grom state coffers. Cesifo Working Paper Nº 991, Ifo Institute for Economic Research, Munich.

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When the tax rate increases, the net real wage in the formal sector decreases, and the marginal return of rent seeking increases, causing the equilibrium level of rent seeking to increase.

### Box 13.4 Centralized versus decentralized corruption by William Easterly

"Under decentralized corruption there are many bribe takers, and their imposition of bribes is not coordinated among them. Under centralized corruption, a government leader organizes all corruption activity in the economy and determines the shares of each official in the ill-gotten proceeds." (…). "More generally, a strong dictator will choose a level of corruption that does not harm growth too badly, because he knows his rake-off depends on the size of the economy. A weak state with decentralized corruption doesn't have this incentive to preserve growth. Each individual bribe taker is too small to affect the overall size of the economy, so he feels little restraint on getting the most out of his victim". (…) "This tale gives us insight why corruption was more damaging to growth in Zaire then in Indonesia. Zaire is a weak state with many independent official entrepreneurs. Indonesia under Suharto was a strong state that imposed bribes from the top down. Zaire had negative per capita

growth, while Indonesia had exceptional per capita growth (…).". [William Easterly (2001, p. 247-248)][273].

### 13.4.8   *Other costs of corruption*

The models outlined above illustrate the pervasive effect of corruption in deviating resources away from production. As any model, however, it cannot address all the negative implications of corruption. Other costs of corruption include:

- Uncertainty: with corruption, the enforcement of the law and regulations becomes more uncertain, turning investment decisions riskier.

- Social unfairness: bribery tends to act as a regressive tax, favouring elites against the general public.

- Distortions: to the extent that corruption fees are not uniformly paid across all agents in an economy, price incentives will be distorted. Corruption affects particularly activities with high fixed costs and long-term profitability, because once the fixed costs become sunk, investors are more vulnerable to additional extortion. It also tends to affect more innovative projects, as these are more likely to require licenses, specific regulation, and so on. Established firms, on the contrary, may use their lobbying efforts to block innovative entrants.

- Low investment in human capital: Since corruption comes along with more inequality and less public provision, poor people will have less opportunity to accumulate education and health. On the other hand, to the extent that corruption discourages investment in new technologies, expected wages for skilled workers will decline, decreasing the education effort and the skill level of the population. More talented workers will tend to emigrate.

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[273] Easterly, W., 2001. "The Elusive Quest for Growth: economist's adventures and Misadventures in the Tropics, Massachusetts Institute of Technology.

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- Wrong policies: competition policies, environmental controls, consumer protection rules, and prudential regulations are in principle created to serve the public interest. Through bribes and corruption fees, public servants are induced to alter the way these rules are implemented or even designed in a society, to favour particular interests, at the cost of the general interest.

- Political instability: The use of public offices and public institutions for private advantage undermines the state legitimacy, leading to political instability and violence.


## 13.5  Coping with decentralized corruption

The problem of a benevolent planner dealing with a large administration is to design institutions that keep the incentives as right as possible. This will include a combination of rules and discretion, checks and balances and a little help from social norms.


### 13.5.1  Rules versus discretion

An obvious way of limiting corruption opportunities is to restrict the discretionary power of public officers. Examples in the real world include rules for hiring and promoting public personnel, rules for selecting private suppliers, rules to allocated subsidies, and so on. However, this avenue shall not be overlooked. The other side of the coin is that these constraints introduce rigidity: it may become too difficult to fire an incompetent civil servant, to reward a competent one, or to efficiently select a private supplier. Moreover, with excess rules, government officials will have limited capacity to react to new circumstances (i.e., those not accounted for in the rule). To deal with unexpected circumstances, some discretion is desirable.

A well-designed institutional framework involves therefore an appropriate balance between rules and discretionary power. The later must be complemented with other ingredients, such as checks and balances, incentive compatible contracts, and ethical principles.  All these ingredients shall be part of a well-designed institutional package.


### 13.5.2  Sticks and carrots

The potential for corruption arises whenever discretionary power is delegated to a bureaucrat. Therefore, it is the interest of the benevolent planner to shape the incentives of the bureaucrat, rewarding good practices and punishing bad practices.

