Impacts of Red Tape and Rent-Seeking On The Distribution of Income*

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Abstract

This paper is concerned with analysing the role of red tape and corruption in determining inequality through their effects on occupational choice and investment opportunities. There are two potential sources of imperfection in the economy - an imperfection in financial markets due to incomplete enforcement of contracts by lenders, and an imperfection in governance due to possible rent-seeking (or bribe-taking) by bureaucrats. The former of these frictions imply that the opportunity to borrow depends on the size of an agent's initial wealth: individuals with wealth above some critical level are granted loans, whilst individuals with wealth below this level are denied loans. The latter friction arises because of an opportunity for bureaucrats to ask for bribes in exchange for allowing individuals to circumvent red tape. It is shown how the critical level of wealth, and therefore the extent of inequality, is affected differently by the existence of red tape or the existence of bribes. The analysis is then extended to consider the case in which red tape and bribe payments are determined together – that is, when bureaucrats, themselves, set the level of red tape in order to maximise their bribe income. Implications are drawn for the effect of such behaviour on inequality and income distribution.

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Абстракт

Энэхүү судалгааны ажилд авилга болон хүнд суртал нь хөрөнгө оруулалт хийх боломж болон мэргэжлийн сонголтод нөлөөлөх замаар орлогын тэгш бус байдлыг хэрхэн бий болгож болохыг харуулсан. Эдийн засагт хоёр төрлийн төгс бус байдал байдаг. Нэг нь санхүүгийн зах зээлийн төгс бус байдал буюу зээлдүүлэгч гэрээний нөхцлийг төгс гүйцэтгүүлэх боломжгүй байдлаас үүсч буй нөхцөл. Хоёр дахь нь төрийн албан хаагчдын зүгээс рент эрэлхийлэх (ө.х хахууль авах) боломж үүсгэж буй засаглалын төгс бус байдал. Санхүүгийн зах зээлийн төгс бус байдлаас болж хүмүүс эзэмшиж буй хөрөнгийн хэмжээнээсээ хамааран зээлээр хязгаарлагдах нөхцөл үүсдэг. Ө.х хэдий хэмжээний зээл авах нь банкны шаарддаг барьцаа хөрөнгийг хангах хэмжээний хөрөнгөөр хязгаарлагддаг. Үүнээс үүдэн бизнес эрхлэх нь зөвхөн тодорхой хэмжээний хөрөнгөтэй (босго хөрөнгө) хүмүүсийн хувьд боломжтой зүйл болно. Засаглалын төгс бус байдал байснаар төрийн албан хаагчдад хүнд суртлыг ашиглан хахууль авах нөхцөл үүснэ. Улмаар энэ байдал нь санхүүгийн төгс бус байдлаас үүдэлтэй босго хөрөнгийн шаардлагыг улам бүр нэмэгдүүлж буйг энд харуулсан. Төрийн хүнд суртлын үйл ажиллагааг рент эрэлхийлэгчид өөрсдөө тодорхойлдог үед хахуулийн түвшинг хамгийн их байлгах хүнд суртлыг бий болгох нь орлого хуваарилалт болон нийт үйлдвэрлэлд хэрхэн нөлөөлөхийг мөн харуулсан.

1 Introduction

Recent survey studies by the World Bank (2006) emphasize that regulatory intervention in business is particularly damaging in countries where its enforcement is subject to abuse through corruption. Djankov et al (2002) observed large cross-country difference the number, time and cost of registration procedures as many of these procedures are performed automatically in the more developed countries, but require considerable legwork in the less efficient ones. For example, in New Zealand businesses have to accomplish only one procedure to be registered but in Equatorial Guinea the figure is sixteen times higher; in terms of time, registration takes only one day in New Zealand but 174 days in Laos; the cost of entry regulation in UK is more or less zero whilst it is equal to 200% of income per capita in Haiti (Doing Business 2019). If we look at the corruption rankings for these countries, New Zealand and UK are rated among the top ten least corrupt countries while Equatorial Guinea is in 172nd place with a CPI of 16, Laos the 132nd place with CPI of 29 and Haiti the 161st place with CPI of 20 according to the CPI table 2018. In the analysis that follows we seek to clarify the connection between red tape and corruption by comparing and contrasting their distributional and aggregate implications in a simple theoretical model of occupational choice, entry regulation and capital market imperfections.

It is noteworthy that there has always been competing views on the benefits and costs of regulation, and its relationship with corruption. The public interest argument by Pigou (1938) contends that regulation is a means of protecting society, so that the stricter is the regulation of entry the fewer are the incidents of market failure. Public choice theory, however, gives less favour to red tape by arguing that it provides an opportunity for rent-seeking for private producers (Stigler 1971; Peltzman 1976) and politicians and bureaucrats (McChesney 1987). Stigler (1971) argues that regulatory power of the state is captured by incumbent industries or some groups with vested interests. For example, an incumbent industry may have an interest to set control over entry by new rivals to protect its own monopoly power, or a group of specialists may want to lobby the government to approve occupational licensing to put barriers to new entrants. Another strand of public choice theory (McChesney 1987) claims that politicians and bureaucrats should be considered as immoral as private interest groups in sense of maximising their own benefits rather redistributing wealth in response to competing private demands. They use their political power to create and extract rents (in the forms of bribes, contributions to political

campaigns or in-kind donations of service and property)[1].

There are many studies trying to prove that bribery is necessary to achieve efficiency. The well-known corruption-favour work by Nathaniel H. Leff (1964) asserts that burdensome bureaucratic regulation is eased by bribery as it provides the direct incentives necessary to mobilize bureaucracy. He stands on the same position with public choice scholars who see the government as less benign and as being captured by existing industries. But he argues that corruption directs bureaucrats into more benign acts and allows new entrants or innovators to break the existing elite's capture and also introduce competition and efficiency by increasing the bidding among enterprises. This concept called "speed money" hypothesis, in other words efficiency-friendly corruption view has been supported by other academics (e.g., Huntington 1968; Leys 1965; Lui 1985).

Indeed, it is possible that red tape has some positive social impact. For example, it may help to ensure some minimum standards of working practices (e.g., health and safety) and production activity (e.g., the most environmentally-friendly technologies). But the main problem is that the amount of red tape is typically determined by those who stand to benefit from producing too much of it in their quest to extract rents. Thus whilst the optimal level of regulation may be non-zero, it is almost certainly much less than what is currently found in most countries, and especially poor ones[2]. The expanding literature on corruption is rife with examples of how red tape and corruption go hand-in-hand and impose significant burden on business activity[3]. The following is just a handful of studies that have been made. Kisunko et al (1997) observes that, in a survey covering 3600 firms of 69 countries, corruption and red tape are ranked as the two highest barriers to doing business. Djankov et al (2002) find that stricter regulation of entry is associated with high levels of corruption and greater size of the unofficial economy, rather than higher quality of products, better pollution records or health outcomes. In a case of study of business licensing in Kenya, Devas and Kelly (2001) note that before the single business permit reform was introduced, most businesses required at least two licences and some required more than two for different elements of their business. Obtaining only one of them used to take multiple visits to various offices with many preconditions such as obtaining health clearance certificate and providing evidence that they had paid their taxes. As a result, the system became

[1]This view is supported by empirical study based on data on the regulation of entry of start-up firms in 85 countries (Djankov et al 2002).

