Reward structures and the allocation of talent

Daron Acemoglu *

Department of Economics, E52-371, Massachusetts Institute of Technology, 50 Memorial Drive, Cambridge, MA 02139, USA

Abstract

As relative rewards that different professions receive are a key factor in the allocation of talent, what determines the reward structure of a society is an important question. This paper develops an equilibrium model of the allocation of talent between productive and unproductive activities (such as rent-seeking). The existence of rent-seeking creates a negative externality on productive agents and implies that relative rewards are endogenously determined. The same externality can also lead to the existence of multiple equilibria, each with different reward structures. In a dynamic setting, allocations of past generations as well as expectations of future allocations influence current rewards and the society may get trapped in a 'rent-seeking' steady state equilibrium. The paper also discusses how the non-pecuniary reward structure can be influenced by equilibrium selection and a historical example that suggests the presence of a causal link from the allocation of talent to non-pecuniary rewards.

Keywords: Reward structures; Rent-seeking; Multiple equilibria; History dependence; Social consensus

JEL classification: D72; J24

1. Introduction

The allocation of talent is an important question for economists and two issues deserve particular attention; first, the allocation of agents according to their comparative advantages, and second, the allocation of talent across different activities with diverging private and social returns. The current paper is concerned with the second, and with the related question of why rent-seeking, tax fraud, corruption and crime are prevalent in certain regions, countries and episodes. The view that agents would choose activities yielding the highest private returns comes natural to economists. This link between the relative rewards of different activities (the reward structure), and the allocation of talent is analyzed in the recent papers by Baumol (1990) and Murphy et al. (1991). The more important question of why reward structures differ across societies is, however, largely unanswered. The answer may partly fall outside the realm of economics. If so the reward structure is largely exogenous and as Baumol points out, it could be changed by policy in order to achieve a more favorable allocation of talent.

This paper takes a different approach. We consider a simple model of allocation of talent between two activities; productive entrepreneurship and unproductive rent-seeking. The reward structure determines the relative rewards of each agent in these activities; yet the proportion of unproductive agents influences these relative rewards by creating an externality. This externality is not technological in nature (as in Romer (1986)), neither is it due to aggregate demand spill-overs (as in Blanchard and Kiyotaki (1987)), nor due to labor market interactions (as in Acemoglu (1993)), but it is derived from interactions in the 'rent market'. Rents that an entrepreneur expects to pay and the marginal profitability of the entrepreneur's investment depend on the number of rent-seekers. It follows that even in a static setting, the reward structure is not exogenous because the extent of rent-seeking activities (the allocation of talent) influences relative rewards. In particular, more rent-seeking in the society reduces the return both to entrepreneurship and rent-seeking. If the relative return to entrepreneurship falls faster over a region, a multiplicity of equilibrium allocations may arise. [1] Since each equilibrium will have different relative rewards, the equilibrium reward structure and allocation of talent are jointly determined.

In a dynamic analogue of this static economy, past allocations, as well as expectations of future allocations, influence the current reward structure thus inducing history dependence and strengthening the sense in which the reward structure is endogenous. When an agent chooses rent-seeking, he influences the relative rewards of the current generation but since he will be an active rent-seeker for a number of periods to come, he also influences the relative rewards to future generations.

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[1] The possibility of multiplicity of equilibria has also been noted recently by Murphy et al. (1993).

A useful distinction can be made between the pecuniary and non-pecuniary aspects of the reward structure where the non-pecuniary reward structure consists of social status and prestige received for different activities. Our formal equilibrium model only discusses the pecuniary aspects of the reward structure. However, by borrowing from the ideas of 'political equilibrium' literature, we argue that non-pecuniary aspects of the reward structure can also be endogenized and that these will contribute further to history dependence. We also try to illustrate this reverse causality by discussing a historical example where changes in the allocation of talent seem to have impacted on the non-pecuniary aspects of the reward structure.

The endogeneity of the reward structure implies that policy action to influence the allocation of talent is not easy and that an inadequate reward structure not only leads to an unfavorable allocation of talent in the present but also distorts future allocations; 'underdevelopment traps' can thus result when economies inherit unfavorable allocations of talent and/or reward structures.

The rest of the paper is organized as follows: Section 2 considers the static model of allocation of talent and reward structure. Section 3 constructs a dynamic analogue of this model and illustrates history dependence and the dynamic interaction between reward structure and allocation of talent. Section 4 suggests an argument that can be used to endogenize the non-pecuniary aspects of the reward structure and discusses a historical example where the reward structure and the 'social consensus' appear to have been influenced by past allocations of talent.