To illustrate the different components of an incentive structure, consider the case of a tax inspector whose job is to investigate whether a firm is liable for taxation[274]. In case the firm is liable for taxation, the firm shall pay a tax $\tau$. However, the tax collector may report that the firm is not liable in exchange for a corruption fee, $\phi$. The tax collector' incentive to misreport will depend on the size of the bribe and also on the penalties he will face in case he gets caught and dismissed, which will happen with probability $p$. Let $g$ and $f$ be the penalties applying to the firm and to the tax collector, respectively. The firm expected profit in case of misreporting is $\tau - pg - \phi$. A risk neutral firm will be willing to pay the bribe only if:

$$0 < \phi < \tau - pg. \qquad\qquad (13.18)$$

The actual value of $\phi$ will be a matter of bargaining between the firm and the tax collector. The interesting question is whether wages in the public sector could be used to deter corruption. To analyse this, let $w$ be the tax collector *wage premium*, defined as the difference between the tax collector wage and the wage he would receive in an alternative job in case of dismissal. The expected return of the tax collector in case of misreporting is $\phi + (1 - p)w - pf$, which he compares to the return of being honest, $w$. He will accept the bribe if:

$$\phi > p(w + f). \qquad\qquad (13.19)$$

This last equation shows that the incentive to accept the bribe depends on the institutional setup defined by the following instruments: the wage premium ($w$), the quality of monitoring ($p$) and the legal punishments ($f, g$). The equation shows that wages paid to the tax inspector can be used to deter corruption: by increasing the cost of being dismissed,

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[274] Aidt, T., 2003. "Economic Analysis of Corruption: a survey". The Economic Journal 113, November, 632-653.

higher wages turn the inspector less willing to accept bribes. The wage above which the tax inspector becomes honest is:

$$w \geq \frac{\phi}{p} - f \qquad (13.20)$$

Together, (13.18) and (13.20) determine the minimum wage the tax inspector should receive, $\bar{w} = \tau/p - (g + f)$. This model points to complementarity between different instruments to deter corruption. The efficiency wage will be lower when the monitoring system is more effective (higher $p$) and the legal sanctions ($f$, $g$) are more severe. In the limit, with an effective monitoring system and sufficiently high penalties, the wage premium could be set equal to zero.

### 13.5.3  Social norms

A critical ingredient in any institutional setup is the quality of social norms. Social norms are human devised tools that promote the coordination of actions among individuals in a society, reducing the need for law enforcement. The underlying mechanism in the arrival of social norms is that of *strategic complementarities*: by establishing what is socially acceptable, social norms impose a psychological cost on those that take actions that deviate from the common behaviour. This leads individuals to choose actions that conform with what is acceptable to the society.

In the context of the bureaucrat model, it is easy to account for the role of social norms: wherever societies erect social norms against thievery and corruption, the punishment parameters $f$ and $g$ will include a social stigma attached to the event of being caught. On the other hand, in a clean society, the probability of a corrupt official being matched by honest citizens increases, so the probability $p$ of being caught will increase too. Hence, he will feel more constrained to accept bribes. In general, wherever principles in ethics in government are developed, the wage premium necessary to turn public officers honest is lower.

### Box 13.5 China and Russia

Dixit (2007, p. 5,6), illustrates the key role of incentives in public administration, taking as examples the cases of China and Russia[275]: "The research concerning property rights and corruption has yielded some useful conceptual distinctions and implications. The first is the distinction between *de jure* and *de facto* effectiveness of governance. The distinction is most vividly seen by contrasting China and Russia. China, at least until recently, had very little formal legal protection of property rights, especially those of foreign investors. However, in practice it has been able to deliver sufficient security to continue to attract large foreign investments. Russia has a much better legal framework on paper, but reality seems much worse. What explains the difference?" (…) "High officials in Deng Xiaoping's government understood enough about economics to recognize that growth requires markets and markets require assured property rights. The Communist Party had retained its highly disciplined organization and so was able to prevent self-seeking behaviour by low-level officials." The top level in Yeltsin's Russia may have had the same understanding, but presumably lacked the disciplined organization". (…) "The top level of government, even if itself well-intentioned, needs sufficiently drastic punishments at its disposal to keep the lower and middle-level agents in check" (…) "Stalin had, and used, punishments as drastic as one could imagine, and yet could not get his officials to perform efficiently. What went wrong? Gregory and Harrison (2005) argue that Stalin's harsh incentives did not work well because his methods for detecting shirking were arbitrary, imprecise, and themselves open to corruption. People found that they ran almost the same risk of being denounced and punished when they worked hard as when they shirked or cheated. Therefore they did not have the incentive to work hard after all. An accurate detection procedure is important for the success of any incentive scheme, including an anti-corruption one".