[2]Banerjee (1997) and Guriev (2004) show that the level of red tape is greater than its optimal level on the equilibrium.

[3]See Bardhan 1984,; Bhagwati 1993; Kisunko et al. 1999; DeSoto 1989, 2000; Djankov et al. 2000; Blackburn and Sarmah 2006.

riddled with rent-seeking and corruption.

The foregoing discussion provides the motivation for this paper which seeks to study the relationship between red tape and rent-seeking and their effects on income distribution in a model of occupational choice with imperfect capital market, and entry regulation. Private individuals choose between two alternative activities (entrepreneurial and subsistence production) that differ in terms of the payoffs expected, the loans required and the regulations applied. Borrowing and lending take place through competitive financial intermediaries according to the terms and conditions of financial contracts. Capital market imperfections arise because of imperfect contract enforcement, meaning that borrowers can strategically default on their debt obligations. The consequent risk for lenders about the repayment of loans leads to a rationing of the amount of credit and an inequity of entrepreneurial opportunities among the population. We show how red tape and corruption reduce entry into the entrepreneurial occupation and therefore increase the income inequality under different circumstances. The cost of red tape is modelled as a monetized value of entrepreneur's time or an opportunity cost of his productivity which is realized ex post. This opportunity cost of red tape implicitly involves a large, non-monetary element in terms of the time and effort spent on complying with various administrative procedures to get licenses, permits and other necessary documents[4]. On the other hand, bribery is literally ex anti monetary expenditure to overcome the red tape or the complicated, time consuming bureaucratic procedures. As a consequence, both of them compound the problem of capital market imperfections, increase the inequality of income distribution and reduce the overall production in the economy. The content to which one is more damaging than the other depends on certain conditions. We also study the interaction between red tape and bribery, with latter being used to circumvent the former. Within this context, we illustrate the "speed money"hypothesis and then challenge it by appealing to the argument, alluded to earlier, that red tape is not exogenous, but rather endogenous to the bureaucratic process, being a means of extracting bribes.

To the extent that we explore the distributional consequences of corruption in an occupational choice model with capital market imperfections, our model is in the spirit of Foellmi and Oechslin (2007) who

[4]In a seminal empirical study on the regulation of entry based on start-up firms in 85 countries (Djankov et al 2002), it is found that using monetized value of the total cost of entry regulation provides very similar result to those using the raw data on time and cost. The former measurement of cost is calculated as adds up the official expenses and an estimate of the value of entrepreneur's time, valuing his time at the country's per capita income per working day.

show how the prospect of rent extraction can exacerbate income inequality by squeezing some agents – especially the middle income agents - out of entrepreneurial opportunities. Our analysis may also be viewed within the context of the modern literature on income distribution which emphasises the role of capital market imperfections in determining occupational opportunities (e.g., Aghion and Bolton 1997; Banerjee and Newman 1993; Blackburn and Bose 2003; Galor and Zeira 1993).

The remainder of the paper is organized as follows. In section 2 we present a simple model of occupational choice and financial intermediation in a regulation-free and corruption-free environment. In section 3 we re-examine this environment in the presence of red tape. In section 4 we do the same in the presence of bribery. In section 5 we study the link between red tape and corruption. In section 6 we make a few concluding remarks.

2 Basic Framework

We consider a small open economy in which there is a continuum of agents measuring a size of unit mass. Agents are endowed with one unit of time to spend on working and are distributed according to their initial endowment of wealth. Each agent engages in productive activity based on a choice of project, or occupation, which gives access to a technology for generating output. For certain types of project to be undertaken, loans must be acquired from financial intermediaries under the terms and conditions of mutually agreeable financial contracts. Capital market imperfections exist because of imperfect contract enforcement. All agents are risk neutral, deriving linear utility from their final incomes. In more detail, the model is described as follows.

Each agent is faced with a choice between two types of production project. The first type involves the use of some basic (or traditional) technology in some routine activity that is costless for an agent. This is a subsistence occupation that requires zero capital outlay, and that yields a fixed amount of output $a > 0$. The second type entails the operation of a more advanced (or modern) technology in an entrepreneurial venture that is more productive, but that is also costly. This is a skilled occupation that requires $k > 0$ units of capital outlay, and that yields $A > 0$ amount of output, where $A > a$. We suppose that agents are heterogeneous in their ex-anti wealth, w, and simplify the distribution of it to being on the interval $(0,\ 1)$ with probability density function $f(w)$. Thus $F(w; z, x) = \int_x^z f(w)dw$ gives a measure of the population with $w \in (x, z)$.

In order to engage in entrepreneurial activity, an agent must acquire a loan of size k as external funding for the fixed capital outlay. Loans

are obtained from financial intermediaries who borrow funds from the world capital market at the exogenous world interest rate r. Competition between intermediaries drives the interest rate on loans down to r. The loan repayment for an agent is therefore $(1+r)k$.

An agent who engages in subsistence activity invests all of her wealth in the world capital market and produces an output of a. The final income for this agent is therefore simply

$$y^s = (1+r)w + a \tag{1}$$

An agent who engages in entrepreneurial activity puts up all her wealth as collateral against a loan of size k that allows her to take on a project, which yields an output of A. After making her loan repayment, the final income for this agent is

$$y^p = (1+r)(w-k) + A \tag{2}$$

We assume that $A - (1+r)k > a$, which has two implications: first agents are always able to repay their loans; and second, agents always prefer entrepreneurial activity to subsistence.

We introduce capital market imperfections by allowing agents an opportunity to deliberately default on their debt obligations - that is, a borrower may abscond with the output from a project without ever paying back her loan. It is this feature - the imperfect enforcement of loan contracts - that explains why some agents may be credit rationed and unable to realise their preferred choice of occupation.

We assume that, if an agent takes flight and avoids her loan repayment, then any income accruing to her is inaccessible to lenders who either fail to track her down, or fail to apprehend her before she has the chance of disposing of her income. At the same time, the agent loses all of her collateral, $(1+r)w$, and incurs a cost associated with her actions (e.g., because effort or resources must be spent on avoiding arrest). We formulate this cost as being equal to a fraction, $\lambda \in (0,1)$, of the agent's project output A. Thus λ provides a measure of the extent of capital market imperfections: the lower is λ, the weaker are the powers of contract enforcement in the sense that agents stand to lose less by reneging on contracts. The net payoff to a defaulter is therefore $(1-\lambda)A$. Evidently, this payoff must be no greater than the income from not defaulting, in eq (2), if defaulting is not to occur. This condition implies $-\lambda A \leq (1+r)(w-k)$, from which we may determine a critical level of wealth, $\widehat{w}$, above which loans are granted and below which loans are refused: that is

$$\widehat{w} = k - \frac{\lambda A}{1+r} \tag{3}$$

Since loans are given only to agents who would never default (i.e., agents whose ex anti wealth is greater than $\widehat{w}$), and not to agents who would always default (i.e., agents whose wealth is less than $\widehat{w}$), defaulting never occurs. Note that the more perfect is the capital market (i.e., the higher is λ) the lower is the critical level of wealth: in the limit when $\lambda = 1$ (no imperfections), $\widehat{w} < 0$ (since $A - (1 + r)k > 0$) and all agents receive loans since none of them has an incentive to default.