2. A simple equilibrium model of the allocation of talent

We assume that each agent has some talent that can be employed in two areas:
(1) Productive activities which we call entrepreneurship.
(2) Unproductive activities which bring positive return to the individual but not to the society, therefore, by definition, create negative returns on some other individuals. This group of activities can be most easily thought of as rent-seeking.

In practice rent-seeking does not need to be entirely unproductive (for example Leff (1964)). If rent-seeking takes the form of trying to exploit monopoly rents accruing to another party, it may have productive aspects as well. However, the effects identified in this paper will still work on the margin. Also, rent-seeking is often carried out by some legitimate groups that have other roles in the society, such as the bureaucracy or the military. The society needs both groups but each of these, once established, can use their position to seek further rents (e.g. Acemoglu and Verdier, 1994). Other important factors also influence the entrepreneurship decisions; the role of capital constraints and uncertainty are obvious here (see for instance Newman (1991), Banerjee and Newman (1993), Evans and Jovanovic (1989), Blanchflower and Oswald (1992) for capital constraints and Kihlstrom and

Laffont (1979) for the role of attitudes towards risk). We abstract from all these considerations in what follows. The important aspect for us is that agents can choose an activity which reduces the return to productive activities carried out by other agents.

We assume that the economy consists of a continuum of identical [2] agents normalized to 1. Each entrepreneur undertakes an ex ante investment that will determine his total product. This total product is equal to $\alpha + x$ where x is the amount of investment undertaken by the entrepreneur in question. This investment has to be chosen from the set $[0, \infty)$ and has cost $c(x)$ with $c'(\cdot)$ and $c''(\cdot) > 0$, $\lim_{x \to 0} c'(x) = 0$ and $c(0) = 0$. However, the entrepreneur does not keep all the revenue he produces. With a certain probability he has to deal with a rent-seeker who will demand a bribe in order not to block the entrepreneur's business. For instance a proportion of the customs officials or tax inspectors in this economy will be corrupt and extract some rents when dealing with an entrepreneur; hence the entrepreneur will lose a proportion $(1 - q)$ of his total product. We assume that the probability of dealing with a rent-seeker is equal to the proportion of rent-seekers in the economy, denoted by p. Therefore, the total net return to the entrepreneur is equal to

$$(1 - p + pq)(\alpha + x - c(x)). \tag{1}$$

Gross revenue of entrepreneurship is $\alpha + x$ and the entrepreneur keeps all of this with probability $(1 - p)$ and only a proportion q of it with probability p, while the cost of investment is always incurred. [3] The investment level will be set to maximize this return which implies

$$x(p) = \delta(1 - p + pq), \tag{2}$$

where $\delta(\cdot)$ is the inverse function of $c'(\cdot)$, and $c''(\cdot) > 0$ implies that $x(p)$ is everywhere decreasing in p. It can be readily seen from Eq. (2) that when p is positive, entrepreneurs will underinvest since they will not be the full residual claimants of the returns they generate.

Pay-off to rent-seeking will depend on the likelihood of obtaining bribes from entrepreneurs. We denote the proportion of entrepreneurs by b and the bribe that a rent-seeker receives from an entrepreneur by R(p). This amount can be a decreasing function of p because of competition among rent-seekers or because the gross

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[2] An earlier version of this paper considered agents with different levels of skill (see also footnote 6). The analysis is simpler with identical agents and we do not have to specify whether the most productive agents choose productive or unproductive activities. According to Murphy et al. (1991) the most important source of inefficiency is that most productive agents may prefer unproductive activities and this would have feedback effects on the growth potential of the economy.

[3] We are implicitly assuming that all agents are ex ante wealthy and can therefore meet the start-up and investment costs without running into credit difficulties. In general this can be a further strategic effect. The higher is rent-seeking, the higher is the probability of bankruptcy and the higher will the cost of capital be thus making entrepreneurship even less attractive.

revenue of entrepreneurs is decreasing in p (as they choose to invest less). We also assume that $R'(\cdot) \leqslant 0$ and $R''(\cdot) \leqslant 0$. The expected return to a rent-seeker is therefore given by

$$bR(p) \tag{3}$$

From Eq. (1) there are pb entrepreneurs that meet a rent-seeker and from (3) exactly the same number of rent-seekers meet an entrepreneur.

Since all agents in this economy are identical, in equilibrium they must have the same expected return. Noting that $b = 1 - p$, this gives

$$(1 - p + pq)(\alpha + x(p)) - c(x(p)) = (1 - p)R(p). \tag{4}$$

The LHS of Eq. (4) is the expected net return to entrepreneurship. This expected return should be equal what the entrepreneur could get if he chose rent-seeking, the RHS of (4).