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[275] Dixit, A., 2007. "Governance, Institutions and Development." P. R. Brahmananda Memorial Lecture, Bank of India, June.

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### 13.5.4    *Optimal corruption*

The discussion above suggests that it is *possible* to design an incentive compatible system that fully resolves the agency problems of delegating discretionary power to a potentially corrupt public officer. However, implementing such system in the real world is not that easy: First, public officials often lack the power to dismiss incompetent bureaucrats or to set performance bonuses. Second, setting wages high enough to guarantee the honesty of bureaucrats might become too expensive when monitoring practices are inefficient, requiring high distortionary taxes elsewhere. Third, setting bureaucrat's wages above the private sector wages also leads to a misallocation of talent, as individuals with entrepreneurial skills may feel attracted to become bureaucrats. Finally, increasing monitoring does not necessarily have linear impacts on corruption: anti-corruption agents may turnout themselves corrupt.

These difficulties rise the question as to whether designing a corruption-free bureaucracy would be *desirable*. As in any second-best reasoning, the optimal policy involves a balance between costs and benefits. In general, the fact that achieving a corruption-free bureaucracy would be too expensive implies that even a benevolent planner would optimally decide some corruption to persist. In other words, paying wages to bureaucrats below the critical level may deliver on balance a higher welfare than a system that turns all bureaucrats completely honest.

## 13.6   When institutions become dysfunctional

The discussion above has pointed to the critical role of institutions in shaping the incentives of public officers in line with the public interest. A problem arises, however, in that the ability of a society to design good institutions is significantly weakened when the level of corruption is already high. This fact brings a vicious cycle: wherever corruption is high because the quality of institutions is low, the quality of institutions tends to remain low because the level of corruption is high. This means that, depending on the starting point, an economy may find itself in a good equilibrium with little diversion and high probability of punishment, or in a bad equilibrium with low probability of punishment and high corruption. This idea was first proposed by the 17th century philosopher, Thomas Hobbes.

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### 13.6.1   *Why corruption brings more corruption?*

There are many reasons to believe that the social pressure against corruption declines with the level of corruption.

First, when corruption is generalized, matching rent seekers and corrupt bureaucrats is less than a problem. The searching costs for new corruption opportunities are low, increasing the relative reward of rent seeking time. Thus, individuals will have little incentive to go honest. Second, when the number of corrupt civil servants is very large, the probability of any one of them being caught and prosecuted is low: detection does not entail the same social stigma as in a corruption-free society (it is hard to punish someone severely when everyone else is doing the same), auditors may be themselves corrupt, and senior officials have the incentive to make sure that corrupt officials are not punished[276]. Third, when corruption is widespread, policies envisaging the strengthening of institutions are more likely to be blocked, because those that have the power to create rules may be more interested in making sure that corruption keeps paying off. Finally, corruption undermines people's trust in the political institutions, resulting in a weak civil society, and clearing the way for corruption to flourish.

In terms of the model above, these considerations suggest that some parameters in equations (13.18)-(13.20), rather than exogenous, should depend on the level of corruption. In particular, the parameters measuring the likelihood of detection ($p$) and the legal punishments ($f, g$), instead of constant, could be modelled as decreasing functions of the economy-wide incidence of corruption. Thus, just like we concluded that corruption tends to flourish in countries where institutions are poorly designed, checks on discretionary power are missing and punishment is weak, now the reverse causality is also true: countries where

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[276] Mauro (2004): "Consider, for example, the case of a civil servant in an administration where everybody including his superiors, is very corrupt. It would be difficult for this civil servant to decline offers of bribes in exchange for favours, because his superiors may expect a portion of the bribe for themselves. By contrast, in bureaucracies that are generally honest, a real threat of punishment deters individual civil servants from behaving dishonestly".

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corruption is generalized tend to have poorly designed institutions, lower checks on discretionary power and lower punishment, making corruption more attractive. Hence, the vicious cycle.