Based on the foregoing analysis, we are able to describe the distribution of income and the total production of output in the economy. The critical level of wealth, $\widehat{w}$, which arises from the imperfect enforcement of loan contracts divides the population of agents into two classes. Agents with wealth less than $\widehat{w}$ are denied external funds from lenders and therefore never engage in entrepreneurial activity, but rather produce at subsistence. By contrast, agents with wealth greater than $\widehat{w}$ are able to acquire loans and invest in the more productive project. Thus from eq (1) and eq (2), an agent's final income can be written as

$$y = \begin{cases} y^s \ if \ w < \widehat{w} \\ y^p \ if \ w \geq \widehat{w} \end{cases} \tag{4}$$

Denoting by $\pi(y)$ the population of agents with an income of y, the distribution of income is then summarised by

$$\pi(y) = \begin{cases} F(w; 0, \widehat{w}) = \int_0^{\widehat{w}} f(w)dw = \widehat{w} \ for \ y = y^s \\ F(w; \widehat{w}, 1) = \int_{\widehat{w}}^1 f(w)dw = 1 - \widehat{w} \ for \ y = y^p \end{cases} \tag{5}$$

Figure 1 below illustrates the relationship between final income of agents and their ex ante wealth.

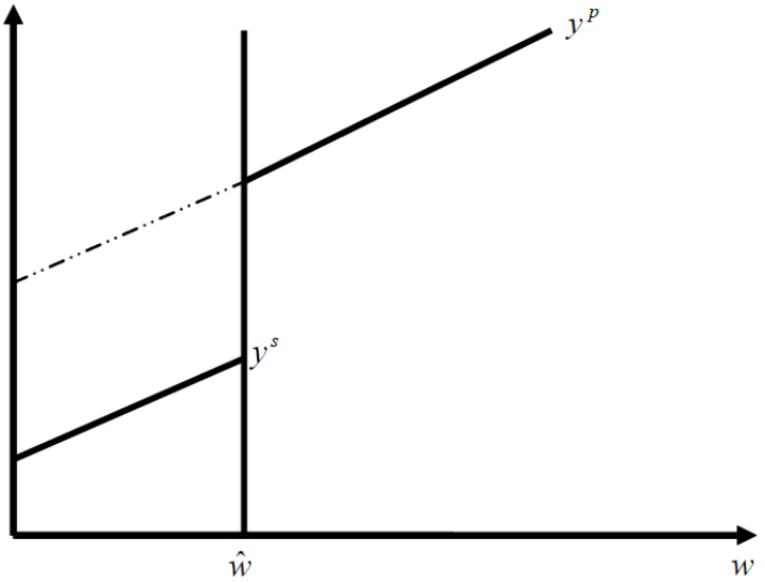
As regards total output, recall that agents produce a from subsistence and A from project investment. Since there are $F(w; 0, \widehat{w})$ agents engaged in subsistence and $F(w; \widehat{w}, 1)$ agents engaged in project investment, total output in the economy as a whole given by

$$X = aF(w; 0, \widehat{w}) + AF(w; \widehat{w}, 1) = a\widehat{w} + A(1 - \widehat{w}) \tag{6}$$

In this economy, the distribution and total level of income are entirely determined by the critical level of wealth $\widehat{w}$. In other words, the degree of credit market imperfections plays a crucial role in both distributional and aggregate outcomes. The more imperfect is the capital market (i.e. the lower is λ), the higher is the critical level of wealth, $\widehat{w}$, the fewer is the number of entrepreneurs, $1 - \widehat{w}$, and the lower is the level of output, X[5]. Note that $\frac{\partial X}{\partial \widehat{w}} = a - A < 0$ as $A > a > 0$.

[5]This result is quite standard for the economy with capital market imperfection and non-convex technology that we are considering (see also Galor and Zeira 1992).

Figure 1



This completes our description of the basic framwork that we use during our subsequent analysis. In that analysis we seek to introduce aspects of regulation and governance, and to examine the effects of such aspects on financial market and consequently on the distribution of income and aggregate output.

3 Red tape

As commented on earlier, agents often spend a substantial amount of resources on going through various procedures and regulations before they are entitled to engage in a particular activity or business. As also mentioned earlier, the benefits of such regulations are not all that understood. That some positive level of red tape might be socially-optimal is an issue worth-pursuing, but it is not one that we address explicitly in the present analysis. Rather, our interest lies elsewhere, being focused towards the relationship between red tape and rent-seeking behaviour by public officials, and the implications of this for entrepreneurial opportunities, the distribution of wealth and the level of production in the economy.

We introduce red tape as the set of institutional regulations that agents must comply with in order to obtain licenses to undertake the advanced project. Responsibility for implementing these regulations and issuing such licenses lies in the hands of public officials using the authority delegated to them by the government. We assume that the process of license acquisition

is costly for an agent, demanding t fraction of his endowed one unit of time. The greater is the amount of red tape, the more complicated or the more drawn-out is this process, and the more time is required from an agent.

Given the above, we re-write (2) - the ex post income of an agent who becomes an entrepreneur - as

$$y_t^p = (1+r)(w-k) + A(1-t) \tag{7}$$

Since part of an agent's time, t, is spent on going through red tape, actual output is $A(1-t)$, which is lower than in the absence of red tape. Like before, we impose a parametric restriction to ensure that agents are able to repay their loans and always prefer entrepreneurial activity to subsistence. Under present circumstances, this condition is $A(1-t) - (1+r)k > a$.

The condition which ensures that defaulting does not occur is now given by $-\lambda A(1-t) \leq (1+r)(w-k)$, from which we deduce a new critical level of wealth, $\widehat{w}_t$, such that entrepreneurship is chosen (not chosen) by any agents for whom $w \geq \widehat{w}_t$ ($w < \widehat{w}_t$). That is, instead of (3), we have

$$\widehat{w}_t = k - \frac{\lambda A(1-t)}{1+r} \tag{8}$$

Because of red tape, the ex post income from project investment is decreased by the amount of At. This means that agents stand to lose less if they are caught defaulting so that the incentive to renege is stronger. Intermediaries respond to this by setting a higher collateral requirement. As a result, the introduction of red tape increases the critical level of wealth from $\widehat{w}$ to $\widehat{w}_t$. Clearly the higher is the amount of red tape, the higher is the level of $\widehat{w}_t$.