Inspection of this equation shows that a multiplicity of equilibria is possible (that is, strategic complementarities in the sense of Cooper and John (1988) exist). Suppose that there is a reduction in rent-seeking, p. The return to entrepreneurship increases due to two sources; first, entrepreneurs keep their full return more often and second, the profitability and the optimal level of investment increase. Thus to satisfy (4), the RHS needs to go up and this requires a reduction in p. Therefore, a fall in p can be self-sustained.

Returning to the algebra, we refer to the LHS of this equation as V_E, return to entrepreneurship and to the RHS as V_R, return to rent-seeking. Using the first-order condition for optimal investment, (2), we can see that

$$\frac{dV_E}{dp} = -(1 - q)(\alpha + x(p)) < 0,$$

$$\frac{d^2 V_E}{dp^2} = -(1 - q)x'(p) > 0 \tag{5}$$

and

$$\frac{dV_R}{dp} = -R(p) + (1 - p)R'(p) < 0. \tag{6}$$

Thus both curves are downward sloping and can obviously have more than one intersection. The number of equilibria will depend on the relative positions of these curves. A no-activity equilibrium in which everyone becomes a rent-seeker will not exist since when $p = 1$, $V_R = 0$, but $V_E > 0$ because $q > 0$. Now consider the following conditions:

Condition A. $\alpha + x(0) - c(x(0)) > R(0)$.

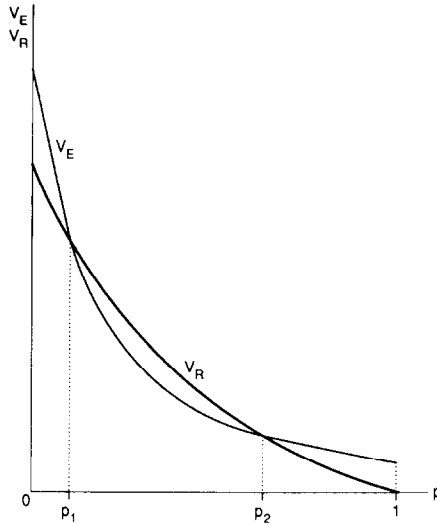This states that when there is no rent-seeking, the return to rent-seeking is lower than that to entrepreneurship.

Fig. 1.

Condition B. $\exists p^*$ such that $(1 - p^* + p^* q)(\alpha + x(p^*)) - c(x(p^*)) < (1 - p^*)R(p^*)$.

This condition implies that at some level of activity in the economy, rent-seeking is more profitable than entrepreneurship. We can then state the following result:

Proposition 1.   (i) *When condition A is satisfied but B is not satisfied, there exists a unique equilibrium in which no agent chooses to become a rent-seeker.*
(ii) *When both conditions A and B are satisfied, there exist at least three equilibria, one without and the others with rent-seeking.*

Proof.   The proof follows from (4) and Fig. 1. Suppose A is satisfied, the curve V_E starts vertically above V_R which implies that when there is no rent-seeking, the return to rent-seeking is less than that to entrepreneurship. Thus a situation without any rent-seeking is an equilibrium. Whether there are any more equilibria depends on the position of the two curves. When assumption B is not satisfied, V_E never falls below V_R, thus the unique equilibrium is given by point $p = 0$. However, when V_E falls below V_R at least two more intersections must exist, since at $p = 1$, we know that $V_E > V_R$.   Q.E.D.

An example can now be given to illustrate this proposition. Let us assume $c(x) = c_0 + \frac{1}{2}c_1 x^2$, $R(p) = \gamma(\alpha + x)$ and suppose q to be small. [4] Given these

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[4] Note that $c(0)$ is not equal to zero in this case, but this example is the simplest one to work with.

specifications, Eq. (4) becomes

$$(1-p)\left(\alpha + \frac{(1-p)}{2c_0}\right) - \frac{(1-p)^2}{2c_0} - c_1 = (1-p)\left(\gamma\alpha + \frac{\gamma(1-p)}{2c_0}\right).$$

(7)

Thus

$$p_{1,2} = 1 - \frac{\alpha(1-\gamma)c_0 \pm \sqrt{\alpha^2(1-\gamma)^2 c_0^2 - 4c_0 c_1\left(\gamma - \frac{1}{2}\right)}}{2\gamma - 1}$$

(8)