### 13.6.2    *Multiple equilibria*

We now adapt the model outlined in Section 13.4, to account for the impact of corruption on the quality of institutions. Remember that the quality of institutions in that model is captured by the parameter measuring the effectiveness of rent seeking time, *b*. By now, this parameter was assumed exogenous. In the following, let's assume instead that this parameter is an increasing function of $\psi$: that is, as the society devotes more time to rent seeking, the quality of institutions decreases and hence the higher will be the effectiveness of the rent seeking effort.

This case is depicted in Figure 13.7, where the line describing the marginal product of rent seeking is downward sloping, instead as horizontal. In that case, the model may have two equilibria, one with low corruption (L) and other with high corruption (H): If the economy starts out in L, the corruption level is low, and the probability of corrupt officials being caught is very high. Because the marginal product of rent seeking is low, people dedicate a small fraction of their time to corruption. In this case, the economy will evolve along virtuous cycle with high per capita income. If the economy starts out in H, the probability of someone being charged for corruption is low. This, in turn, induces people to engage in rent-seeking, self-validating the high corruption level and the equilibrium path with low per capita income.

Because there is multiple equilibrium, *history* plays a role where an economy will lie: the economy will be poor and corrupt if it starts out poor and corrupt; the economy will be rich and clean if it starts out rich and clean. Depending on the initial conditions, two-otherwise identical economies may end up with different levels of per capita income.

### 13.6.3    *Escaping the trap*

To see how difficult is to escape the bad equilibrium H, suppose that the fraction of time devoted to rent-seeking decreased slightly to a point between H and L. In that case, the marginal product of rent seeking would be temporarily higher than real wages, and the incentives will exist for corruption to increase. Hence, the economy would return to point H.

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Because the equilibrium H is stable and is dominated by another possible outcome (equilibrium L), it is a *poverty trap*.
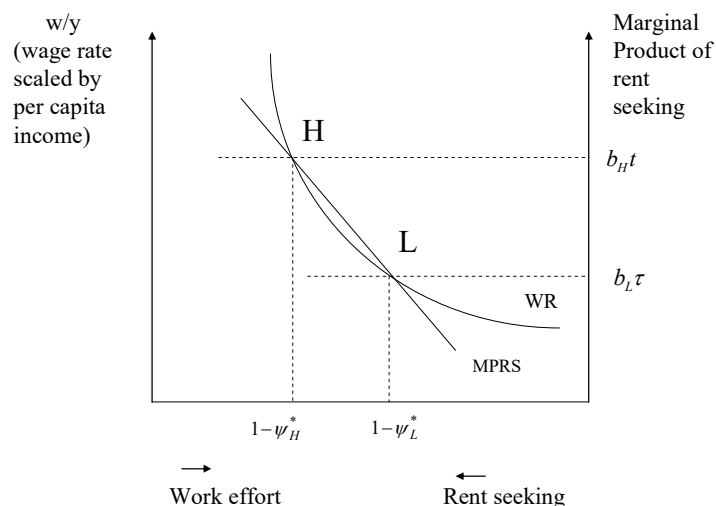
The model provides an explanation of why it is very difficult to eradicate endemic corruption once installed. In light of this model, modest anti-corruption initiatives (like using the police, the courts or even creating ethic offices) are more likely to move the economy somewhere between H and L, without alleviating corruption in a sustained way. For an economy to escape the trap, a huge anti-corruption effort will be needed. The self-sustained aspect of institutions helps understand why many developing countries have failed to improve their living standards despite considerable external support.

The model also implies that an historical accident (like a war, a social unrest, a terms of trade deterioration, a natural catastrophe) may cause the economy to move from the good equilibrium to the bad equilibrium and remain there. Once institutions, informal rules and norms of behaviour have already been adapted to a corrupted system, the high corruption equilibrium will be self-sustained. The economy will be *locked in* the bad equilibrium and will not move back to the original equilibrium, even though the original shock was dissipated. Real life examples of such a path could be the collapse of communism in Russia and, more generally, cases of political instability in Africa[277].

*Figure 13.7. Multiple equilibrium with rent seeking*

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[277] Murphy, K., Shleifer, A, Vishny, R., 1993. Why is rent seeking so costly to growth? American Economic Review Papers and Proceedings 83 nº 2, May.

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When the quality of institutions is influenced by the level of rent seeking, there is possibility of multiple equilibrium: an economy that starts out with a high level of corruption will tend to remain corrupt, and an economy that starts out with low corruption will ten to remain with low corruption.