The distribution of income and the total production in the economy are changed according to the new critical level of wealth. Thus, eq. (4) becomes

$$y_t = \begin{cases} y^s \ if \ w < \widehat{w}_t \\ y_t^p \ if \ w \geq \widehat{w}_t \end{cases} \tag{9}$$

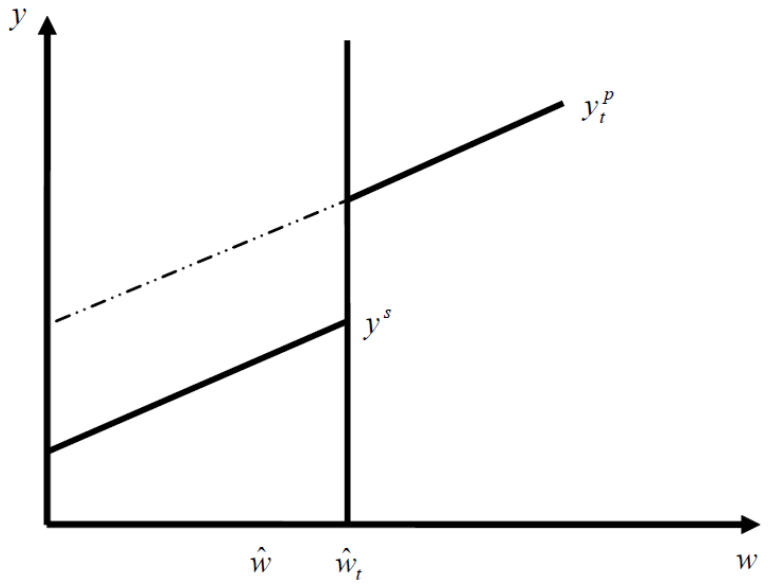
where $y_t^p < y^p$. Eq. (5) becomes

$$\pi(y_t) = \begin{cases} F(w;0,\widehat{w}_t) = \int_0^{\widehat{w}_t} f(w)dw = \widehat{w}_t \text{ for } y_t = y^s \\ F(w;\widehat{w}_t,1) = \int_{\widehat{w}_t}^1 f(w)dw = 1 - \widehat{w}_t \text{ for } y_t = y_t^p \end{cases} \tag{10}$$

And Figure 1 in the previous section is changed to Figure 2.

Since the critical level of wealth is now higher, some agents who were able to engage in entrepreneurial activity under the previous scenario are forced into the subsistence activity. The number of agents who are squeezed

Figure 2



out of entrepreneurial activity is $1-\widehat{w}-(1-\widehat{w}_t)=\widehat{w}_t-\widehat{w}=\frac{\lambda At}{1+r}$, which is obviously an increasing function of the amount of red tape.

Finally, total production in the economy, denoted by X_t is

$$X_t = aF(w;0,\widehat{w}_t)+A(1-t)F(w;\widehat{w}_t,1)=a\widehat{w}_t+A(1-t)(1-\widehat{w}_t) \quad (11)$$

The introduction of bureaucratic regulation reduces both the productivity of entrepreneurs and the number of entrepreneurs so that total production is reduced. Comparing eq (11) with eq (6), we can see that $X_t-X=(a-A)\frac{\lambda At}{1+r}-At(1-\widehat{w}_t)<0$ as long as $t>0$. Furthermore, X_t is decreasing with the amount of red tape as $\frac{\partial X_t}{\partial t}=\frac{\lambda A}{1+r}\left[a-A(2-t)\right]-A(1-k)<0$ (note that $A(1-t)>a$).

4 Rent-Seeking

According to the above description of events, the cost to an individual of acquiring a license for undertaking the advanced project is the time and effort spent on going through red tape: the license, itself, is issued free of charge. In what follows we consider an alternative environment in which individuals make themselves eligible for entrepreneurial activity by bribing public officials: the cost of a license is now the amount of bribe that is paid. This kickback may be given two interpretations. The first is that it is the

necessary payment demanded by bureaucrats who have the monopoly power to issue or withhold licenses at will. The second is that it is the optional payment which an individual can make as a means of circumventing red tape. In terms of our immediate concerns, it makes no difference as to which interpretation is used since our objective is simply to illustrate the effects of bribery. Subsequently, however, we focus on the latter interpretation for reasons that will become clear. Throughout our analysis we assume that bureaucrats are able to extract bribes without any risk of detection or punishment. This assumption (used in other analyses) is intended primarily as a simplification, though it is probably near the mark for many developing countries where the will and wherewithal to stop corruption are relatively weak.

The immediate effect of bribery is to increase the size of loan that is needed to engage in entrepreneurial activity. Let b denote the amount of bribe that an individual pays. Then the size of loan is $k + b$. Given this, we may proceed as before to determine the equilibrium outcomes in the economy.

The ex post income of an agent who becomes an entrepreneur is given by

$$y_b^p = (1 + r)(w - k - b) + A \tag{12}$$

Like before, loans can always be repaid and project investment is always preferred to subsistence if $A - (1 + r)(k + b) > a$. Since lenders make sure that no one defaults, $-\lambda A \leq (1 + r)(w - k - b)$ must hold. A new critical level of wealth, $\widehat{w}_b$, is determined by

$$\widehat{w}_b = k + b - \frac{\lambda A}{1 + r} \tag{13}$$

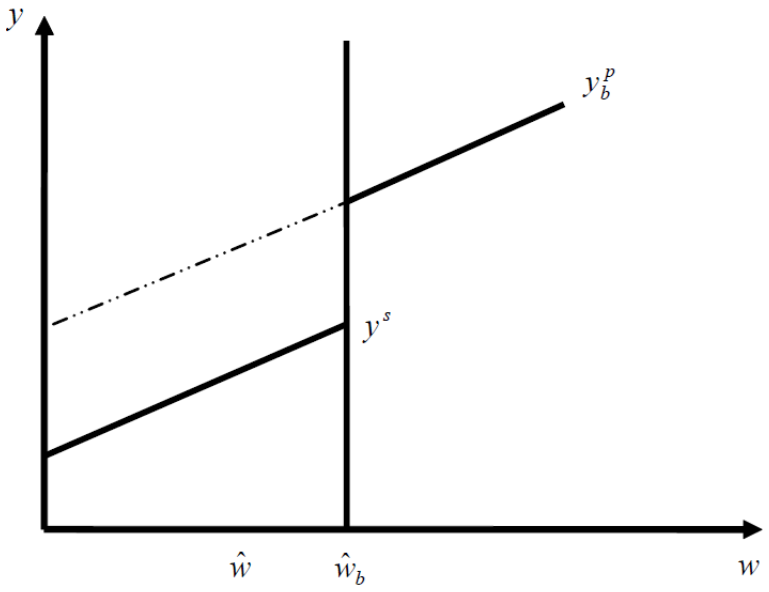
Comparing (3) and (13), we see that $\widehat{w}_b > \widehat{w}$ as $\widehat{w}_b - \widehat{w} = b$. As in the case of red tape, the existence of rent-seeking increases the critical level of wealth that an agent needs to secure a loan. In both cases the explanation is that the incentive to default on loans is greater, though the reasons are different: as regards red tape, agents stand to lose less in terms of their lower income if they are caught defaulting; as regards bribing, agents stand to gain more in terms of not paying back their higher loans if they default.