Therefore, for a multiplicity of equilibria we require

$$\alpha + \frac{1}{2c_0} - c_1 > \gamma\alpha + \frac{\gamma}{c_0},$$

(9)

which corresponds to condition A, and

$$\frac{c_0}{c_1}\alpha^2 \frac{(1-\gamma)^2}{\gamma - \frac{1}{2}} > 4,$$

(10)

which corresponds to condition B. This simple example illustrates a number of points. First if γ is near 1, then rent-seekers will capture a large portion of the returns and multiplicity will fail to exist. Similarly if γ is smaller than $1/2$, rent-seeking is not sufficiently attractive and we again have a unique equilibrium. We also need c_0 to be large relative to c_1, otherwise entrepreneurship remains attractive relative to rent-seeking and (10) is not satisfied.

In the rest of the paper, we will assume that both conditions hold so that the economy has at least three equilibria. [5] Intuitively, when rent-seeking is high, the return to investment will be low, thus entrepreneurship will be relatively less attractive compared to rent-seeking. In practice there will be other and perhaps equally important sources of multiplicity in the economy not modelled here. [6]

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[5] When Assumption A does not hold (which implies that B must hold) one or more equilibria are possible as inspection of Fig. 1, bearing in mind that V_R can still fall more or less steeply than V_E, will show.

[6] It can also be asked how our results will change when we allow for heterogeneity. Most simply we can assume that the return to investment is $b_i x$ where b_i is the type of the agent and has a distribution over [0, 1] given by $G(b)$. In this case (4) will be replaced by

$(1 - p + pq)(\alpha + bx(b,p)) - c(x(b,p)) = (1-p)R(p)$

since we would now need the marginal agent b to be indifferent between entrepreneurship and rent-seeking. All agents with a comparative advantage for rent-seeking relative to b (i.e. $b_i < b$) will choose rent-seeking and thus $p = G(b)$. We can then proceed as before and verify that the strategic complementarity discussed in the text is present. Also a multiplicity of equilibria will be more likely when there are enough intermediate types who can choose either rent-seeking or entrepreneurship.

Apart from the example given in footnote 3, we can think of investment by an entrepreneur as creating positive externalities affecting the investment decision of other entrepreneurs (technological, aggregate demand or labor market externalities) which would also make high and low activity equilibria possible. However, Proposition 1 shows that there exists an additional externality due to the fact that relative rewards that determine the allocation of agents across activities depend on the amount of unproductive activity in the economy.

Proposition 1 also establishes that the allocation of talent is jointly determined with the reward structure. In the equilibrium without rent-seeking, the return to entrepreneurship is high relative to that of rent-seeking, while this is not true in the other equilibria. Obviously there are aspects of the reward structure that are exogenous. For instance, $R(\cdot)$ and q are determined outside the model. However, given these, the relative reward of a profession is endogenous and varies considerably across the three equilibria. Baumol's (1990) argument, that even though the supply of entrepreneurial talent is not sensitive to relative rewards, the allocation of this talent is, is also vindicated by this model; the supply of talent is fixed but its distribution across activities crucially depends upon the reward structure which, however, is also determined endogenously in our model. In Baumol's discussion, history could play a role through the evolution of the non-pecuniary aspects of the reward structure, whereas the existence of multiple equilibria in our model introduces the question of equilibrium selection which brings history and expectations to the forefront of the analysis.

Further the equilibria that exist in this model can also be Pareto ranked:

Proposition 2.   When multiple equilibria exist, an equilibrium with less rent-seeking strictly Pareto dominates an equilibrium with more rent-seeking. The equilibrium without rent-seeking is always Pareto efficient.

Proof.   The vertical axis is proportional to the expected return of each agent. Q.E.D.

As in most models of multiple equilibria through strategic complementarities, the equilibria are Pareto ranked (see Cooper and John, 1988). Also since the only source of inefficiency in this model is rent-seeking, the equilibrium without rent-seeking is Pareto efficient.

3. A dynamic extension and history dependence

Let us now consider a continuous time overlapping generations analogue of the above economy. Each agent is potentially infinitely lived but faces a death rate of