## 13.7  Discussion

Along this book, we have stressed the key role of human devised government policies for economic development. To a large extent, the analysis has been optimistic regarding the growth opportunities of laggard nations: after all, if achieving economic development was only a matter of adjusting the policy mix, then this should be within reach for any poor country in the world.

This chapter traces a less optimistic view of economic development. The key issue is that policies are embedded in institutions and institutions are not always shaped so as to promote the social welfare. In societies where property rights are not well enforced and where controls over the political elites are lacking, there will be deviation of resources away from public infrastructure, misallocation of talent and bad economic polices.

The discussion in this chapter emphasized the critical role of institutions in shaping the incentives of policymakers, bureaucrats and economic agents in general. A well-balanced institutional design has to include the separation of political powers, transparency in decision-making, a strong civil society, checks and balances, rewards and punishment, and a strike between rules and discretionary power. A well-balanced institutional design shall also take into account that achieving zero corruption would be too expensive. Sound social norms play a critical role in the incentive structure, enhancing the effectiveness of formal institutions and reducing the costs of law enforcement.

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A critical problem is that institutions are not easy to change. Institutions emerge as a result of complex games involving the different groups in a society. When corruption becomes so generalized that institutions, informal rules and norms of behaviour become adapted to it, the economy will find itself *locked in* low-level poverty trap. Poor countries will hardly the financial means and the political strength to escape this trap, so corruption becomes endemic.

## 13.8  Key ideas of Chapter 13

- Central planners and civil servants are not necessarily benevolent. Whenever the institutional environment allows for, they may deviate from the social interest to pursue own objectives, at the cost of the quality of the policy environment.

- When corruption affects the high level of the administration only, it is the interest of the corrupt leader to look out at aggregate efficiency and to organize the extraction activity, in order to maximize theft opportunities.

- The theft opportunities of a non-benevolent leader depend on the constraints imposed by the political and legal institutions that he cannot change.

- When corruption affects all levels of the administration, each corrupt official will try to maximize his corruption fees without taking into account the impact on the economy as a whole. This gives rise to a coordination failure that resembles the "tragedy of the commons". The deviation of resources to corruption comes at a cost of low production in the formal good sector. As long as there are diminishing returns, the higher the corruption activity in the economy, the higher will be the wage rate in formal production, creating the incentives for some fraction of the labour force to remain productive. This prevents the economy from being "exterminated".

- When corruption is decentralized, a benevolent leader concerned with the social welfare will provide less of the public good than in the case of centralized corruption. The reason is that the required increase in taxation would induce an increase in corruption activity. This case provides another example of second-best decision-making.

- In order to control corruption, benevolent leaders have to strike an ideal balance between the rigidity cost of rules and the opportunities raised with discretion. In the optimal institutional setup, discretionary decisions should be complemented with efficient wages, checks and balances in order to keep the incentives right. The optimal corruption level is not however zero, as that would be socially too costly to achieve.

- Social norms and civil society play a critical role in deterring corruption. However, societies do not naturally gravitate towards good institutions: whenever corruption becomes generalized, strategic complementarities create the incentives for each one individual in the society to remain corrupt. In this case, a society may find itself locked in a low level poverty trap, with high corruption and dysfunctional institutions that nobody has interest to change.

### 13.9 Problems and Exercises

*Key concepts*

- *Corruption. Rent seeking. The "Grease in the wheels" argument. Centralized vs. decentralized corruption. Incentive compatible contracts. No-natural gravitation. Strategic complementarities in corruption. Development accounting.*

*Essay questions*

- Comment: "Corruption is an efficient mechanism to allocate the scarce time of bureaucrats to the most productive uses"

- Comment: "The theft opportunities of a non-benevolent leader depend on the incentives embodied in political, administrative and legal institutions he cannot change".

- Explain why the provision of key public inputs is lower under decentralized corruption than in the kleptocrat case.

- Comment: "Corruption is bad for growth".

- Comment: "A well-designed institutional framework involves an appropriate balance between rules, discretionary power, incentive compatible contracts, and well founded ethical principles".

- Why it pays more to be corrupt when others are corrupt too?

- Explain why sometimes countries hit by an historical accident get locked in high corruption poverty traps.