Ex post income y_b and income distribution $\pi(y_b)$ are now given by

$$y_b = \begin{cases} y^s \ if \ w < \widehat{w}_b \\ y_b^p \ if \ w \geq \widehat{w}_b \end{cases} \tag{14}$$

$$\pi(y_b) = \begin{cases} F(w; 0, \widehat{w}_b) = \int_0^{\widehat{w}_b} f(w)dw = \widehat{w}_b \text{ for } y_b = y^s \\ F(w; \widehat{w}_b, 1) = \int_{\widehat{w}_b}^1 f(w)dw = 1 - \widehat{w}_b \text{ for } y_b = y_b^p \end{cases} \tag{15}$$

Figure 3



Like before, figure 1 changed to figure 3 below.

By increasing the critical level of wealth, bribery discourages entrepreneurial activity and so increases income inequality in a similar way that red tape does. In this case, the number of corruption victims, from (5) and (15), is $1 - \widehat{w} - (1 - \widehat{w}_b) = \widehat{w} - \widehat{w}_b = b$. Recall that the number of victims in presence of red tape is $\frac{\lambda At}{1+r}$. In general, therefore, bribery may squeeze more or less people out of entrepreneurial activity than red tape depending on the size of bribe payment, the amount of red tape and other parameter values. Put differently, a unit increase in bribe payment may reduce entrepreneurial activity by more or less than a unit increase in red tape.

Finally, total production in the economy is given by

$$X_b = aF(w; 0, \widehat{w}_b) + AF(w; \widehat{w}_b, 1) = a\widehat{w}_b + A(1 - \widehat{w}_b) \tag{16}$$

Bribery reduces total production by $X_b - X = (a - A)b < 0$ and an increase in the amount of bribe reduces the total production by $a - A < 0$ which may be greater or less than the reduction under red tape. This is partly because the critical level of wealth is different in each case and partly because red tape (unlike bribery) reduces the productivity of entrepreneurs.

5 The Connection between Red Tape and Rent-seeking

The above analysis has established separately what outcomes would occur under an arbitrary amount of red tape and bribe payment which have been treated as unrelated to each other. In reality, it is well-recognized that red tape and rent-seeking are not separate phenomena but are intimately connected, the former being used as a means of practicing the latter. That is, bureaucrats can offer agents the opportunity of avoiding costly rules and regulations in return for kickbacks in one form or another. In the analysis that follows we seek to explore this connection.

Our starting point is to determine the optimal amount of bribe for bureaucrats. Bribes are obtained from those agents who are able to acquire loans of $k + b$ to undertake project investment. The population of these agents, $F(w; \widehat{w}_b, 1)$, depends on the critical level of wealth, $\widehat{w}_b$, which depends on the amount of bribe b. In addition, as we mentioned before, bribing a public official is a decision for individuals to make for themselves not an unavoidable bureaucratic abuse. Therefore we can say that agents compare their ex post incomes y_t^p and y_b^p to decide whether to pay bribes to circumvent the red tape or just go through it. From (7) and (12), these agents are willing to pay bribes if only if , $y_b^p \geq y_t^p$ implying $b \leq \frac{At}{1+r}$.

We assume that bureaucrats have knowledge about individual and market variables, such as agents' wealth, agents' output and the level of capital market imperfection, so that they also know the critical level wealth. We also assume that bureaucrats act collusively in their rent-seeking, forming an organized corruption network so as to maximise their total bribe income. Under such circumstances, bureaucrats take account of the fact that the number potential bribe payers, determined by $\widehat{w}_b$, depends on the size of bribe demanded[6].

Given the above, bureaucrats determine their optimal level of bribe by solving the following maximisation problem.

$$\max_b imise\ B = bF(w; \widehat{w}_b, 1) = b(1 - \widehat{w}_b) \tag{17}$$

$$subject\ to\ b \leq \frac{At}{1+r} \tag{18}$$

The optimal amount of bribe and its impact on the aggregate economy can be different depending on whether red tape is exogenous or endogenous to bureaucrat's decisions.

[6]This is the same as assuming there is just a single bureaucrat extracts bribes from all entrepreneurs.

5.1 Exogenous Red Tape

If we solve the above optimisation problem assuming that bureaucrats take the amount of red tape t as given, then the following result is obtained.

> Lemma 1: $\exists$ *a threshold level of red tape,* $\widetilde{t} = \frac{(1-k)(1+r)}{2A} + \frac{\lambda}{2}$, *above which the optimal bribe is* $b_1^* = \frac{1-k}{2} + \frac{\lambda A}{2(1+r)}$ *and below which the optimal bribe is* $b_2^* = \frac{At}{1+r}$.

The first order condition for the maximisation problem in (17) and (18) is

$1 - k + \frac{\lambda A}{1+r} - 2b - \mu = 0$

We also have the complementary slackness conditions;

$\mu = 0$ and $b \leq \frac{At}{1+r}$; or $\mu > 0$ and $b = \frac{At}{1+r}$

suppose that $\mu = 0$. Then the optimal bribe is $b_1^* = \frac{1-k}{2} + \frac{\lambda A}{2(1+r)}$ which must satisfy the non-binding constraint $b \leq \frac{At}{1+r}$, implying $t \geq \frac{(1-k)(1+r)}{2A} + \frac{\lambda}{2} \equiv \widetilde{t}$. If $t < \widetilde{t}$, then $b_1^* > \frac{At}{1+r}$ which is not admissible. In this case the optimal bribe is determined from the binding constraint, $b_2^* = \frac{At}{1+r}$.

Since red tape is exogenous to bureaucrats' decision, lemma 1 shows that bureaucrats cannot demand bribes higher than the discounted ex post cost of red tape $\frac{At}{1+r}$ if t is less than the threshold level $\widetilde{t}$. If this is the equilibrium, two different critical levels of wealth come out in the credit market - $\widehat{w}_t$ as given in (8) and $\widehat{w}_{b_2^*}$ as given by

$$\widehat{w}_{b_2^*} = k + \frac{At}{1+r} - \frac{\lambda A}{1+r} \tag{19}$$

From (8) and (19), we can show that $\widehat{w}_{b_2^*} > \widehat{w}_t$ since $\widehat{w}_{b_2^*} - \widehat{w}_t = \frac{At}{1+r}(1-\lambda) > 0$ as long as $t > 0$. Given this, paying a bribe is an affordable option only for those agents with wealth $w \geq \widehat{w}_{b_2^*}$ as these agents are eligible for loans of size $k + b_2^*$. On the other hand, engaging in entrepreneurial activity is still possible for agents with wealth $w \in \left[\widehat{w}_t, \widehat{w}_{b_2^*}\right)$, but these agents can choose this occupation only by going through red tape as their affordable loan size is only k which is not enough to pay the extra bribe payment b_2^* ex ante. As a result, there has emerged three different types of agents in the economy; low income agents - with ex ante wealth $w < \widehat{w}_t$ - who choose subsistence occupation; middle income agents - with wealth $w \in \left[\widehat{w}_t, \widehat{w}_{b_2^*}\right)$- who can invest in the advanced project but have to go through the red tape to do so; and high income agents - with wealth $w \geq \widehat{w}_{b_2^*}$ - who can invest in the project and can pay bribes to circumvent red tape if they need to. Proceeding as before, the income of these three groups of agents is summarised by

$$y_{b_2^*} = \begin{cases} y^s & \text{if } w < \widehat{w}_t \\ y_t^p & \text{if } \widehat{w}_t \leq w < \widehat{w}_{b_2^*} \\ y_{b_2^*}^p & \text{if } w \geq \widehat{w}_{b_2^*} \end{cases} \tag{20}$$