β per period and also there are β new agents who are born at every instant, implying a constant population. Each agent has an irreversible career choice when he is born; to become an entrepreneur or a rent-seeker. The per period returns are given as above and the discount rate adjusted for the probability of death is denoted by r. This description implies that each agent, when born, observes, p and anticipating the choice of future generations makes his career choice. Also each entrepreneur chooses his investment level at each instant and this only influences his total product at that point. This investment level will therefore only depend on the current level of rent-seeking in the economy and similarly to the previous section, we can write it as $x(p)$. The following value equations can therefore be written (dropping time arguments);

$$rV_E - V_E' = (1 - p + pq)(\alpha + x(p)) - c(x(p)) \tag{11}$$

and

$$rV_R - V_R' = (1 - p)R(p), \tag{12}$$

where a prime denotes a time-derivative. The intuition for (11) and (12) can be most easily given by interpreting them as asset value equations. Choosing a career is a commitment to hold an asset for the rest of one's life. The instantaneous return from this asset, rV_E (or rV_R), is equal to the appreciation in the value of the asset at that instant, V_E' (or V_R'), and the per period dividend, the RHS of each equation. As return to entrepreneurship is given by V_E and that to rent-seeking by V_R, entrepreneurship will be more attractive than rent-seeking when $V_E > V_R$ and new born agents would prefer entrepreneurship to rent-seeking. Alternatively, we can define $V = V_E - V_R$ and entrepreneurship will be more attractive than rent-seeking when $V > 0$. Subtracting (12) from (11), we obtain the law of motion of V as

$$V' = rV + (1 - p)R(p) - (1 - p + pq)(\alpha + x(p)) + c(x(p)). \tag{13}$$

Let $p^*(t)$ be such that $V(p^*(t)) = 0$. When $p^*(t) < p(t)$, new born agents would like to be entrepreneurs. However, as the career choice is irreversible, $p(t)$ is a predetermined variable and cannot jump to $p^*(t)$. Thus when $V > 0$, all new agents would choose to become entrepreneurs and p would only fall due to the death of existing rent-seekers. This change in p would take place at the rate βp. Similarly when $V < 0$, all new born agents would become rent-seekers but as βp rent-seekers die at every instant, the increase in p will be equal to $\beta(1 - p)$. New born agents would only like to choose different activities when they are indifferent between the two professions, i.e. when $V = 0$. Thus the law of motion of p will be given by the following equation;

$$p' \begin{cases} = \beta(1 - p) & \text{if } V < 0 \\ \in [-\beta p, \beta(1 - p)] & \text{if } V = 0 \\ = -\beta p & \text{if } V > 0 \end{cases} \tag{14}$$
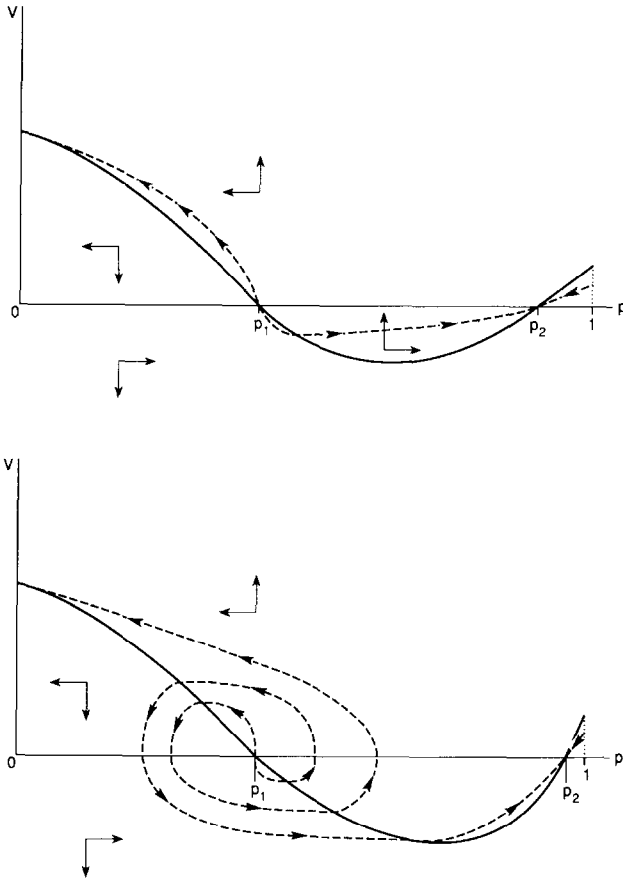
Fig. 2a, b.

Proposition 3.   Under conditions A and B, there exist at least three steady state equilibria.

Proof.   The static equilibria of the last section are steady state equilibria as they satisfy $p' = 0$ and $V' = 0$. At $p = 0$, we satisfy (12) with equality, i.e. $V' = 0$ and $p' = -\beta p = 0$. At p_1 and p_2 of Fig.1, we again have $V' = 0$ and $V = 0$, and thus $p' = 0$.   Q.E.D.