*Exercises*

**13.1** Consider an economy with a large number of equal firms. Each firm $i$ at time $t$ producing a homogeneous consumption good according to: $Y = A_t K_t^{0.5} N_t^{0,5}$ , where $A_t = A e^{0,015t}$ and $L_t = e^{\gamma t} N_t$. In this economy the saving rate is 20%, the population is constant and the capital depreciation rate is 3%. a) (**Solow**) Find out the steady state level of per capita income in this economy. Consider A=0.3. b) (**Market failure**) Assume now that $A = (G/Y)^{1/3}$ , where G are public inputs. (b1) Explain this specification. To which type of public inputs it applies? (b2) Compute the aggregate production function of this economy. (b3) Explain why there is a market failure in this model. (c) (**Waste**) Assume that the provision of public inputs was financed with a production tax $\tau$ , but that a fraction $\varphi$ of the tax revenues is wasted in unproductive uses. Write down the government budget constraint. Which factors are captured by parameter $\varphi$? Elaborate. (d) (**Steady state**) Find out the expressions for the steady state levels of per capita income and of per capita consumption, in terms of $\tau$ and $\varphi$. (e ) (**Benevolent planer**) Assuming that the objective of the planner was to maximize the

steady state level of consumption: (e1) find out the optimal values of $\tau$ and $\varphi$. Is this solution intuitive? (e2) Explain, with the help of a graph, the dual effect of the tax rate on the steady state level of per capita consumption. (f ) (**Kleptocrat**) Now suppose that you were a kleptocrat, which aim was to maximize your theft on government expenditures. (f1) Which solution would you choose? (f2) would per capita GDP be higher or lower than in (e)? (f3) Is this equilibrium in light with the Kaldor facts? (f4) Compare the benevolent planner and kleptocrat solution in the Solow model graph (g) (**Bureaucracy**) If the kleptocrat could not control its bureaucracy, citizens would be better of or worse of? Why? Which mechanisms can societies implement to limit the corruption opportunities?

**13.2** (**Rent seeking**) Consider an economy with a large number of equal firms. Each firm $i$ at time $t$ producing a homogeneous consumption good according to $Y = AK^{0.5}N_Y^{0,5}$, where $N_Y = (1-\psi)N$ is the total work-time devoted to production and $\psi$ is the fraction of time devoted to rent-seeking. Assume also that the proportion of government resources extracted by rent-seekers ($\phi$) is a linear function of the seeking effort ($\psi$), that is, $\phi = \psi b$, where $b$ is an exogenous parameter that captures the marginal product of rent-seeking time. (a) Considering that the government imposes a tax on income, derive the expression for the wage rate in this economy. (b) Write down the expression for the total amount of resources deviated from the government by rent-seekers. Explain it. (c) Find out the equilibrium level of $\psi$. With the help of a graph, analyse the implications of: (c1) A fall in the tax rate. (c2) A decline in productivity of the rent seeking. Which measures could be implemented to achieve this?

**13.3** (**Rent seeking**) Consider an economy where workers are free to decide the time they allocate to formal work and to rent seeking. In this economy, the production function is given by $Y = N_Y^{0.16}$ where $N_Y = (1-\psi)N$ is the time allocated to formal work. The tax on production is equal to $\tau = 1/2$. (a) From profit maximization, find out: (a1) the demand for labour; (a2) the expression relating the wage rate to: per capita income and the fraction of time devoted to rent seeking. (b) Show that individual choices lead to the following condition: $1 - \psi = 0.16/b$, where b measures the effectiveness of rent seeking effort. (clue: find out the demand for labour and use the arbitrage condition $w = b\tau y$). (c) Explain this relationship above, illustrating with the following values for b: b=0,2 and b=0.8. (d) Now assume that the effectiveness of rent seeking is itself a positive function of the level of rent seeking: $b = \psi$. Why should that be? Describe the equilibria of the model, discuss their stability. Explain what this model intends to capture.