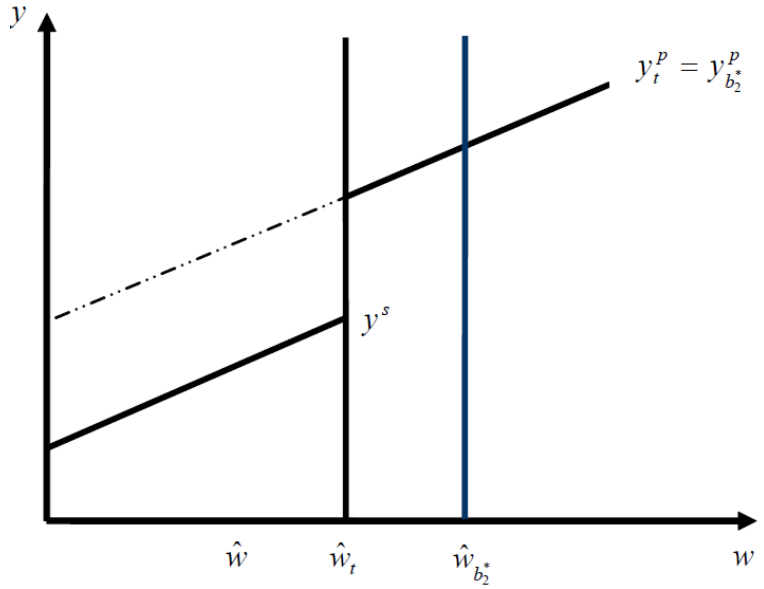
Note that, since $b_2^*(1+r) = At$ and so $y_t^p = y_{b_2^*}^p$, there is no difference between paying bribe and going through red tape for those agents with wealth $w \geq \widehat{w}_{b_2^*}$.

The distribution of income is re-written as

$$\pi(y_{b_2^*}) = \begin{cases} F(w;0,\widehat{w}_t) = \int_0^{\widehat{w}_t} f(w)dw = \widehat{w}_t \text{ for } y = y^s \\ F(w;\widehat{w}_t,\widehat{w}_{b_2^*}) = \int_{\widehat{w}_t}^{\widehat{w}_{b_2^*}} f(w)dw = \widehat{w}_{b_2^*} - \widehat{w}_t \text{ for } y = y_t^p \\ F(w;\widehat{w}_{b_2^*},1) = \int_{\widehat{w}_{b_2^*}}^{1} f(w)dw = 1 - \widehat{w}_{b_2^*} \text{ for } y = y_{b_2^*}^p \end{cases} \tag{21}$$

The relationship between the final incomes of these three classes of agents and their ex ante wealth is described in figure 4.

Figure 4



Given the above, we have the following result by using (10) and (21).

Proposition 2: *When red tape is treated exogenously, bribery has a similar effect to red tape on income distribution as t increases up to* $\widetilde{t}$. *Beyond* $\widetilde{t}$, *bribery increases income inequality more than red tape as t increases.*

Lemma 1 argues that $b_2^* = \frac{At}{1+r}$ as long as $t < \widetilde{t}$. Therefore, $\widehat{w}_{b_2^*} - \widehat{w}_t$ proportion of agents, who are going through the red tape, and $1 - \widehat{w}_{b_2^*}$ proportion of agents, who are bribing public officials, earn the same net income $A - (1+r)k - At$ and $A - (1+r)k - b_2^*(1+r)$ respectively since $b_2^*(1+r) = At$ (see figure 4). In other words, the income distribution is same as the distribution in section 3 on red tape. When $t \geq \widetilde{t}$, the net income of $\widehat{w}_{b_2^*} - \widehat{w}_t$ proportion of agents is less than net income earned by the $1 - \widehat{w}_{b_2^*}$ proportion of agents as $b_2^*(1+r) \leq At$. So, in this case, the income distribution becomes more unequal than the distribution determined in the economy with red tape.

Finally, the total production in the economy is

$$X_{b_2^*} = a\widehat{w}_t + A(1-t)(\widehat{w}_{b_2^*} - \widehat{w}_t) + A(1 - \widehat{w}_{b_2^*}) \tag{22}$$

Comparing the output $X_{b_2^*}$ in (22) and X_t in (11), the following result is provided

> Proposition 3: *When red tape is exogenous to bureaucrats' decision, bribery always reduces the total output in the economy by a less amount than red tape does as long as* $t < \widetilde{t}$. *Furthermore, as the amount of red tape increases, the marginal loss in total production with bribery* $X_{b_2^*}$ *is less than the marginal loss in total production with red tape,* X_t, *when* $t < \widetilde{t}$, *and vice versa when* $t \geq \widetilde{t}$.

Bribery reduces the total output in the economy by a less amount than red tape does since the difference between these outputs $\Delta X_{b_2^*} = X_{b_2^*} - X_t$ is given by

$$\Delta X_{b_2^*} = At(1 - \widehat{w}_{b_2^*}) \tag{23}$$

Hence, $\Delta X_{b_2^*}$ is positive as long as $t > 0$. $\Delta X_{b_2^*}$ in (23) is a concave function in t and it has a unique global maximum point at $\widetilde{t} = \frac{(1-k)(1+r)}{2A} + \frac{\lambda}{2}$. By substituting (19) into (23), we can write the first order condition as $\frac{\partial \Delta X_{b_2^*}}{\partial t} = A\left[1 - k + \frac{\lambda A}{1+r}\right] - \frac{2A^2 t}{1+r} = 0$ and find the maximum point as $t = \widetilde{t}$. So, as t increases, $\Delta X_{b_2^*}$ increases up to $\widetilde{t}$ and decreases beyond it.

Under exogenous red tape, as long as $t < \widetilde{t}$ and so $b^* = \frac{At}{1+r}$, bribery has a similar, but less adverse, effect to red tape on the total production. We can conclude that bribery is less harmful to the economy than the red tape overall. This is because, compared to red tape, bribery allows the wealthiest agents in the economy (with wealth $w > \widehat{w}_{b_2^*}$) to become more productive by bribing public officials instead of going through red tape. This is essentially the "speed money"hypothesis, according to which

bribes can play a positive role in helping to circumvent institutional hurdles that can create costs of doing business. But once t passes the threshold level $\widetilde{t}$, bribery has more harmful effects on income distribution and the marginal loss in total production with bribery is greater than the marginal loss in total production with red tape. In other words, the benefits of "speed money"decreases as t increases.