We can also illustrate the steady state equilibria of this economy in the (p, V) space where the curve $f(p)$ denotes the equation

$$f(p) = (1 - p + pq)(\alpha + x(p)) - c(x(p)) - (1 - p)R(p). \qquad (15)$$

Eqs. (12) and (13) determine the local dynamics of this system in Fig. 2 with three steady state equilibria. Note first that the maximum of $f(p)$ is an upper

bound on V as the difference between the return to entrepreneurship and rent-seeking cannot exceed $f(0)$. Similarly the minimum of $f(p)$ is a lower bound on V. Drawing the arrows in the phase diagram is straightforward. Steady states 0 and p_2 can be seen to be locally stable while p_1 is unstable. Therefore depending on where the economy starts, the long-run behavior can be quite different. In particular an economy which inherits an unfavorable allocation of talent will have higher relative rewards for rent-seeking and eventually converge to a steady-state with high rent-seeking. However, as (13) is a discontinuous function, we cannot determine the exact behavior of the system around p_1. Figs. 2a and 2b are both possible and an indeterminacy of equilibrium behavior can arise around p_1 (as in Fig. 2b). However, once we are sufficiently away from p_1, there is a unique equilibrium path which tends either to the high or to the no rent-seeking equilibrium.

The economic interest of the dynamic extension is in the emphasis it places upon how past allocations of talent influence future reward structures. For instance, if the majority of the current generation choose rent-seeking, the return to entrepreneurs relative to that of rent-seekers will be reduced in future periods and future generations will be induced to choose rent-seeking, thus giving us history dependence. The fact that in a dynamic setting the economy stays in a steady-state when it reaches this point is true by definition. However, we have also obtained the additional result that if an economy starts with too much rent-seeking at a point in time, it may be condemned to the steady state equilibrium with high rent-seeking unless shocked by an exogenous event. Initial differences can thus have important long-run effects. [7] Moreover reversing the adverse effects of a misallocation is difficult because such a misallocation also leads to an unfavorable future reward structure. The intuition is similar to that of Tirole's (1993) contribution which provides a mechanism more clearly derived from microfoundations. In Tirole's model, beneficial trade requires honesty on the part of the agents. Agents can choose to be honest or corrupt and whether they are honest is imperfectly observable. When agents have a good collective reputation, it pays for each agent to have a good track record but not when the collective reputation is bad. There too, a high level of corruption will have lasting effects. When a certain generation is known to be corrupt, this will reduce the desire of future generations to have a good reputation and thus, as in our model, wrong incentives will persist. Put more succinctly, "*a vicious circle of corruption*, where the new generations suffer from the original sin of their elders long after the latter are gone" (Tirole, 1993) is obtained.

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[7] If there are technological externalities created by the career or investment decisions of agents in this economy, different allocations will also lead to different long-run growth rates.

4. Non-pecuniary rewards, social consensus and history dependence

So far our discussion and model have only dealt with the pecuniary aspect of the reward structure. However, Baumol and also economic historians who have studied this field earlier, such as Landes (1949, 1969) and Sawyer (1951) and sociologists such as Parsons and Shils (1952) have emphasized the importance of non-pecuniary rewards. For example,

"When a single entrepreneurial behavior,..., can in one society lead to high income, high office, high status and the cover of Business Week, *while in another it brings economic reprisals or social penalties ranging from mere disapproval to ostracism from church and community, then we are dealing with real forces to be reckoned with"* (Sawyer, 1951).

Our analysis above can therefore be criticized for ignoring this important determinant of the allocation of talent. Moreover, if non-pecuniary rewards were indeed crucial and exogenously determined, they would weaken the effects emphasized in this paper and our emphasis on the importance of history dependence would be partly misplaced. In this section we will argue that there exist endogenous forces related to past allocations that also influence the non-pecuniary reward structure, thus strengthening the history dependence emphasized above rather than weakening it.

4.1. Political equilibrium in a rent-seeking economy

Our discussion of the non-pecuniary rewards is influenced by the idea of 'political equilibrium', whereby agents are allowed, by voting or lobbying, to influence the institutional restrictions that will govern their interaction. To give the basic flavor let us introduce a government in our dynamic model which can choose the size of a 'police force' that polices rent-seekers, say for instance catches custom officers receiving bribes. [8] Also suppose that at a certain point, the government has a choice between a small and a large police force. A large police force reduces incentives to choose rent-seeking (i.e. shift V_R down in Fig. 1) and as a result entrepreneurship will be relatively more attractive for future generations and unless the larger police force is prohibitively costly, social welfare will increase. Note that in our model, this does not constitute a Pareto improvement, even if we ignore the costs of policing, because those agents who have already chosen rent-seeking will suffer as a result.