**13.4** Consider an economy where the production function of the individual firm is $Y = AK^{0.5}N_Y^{0,5}$, with $N_Y = (1-\psi)N$ being the amount of labour devoted to formal work and $A = (G/Y)$. In this economy, population is constant (*n=0*), there is no technological progress ($\gamma=0$), and the saving rate is s=24%. Capital depreciates at $\delta$= 4%. (a) Find out the aggregate production function and explian why there is a market failure. (b) Assume that G was financed with a tax on production $\tau$, but a proportion $\phi$ of the fiscal proceeds was wasted. Whish types of failures are captured by this parameter? (c) Find

out the benevolent planner optimum assuming that it can decide $\phi$ and $\psi$ . In particular, quantify: (c1) the optimal tax rate; (c2) G/Y. (c3) private consumtion pr capita; (c4) Describe the equilibrim in the Solow - (k, y) – diagram. (d) Assume now that the leader could not control its bureacracy. In particular, assume that the fraction $\phi$ of the budget was deviated, according to $\phi = b\psi$ , with b=1.5. (d1) Assuming that the tax rate was $\tau = 0.5$, find out the equilibrium level of rent seeking, as well as the resulting G/Y. (e) With the help of a graph, show how the government could induce zero rent seeking using: (e1) The tax rate; (e2) policy changes impacting on b. Quantify and compare the quality of these two possible equilibria.

**13.5** Consider an economy with a large number of equal firms. Each firm produces a homogeneous consumption good according to $Y = AK^{0.5}N^{0,5}$ . Although each firm considers $A$ as an exogenous parameter, in the aggregate the following condition holds: $A = \left(G/Y\right)^{3/2}$ . In this economy the population is constant (*n=0*), there is no technological progress (γ=0), the saving rate is 20% and the capital depreciation rate (δ) is equal to 4%. In this economy, the provision of public inputs is financed with a <u>production</u> tax $\tau$ , but a fraction ϕ of the tax revenues is wasted in unproductive government consumption. (a) Describe the profit maximization problem of individual firms and find out the demand for capital and labour, as well as the households' disposable income. (b) **Market failure**: Compute the aggregate production function in this economy and explain why there is a market failure. What would happen if there was no government? (c) Write down the government budget constraint. (d) Which factors are captured by parameter $\phi$ ? Elaborate. (e) **Steady state**: Find out the expression for the steady state levels of per capita income and per capita consumption, in terms of $\phi$ and $\tau$ . (f) **Benevolent planner**: consider the problem of a benevolent planner, which aim is to maximize the steady state level of private consumption: (f1) compute the optimal values of $\phi$ and $\tau$ . Is this solution intuitive? (f2) Find out the steady state levels of per capita income and of consumption in that case; (f3) Explain, with the help of a graph, the dual effect of the tax rate on the steady state level of per capita consumption. (g) **Kleptocrat**: Now suppose that you were a kleptocrat, which aim was to maximize your theft on government expenditures: (g1) Which values would you choose for τ, ϕ, and G/Y? (g2) Find out the correspondinf steady state levels of per capita income and of consumption. (g3) Explain how this solution compares to that of the benevolent planner. (g4) find ou the interest rate in this case. (h) **Decentralized corruption**: Finally, consider the case where the benevolent planner sets the tax rate at 60%, but it cannot control its bureaucracy, so a proportion $\phi$ of government revenues is appropriated by rent seekers. Further assume that citizens in this economy devote a fraction of their time $\psi$ to rent seeking, and the remaing time to formal work, that is $Y = AK^{0.5}N_Y^{0,5}$ . h1) Describe the income flow chart of this economy; h2) Find out the demand for formal labour in this economy, and then re-write it as a function of per capita income; h3) Assume that the private appropriation of government resources is a direct proportion of the time devoted to rent seeking, that is: $\phi = b\psi$ , with b=1.  Find out the equilibrium level of rent seeking in this economy, and explain it with the help of a graph; h4) Find out the level of  government provision G/Y in this case, and compare to the previous models; h5) How much will be per capita income and per capita consumption? h6) Which policies could the benevolent planner use to improve the

quality of his bureacracy? Elaborate. (i) **Endemic corruption**: Returning to (h), assume instead that $b = 0.75\psi$ . i1) Explain the rationale for such specification. i2) Describe the equilibria and the stability of the model in this case. i3) Interpret.

**13.6** (**Incentives**) Consider a tax collector which job is to investigate whether a firm is liable for taxation or not. If so, the firm has to pay a tax $\tau$. However, the tax collector may report that the firm is not liable for taxation in exchange for a bribe b. Assume also that the government discovers corrupt acts (with probability 0.5) then the firm pays a penalty g = 1 and the tax collector pays a penalty f = 0.5. (a) If $\tau = 2$, what would be the maximum bribe amount the firm would be willing to offer? (b) Write down the expression for the expected return of the tax collector in case of misreporting. (c) What would be the minimum wage rate that would keep the tax collector honest?