5.2 Endogenous Red Tape

The previous analysis showed that compared to red tape, bribery reduces total production by less but has a similar effect on income distribution. This result supports the "speed money"hypothesis. As indicated earlier, however, this hypothesis may be challenged on a number of grounds, and we single out just one, perhaps the most significant, point of contention. The institutional obstacles that bribes are meant to overcome are typically the result of corrupt practices to begin with. Indeed, they are often the very means by which public officials engage in illegal profiteering. In other words, rather than being taken as given by bureaucrats, t is an instrument of choice in the extraction of rents. As such, the amount of red tape is appropriately seen as being endogenous, rather than exogenous, to the bureaucratic process. Our analysis now proceeds to take this into account.

Since red tape is now endogenous (chosen to accommodate bribe demands) the optimisation problem given in (17) is no longer constrained and can be re-written as

$$\max imise\ B(b) = bF(w; \widehat{w}_b, 1) = b(1 - \widehat{w}_b) \tag{24}$$

bureaucrats chooses the optimal level of bribe b^* that maximises $B(b)$ in (23) as

$$b^* = \frac{1-k}{2} + \frac{\lambda A}{2(1+r)} \equiv b_1^* \tag{25}$$

Given this, bureaucrats then set the level of red tape such that $b_1^* \leq \frac{At}{1+r}$ or $\frac{b_1^*(1+r)}{A} \leq t$, to make sure that they receive b_1^* amount of bribe income from each entrepreneur (i.e. to ensure that entrepreneurs will be willing to pay bribes rather than go through red tape). The optimal amount of red tape t^* that maximises bureaucrats bribe income $B(b)$ in (24) satisfies $t^* \geq \widetilde{t}$, where $\widetilde{t}$ is defined in Lemma 1. Given this, we provide the following results.

> Proposition 4: *When red tape is endogenous to bureaucrats' decision, bribery has a more harmful effect on income distribution and the total output in the economy than red tape as long as* $t^* > \widetilde{t}$.

When red tape is endogenous, bureaucrats always set the level of red tape at $t^* \geq \widetilde{t}$, where, according to proposition 2 and 3, bribery increases income inequality and reduces total production more than red tape does as t increases.

Substitution of the optimal amount of bribe in (25) into the critical level of wealth with bribery in (13) provides the following critical level of wealth

$$\widehat{w}_{b_1^*} = \frac{1+k}{2} - \frac{\lambda A}{2(1+r)} \tag{26}$$

Similar to the previous section, there will emerge two different critical levels of wealth if $\widehat{w}_{b_1^*}$ is greater than the critical level of wealth with red tape $\widehat{w}_t$. From (8) and (25), $\widehat{w}_{b_1^*} > \widehat{w}_t$ if and only if $\frac{(1-k)(1+r)}{2\lambda A} + \frac{1}{2} > t$. Since $0 < \lambda < 1$, $\frac{(1-k)(1+r)}{2\lambda A} + \frac{1}{2}$ is greater than the threshold level of red tape in Lemma 1. So, in this case, we have two different situations.

The first situation is when the optimal red tape $t^*$is set by bureaucrats such that $\frac{(1-k)(1+r)}{2\lambda A} + \frac{1}{2} > t^* > \widetilde{t}$, and subsequently there exist two critical levels of wealth $\widehat{w}_{b_1^*}$ for entrepreneurs who are eligible for the loan size of $k + b_1^*$ and so who can afford the bribe payment b_1^*, and $\widehat{w}_t$ for entrepreneurs who cannot afford bribe payment. $\widehat{w}_{b_1^*}$ is given in (25) and $\widehat{w}_{t^*}$ is given as

$$\widehat{w}_{t^*} = k - \frac{\lambda A(1-t^*)}{1+r} \tag{27}$$

$$y_{b_1^*} = \begin{cases} y^s \ if \ w < \widehat{w}_{t^*} \\ y_t^p \ if \ \widehat{w}_{t^*} \leq w < \widehat{w}_{b_1^*} \\ y_{b_1^*}^p \ if \ w \geq \widehat{w}_{b_1^*} \end{cases} \tag{28}$$

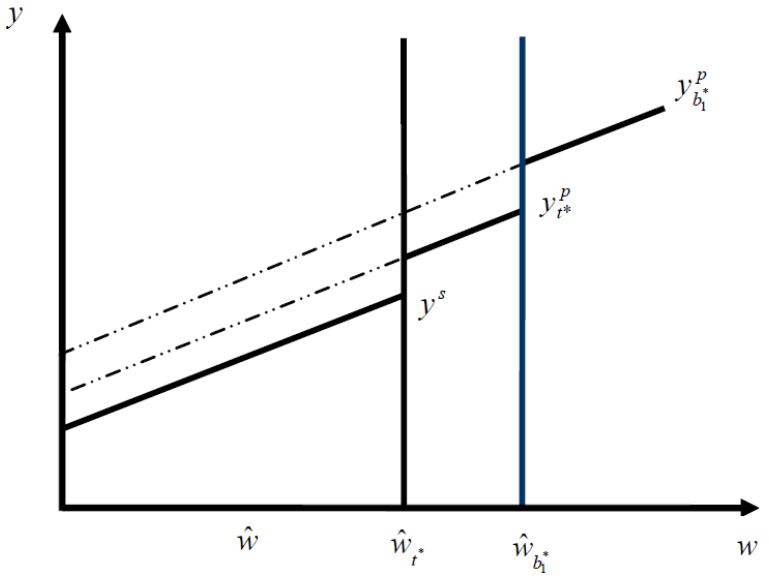
Entrepreneurs prefer bribing public officials rather than going through the red tape to get the license as $b_1^*(1+r) \leq At$ and so $y_t^p \leq y_{b_1^*}^p$ (see figure 5). But bribery is a possible option only for those agents with wealth $w \geq \widehat{w}_{b_1^*}$. Given the above final incomes, the distribution of income is

$$\pi(y_{b_1^*}^*) = \begin{cases} F(w; 0, \widehat{w}_{t^*}) = \int_0^{\widehat{w}_{t^*}} f(w)dw = \widehat{w}_{t^*} \text{ for } y = y^s \\ F(w; \widehat{w}_{t^*}, \widehat{w}_{b_1^*}) = \int_{\widehat{w}_{t^*}}^{\widehat{w}_{b_1^*}} f(w)dw = \widehat{w}_{b_1^*} - \widehat{w}_{t^*} \text{ for } y = y_t^p \\ F(w; \widehat{w}_{b_1^*}, 1) = \int_{\widehat{w}_{b_1^*}}^{1} f(w)dw = 1 - \widehat{w}_{b_1^*} \text{ for } y = y_{b_1^*}^p \end{cases} \tag{29}$$

Figure 5 describes the relationship between final income and wealth.