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[8] It also has to be borne in mind that it will be a problem to control the police force too. In fact in many situations rent-seeking type activities are carried out by agents who have other roles such as upholding property rights or regulation.

Now suppose that the size of the police force is not determined by the government but is decided by the agents in this economy. This can be by voting or lobbying or via other channels. The important point for us is that the preferences of the agents who live in the present will influence this decision. As a consequence, an economy that has relatively more rent-seeking will put more fierce opposition against a larger police force. For instance, if we have costless voting, the median voter will decide and if $p < 1/2$, the proposal for a larger police force will be accepted but not if $p > 1/2$. More generally we can have a political mechanism that maps the allocation of talent into a political decision. In this case, if we denote the probability that a proposal that will hurt the rent-seekers will be accepted by $\pi(p)$, $\pi(\cdot)$ will be weakly decreasing in p. Therefore, higher rent-seeking in an economy will lead to a low level of π and a higher likelihood that relative rewards to rent-seeking will remain favorable in the future. The intuition of this result is straightforward. Societies with high rent-seeking will be less willing to hurt the rent-seekers thus rent-seeking is more likely to persist. This conclusion would, however, not follow if the existing rent-seekers, who prefer a lower amount of rent-seeking in the society (i.e. V_R is decreasing in p), could choose a scheme which would not hurt themselves but make rent-seeking less attractive for new entrants. Although we may be able to find examples where an elite controls the state and manages not to share these rents with new-comers, it is in general difficult to create a discriminating reward structure. Thus our conclusion, that the higher is the amount of rent-seeking, the weaker is the political will to improve the allocation of talent, is likely to hold.

4.2. Social consensus and non-pecuniary rewards

The non-pecuniary aspects of the reward structure are obviously not under the direct control of the government or any other group. Are these aspects nevertheless influenced by past allocations of talent? The above intuition about the impact of past allocations on pecuniary aspects of the reward structure and on the 'political consensus' of the economy also gives us an insight about non-pecuniary rewards.

Let us use the term 'social consensus' as a measure of the society's attitudes and value judgements. We will argue that a society that is in the high rent-seeking equilibrium will tend to have a social consensus that gives relatively more respect to rent-seeking than a society that enjoys the Pareto preferred equilibrium. There can be many channels via which the prestige and the status of different professional groups in society are influenced. This is strictly speaking the area of social psychology; how the environment affects the value judgements, attitudes and perceptions of the individuals (see for example Aron and Aron (1984), Sears et al. (1985, chapter 1)). First, learning by new generations will start from the already established norms and role models. This learning process will influence the views of the new generations as well as their stock of knowledge (e.g. Coleman, 1990; Wilson, 1987; Montgomery, 1991); in the high rent-seeking equilibrium this will

bias the perceptions of the new generations in favor of rent-seeking. Second, people often adjust their behavior, comparing themselves to a particular reference group (Runciman, 1934; Coleman, 1990) and this group is more likely to contain a large number of rent-seekers in the high rent-seeking equilibrium than the low one. A derivative of this approach has very innovatively been used by Cole et al (1992). They argue that in the presence of non-marketed goods, status will matter for the allocation of these non-marketed goods, thus social status may be endoge-nously determined in equilibrium as well as being an independent force. In our context, the social status of a profession may depend on the choices that the rest of the society makes and thus rent-seeking may have less damaging stigma when it is more widespread. Third, the theory of cognitive dissonance [9] in social psychology implies that the society's value judgements may conform to past practices (or more directly to economic behavior) because individuals will feel unhappy living in a high rent-seeking society while also knowing that rent-seeking is bad. Thus one of these conflicting parts has to give in and people who have irreversibly chosen a certain career will change their value judgements and pay relatively more respect to rent-seeking. Finally Tirole's (1993) contribution discussed in the previous section can also be interpreted as an additional force influencing the 'social consensus' through the collective reputation of generations and of the society as a whole.

Therefore, there exist many mechanisms which would make the social consen-sus and the non-pecuniary rewards respond to the economic decisions of the agents. Although this thesis is plausible and receives some support from the social psychology/sociology literature, the presence of such a two way-causality be-tween reward structures and the allocation of talent is hard to ascertain and test. When we compare historical episodes, we have an observational equivalence problem. Reward structures that favor entrepreneurship appear to exist in societies which allocate their talents to entrepreneurship (see Baumol, 1990). But is this a unidirectional causation from non-pecuniary rewards to the allocation of talent or is the reverse causality also present? The only way to investigate whether the reverse causality can also be present is to look at episodes in which the allocation of talent or some other features of the economic organization changed and see whether the society's value judgements and social attitudes have responded in the direction suggested by our thesis. This is obviously not a job for an economist and is full of pitfalls [10], so I will only give an example where this reverse causality seems to be important (other examples were also briefly discussed in an earlier version of the paper). This should however not be interpreted as emphasizing the

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[9] See Festinger (1957), Aronson (1979), Aron and Aron (1984) and references therein for evidence in favor of cognitive dissonance and arguments against it. See Akerlof and Dickens (1982) for an economic application. Also note that even the somehow rival theories such as Bem (1967) have the same implication for us as they too claim that behavior affects attitudes.

[10] For instance, does ranking in time imply causality?

influence of the allocation of talent on the reward structure and social norms at the expense of the role that these factors play in determining the allocation of talent. I only intend to illustrate that the reverse causality can sometimes be important.

Pirenne (1953) argues that the arrival of Islam in the Mediterranean in the eighth century stopped commerce through this sea to a large extent. This led to the disappearance of merchants, to the emergence of the feudal system and to the dominance of the Catholic Church in Europe (pp. 5–15). Before these events, merchants had relatively high respect in the society whereas from the eighth until the eleventh century, the attitudes became very adverse (p. 7). However, Italian towns such as Naples, Amalfi, Bari and Venice continued with their trades through the Byzantine Empire and the pressure of the Pope did not change the behavior nor the attitudes of the people in these towns (p. 18). In the twelfth century, the Christian counterattack against Islam started and Europeans took once again control of the Mediterranean. This gradually led to the renewed trade and to the revival of cities (pp. 40–45). By the fourteenth century this had led to economic activity organized around towns and merchants (pp. 80–81, 169–178). These developments laid the foundations of the later industrialization and significantly changed the social attitudes towards trade and merchants. Thus in this instance social consensus and social attitudes seem to have responded and adjusted to seemingly exogenous changes in the economic organization of these medieval societies (i.e. first in response to the arrival and then to the departure of Islam from the Mediterranean).

This discussion goes someway in endogenizing the reward structure of a society as responding to the outcome of past economic decisions. Economic decisions, as argued by Baumol (1990), are in turn determined by the reward structure, thus the two-way causality between the economic decisions and the social consensus of a society acts as an additional force that exacerbates the effects of history dependence. In a country or a region that is trapped in the high rent-seeking equilibrium, growth will be slower, policies against rent-seeking harder to implement and there will exist a much less damaging stigma attached to rent-seeking than in a country or region enjoying a low rent-seeking equilibrium. This link between past allocations and non-pecuniary rewards implies that after a misallocation of talent, not only will pecuniary rewards favor unproductive activities but the society may also lack the 'social/political will' to change the status quo.

Our above analysis also suggests an insight about underdeveloped countries. Many underdeveloped countries can be thought to be trapped in a low wage, low entrepreneurship, low growth equilibrium from which escape is not easy. The fact that rent-seeking and fraud become an endemic part of the cultures of these societies coheres well with the above view. Another possible reason why the trap may be easier to fall into for the underdeveloped countries is the difference between the education systems of developed and underdeveloped countries. In particular, a well-functioning education system will increase the relative returns to the talented people in productive compared to unproductive jobs. Therefore,

getting trapped in the inferior equilibrium is less likely when talented people have access to an education system that prepares them to be productive. The brain drain further makes the inefficient equilibrium a distinct possibility in the less developed countries; in particular, agents with high productivity levels will try to migrate to countries where they can obtain higher returns for their talent.

5. Conclusion

This paper considered a simple model of allocation of talent between productive and unproductive activities. Because returns to productive activities depend on the amount of rent-seeking in the economy, the reward structure that determines the allocation of talent is also endogenous. Further, more rent-seeking reduces the marginal productivity of investment and the relative return to entrepreneurship, thus a multiplicity of equilibria is possible, where increased rent-seeking makes rent-seeking relatively more attractive. In a dynamic context, initial differences in rewards and/or allocations will have long-run effects because allocations of the past generations determine current rewards. The paper also argues that there exist mechanisms that make non-pecuniary rewards endogenous and thus induce further history-dependence.

Although the thesis put forward in this paper has very different implications, it is almost observationally equivalent to Baumol's thesis that there is a unidirectional causation from reward structure to allocation of talent. A possible way of investigating the two-way causality is to look at historical episodes in which allocations change exogenously and to investigate whether reward structures respond. The paper argues that such examples exist.

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