From (5) and (28), the number of agents who are being squeezed out of entrepreneurial activity because of corruption is $1 - \widehat{w} - (1 - \widehat{w}_{t^*}) = \widehat{w}_{t^*} - \widehat{w} = \frac{\lambda A}{1+r} t^*$. On the other hand, the number of sufferers due to the red tape is $\frac{\lambda A}{1+r} t$. Comparing these two terms, we can see that the number of

Figure 5



victims of corruption with endogenous red tape is greater than the number of victims of the red tape since $\frac{\lambda A}{1+r}(t^* - t)$ is positive as long as $t^* > t$. So, when bureaucrats take t as endogenous to their decision, bribery has always a more deteriorating effect than red tape on the income distribution as long as $t^* > t$. The total output in the economy, $X_{b_1^*}$, is now

$$X_{b_1^*} = a\widehat{w}_{t^*} + A(1 - t^*)(\widehat{w}_{b_1^*} - \widehat{w}_{t^*}) + A(1 - \widehat{w}_{b_1^*}) \tag{30}$$

Using proposition 3, we can see that $X_{b_2^*} - X_t > X_{b_1^*} - X_{t^*}$ when $t^* > t > \widetilde{t}$. We therefore conclude that bribery under endogenous red tape reduces total output more than bribery under exogenous red tape if $t^* > t$.

The second situation is when the optimal red tape is set like $t^* \geq \frac{(1-k)(1+r)}{2\lambda A} > \widetilde{t}$[7], in which case there will be only one critical level of wealth $\widehat{w}_{b_1^*}$ as it becomes less than the critical level of wealth with optimal red tape $\widehat{w}_{t^*}$. In this case, bureaucrats set the amount of red tape too high and there is only one critical level of wealth $\widehat{w}_{b_1^*}$ given in (25). Now there are only two income classes with the following final incomes

$$y_{b_1^*} = \begin{cases} y^s \text{ if } w < \widehat{w}_{b_1^*} \\ y^p_{b_1^*} \; if \; w \geq \widehat{w}_{b_1^*} \end{cases} \tag{31}$$

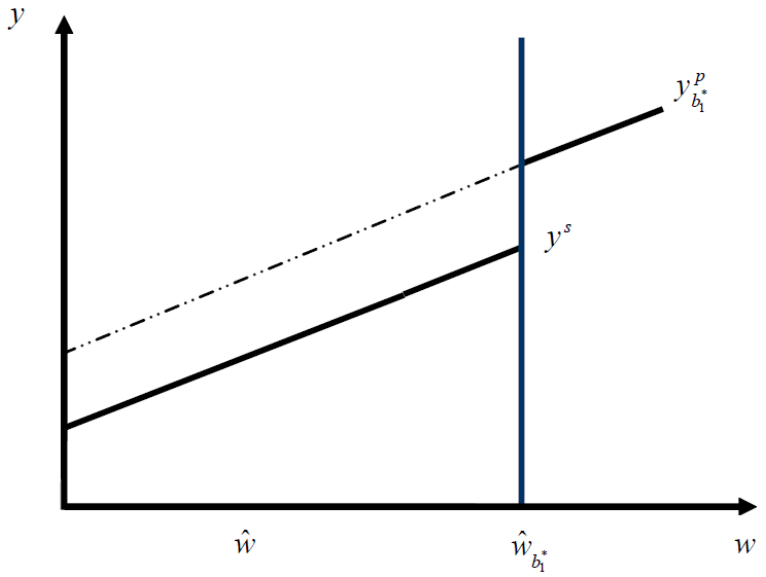
[7]Here, we assume implicitly that $\frac{(1-k)(1+r)}{2\lambda A} + \frac{1}{2} < 1 - \frac{a+(1+r)k}{A}$ due to the parametric restriction - $A(1-t) - (1+r)k > a$ - in section 3.

and the distribution of income is

$$\pi(y^*_{b^*_1}) = \begin{cases} F(w;0,\widehat{w}_{b^*_1}) = \int_0^{\widehat{w}_{b^*_1}} f(w)dw = \widehat{w}_{b^*_1} \text{ for } y = y^s \\ F(w;\widehat{w}_{b^*_1},1) = \int_{\widehat{w}_{b^*_1}}^1 f(w)dw = 1 - \widehat{w}_{b^*_1} \text{ for } y = y^p_{b^*_1} \end{cases} \tag{32}$$

Figure 5 is changed to figure 6 below.

FIGURE 6



Comparing (5) and (31), the number of victims of rent-seeking is $\widehat{w}_{b^*_1} - \widehat{w} = \frac{1-k}{2} + \frac{\lambda A}{2(1+r)}$. This is greater than the number of rent-seeking victims in previous case since $\frac{\lambda A}{1+r}t^* \geq \frac{1-k}{2} + \frac{\lambda A}{2(1+r)}$ given that $t^* \geq \frac{(1-k)(1+r)}{2\lambda A} + \frac{1}{2}$.

Now bribery squeezes even more agents out of entrepreneurial activity than red tape. Finally, the total output in the economy, $X_{b^*_1}$, is

$$X_{b^*_1} = a\widehat{w}_{b^*_1} + A(1 - \widehat{w}_{b^*_1}) \tag{33}$$

Now the difference between the total output under endogenous red tape (32), and the total output under exogenous red tape (22) is even bigger than the previous case as t^* is higher here.

In summary, when the amount of red tape is taken by bureaucrats endogenously, bribery becomes more harmful for income distribution and economic performance as the level of red tape gets higher.

6 Conclusions

The impacts of, and connections between red tape and rent-seeking by bureaucrats have been analysed in a model of occupational choice, entry regulation and imperfect capital markets. Red tape is the bundle of bureaucratic procedures that private agents must follow in order to engage in entrepreneurial activity. Bribery is the payment by some agents to bureaucrats to avoid the red tape. Capital market imperfections are the asymmetries of information between borrowers and lenders about the repayment on loan. The basic problem for agents is to choose whether or not to become entrepreneurs, given the terms and conditions of borrowing and the terms and conditions of acquiring licenses.

According to our analysis, both red tape and bribery are costly for agents, and both reduce the number of entrepreneurs by increasing the critical level of wealth that agents need to obtain loans. This increase in critical level of wealth reflects an increase in the incentives of agents to default on their loans. The reason for this is slightly different the two cases: in the case of red tape (which reduces the output from entrepreneurship) agents stand to lose less if they are caught defaulting; in the case of bribing (which increases the amount of borrowing) , agents stand to gain more by not paying back their loans. Against this background, we established conditions under which red tape is either more or less damaging than bribery in terms of its impact on income distribution and aggregate output.

In an extension of the analysis, we sought to investigate the implications of allowing for interaction between red tape and bribery. In particular, we treated bribery as a means by which agents may circumvent red tape. This gave rise to some new results, not least of which was the separation of the population into three (rather than just two) income classes. Our analysis was also used to illustrate the "speed money"hypothesis, which we subsequently challenged by taking account of the fact that red tape is typically the very means by which bureaucrats extract bribes and should therefore be treated endogenously, rather than exogenously, in the bureaucratic process.

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