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Privilege Seeking Activities, Monitoring and the Firm Structure

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Abstract

The management of a bank, like any other firm, faces the problem of employee assessment. This unavoidable situation creates an opening for dishonest and misleading behavior, whereby employees of a bank invest in privilege seeking activities ("management relations") and misrepresent their actual contribution to total output. These activities lead to a reduction in productivity and consequently to a loss of profits. The management may decrease the firm's losses by engaging in monitoring activities. It is shown here that a firm should be composed of different productive level workers. Moreover, it may be optimal to employ workers who are generally good at privilege seeking activities forcing the remaining workers to invest in real production.

Keywords: Privilege seeking activities, Monitoring, Influence costs.
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1. Introduction

Many firms have difficulty in assessing their employees' contribution to the total output and profit. For example, when a salesperson convinces a customer to buy a certain product the actual purchase may be made through the local distributor. However, the firm will find it hard to determine which of the two is responsible for the sale. Citing Radner (1993): "If we look at individuals in the firm, especially in the managing sector, it is rare that we find a person whose output can be realistically measured in money or any other one-dimensional variable." One type of system where it is known to be difficult, is assessing the workers. The workers can, and do, use this to their advantage in the banking system (Makoto, 1996, Johnnie, 1998, and Bartel, 2004). In this system there are many monitoring problems thus the workers can use this to their advantage (Nadler, 2004).

This difficulty generates "influence costs" that have been defined in a recent book by Milgrom and Robert (1992) as follows: "The costs included in attempts to influence others' decisions in a self-interested fashion, in attempts to counter such influence activities by others, and by the degradation of the quality of decisions because of influence." In their book (pp. 192-193) the authors mention several items that represent influence costs such as: a. Expending resources trying to influence the decision maker to bring about unproductive interventions; b. Influencing the manager to intervene inappropriately; and c. The cost to the decision-maker in avoiding and controlling these attempts to influence him. This phenomenon is discussed also by Milgrom and Roberts (1986, 1988, 1990).

In this paper we apply "influence costs" within an analytical model and query how the worker in a bank (or any other type of organization where it is hard to monitor the workers) allocates his/her time and how the policy maker should allocate resources for controlling and minimizing the "influence costs". Moreover, we look at the type of structure of a bank (firm) in terms of the composition of workers who should exist in order to decrease these negative activities.

The management would like to reward each worker as a direct function of his/her contribution to the profits of the firm. However, there exists an income that is generated by the workers that the management does not know how to distribute. As a result, the workers compete against each other in order to gain a greater portion of the

pie. We consider a rent seeking contest in which the workers compete for their share. Each worker is limited in the total time that can be spent in privilege seeking activities and real production. The more a worker invests in order to try and receive a larger portion of the pie the less time he will have to spend in real productive activities and thus to decrease the total output of the firm. The management determines the total size of the pie by using monitoring methods. Monitoring the workers enables the management to decrease the uncertainty regarding the workers' contribution to the profits of the firm. Monitoring is costly.

A similar type of problem was presented by Epstein and Spiegel (1997) in which the supervisor does not know the exact productivity level of the workers and assumes that the agents' work includes meeting the management for briefings, advice and approval of new ideas. In such meetings the management may also be called upon to solve problems that are beyond the employees' authority. At the same time, meetings become the management's main source of information concerning its employees' productivity. The management's assessments can be based on the problems brought before it by the employees as well as on their ideas and initiative. The authors model a workers' queue waiting for the management's attention. The main method used by the management to decrease the different type of externalities is via the time the workers have to wait for their appointment. In this work we do not use such queuing methods while instead a simple rent seeking game between the different employees is set up.

This approach can be analyzed within the framework of the principal agent's problem. The principal agent's issue has been discussed extensively in economic literature including a variety of related topics such as optimal contracts, monitoring and mutual relationships. The literature deals both with the single agent case and the case of multiple agents acting under one principal. The first issue discusses a contract that will best motivate both the agent and the principal. The problem of asymmetric information usually exists and as Spier (1992) explains such asymmetry can lead to contractual incompleteness. An optimal contract however does not solve all the problems faced by both the involved sides. Milgrom (1988) suggests an "optimal contract" model and shows that even when this exists both sides invest in attempts to influence decision making in the organization. He examines the effect, that time spent

on trying to influence decisions, has on the total output and shows the conditions under which such efforts are efficient. This situation leads to diverting of human resources from production to bargaining. Furthermore, contracts do not eliminate the fact that principals must engage in monitoring. In general, the theory claims that monitoring increases the effort exerted by the agent (see Frey (1993)). The answer to the basic question of whether to invest in monitoring depends on the expected utility versus cost (see Jost (1991)). Bohn (1987) deals with a similar question in which there is a large number of agents for every principal. Bohn shows that monitoring can be made efficient by changing the organization's structure into a hierarchy.

The monitoring method is, within itself, a decision variable. Radner and Rothschild (1975) mention various possible policies that may be used by a decision maker who must determine his preferred order regarding different projects that are being processed and require his attention.

In this paper we set up a rent-seeking competition in which the total size of the prizes is determined by the level of monitoring by the manager. It is shown that the variance of productivity levels of the workers have an important effect on the firm's profit. We show that the level of monitoring by the manager decreases and the firm's profits increase as the variance of the productivity levels of the workers increase. Moreover, it may be optimal to have, in a firm, workers that are less productive whose main task would be to excel at privilege seeking activities forcing the remaining workers to invest their time in real production rather than in privilege seeking activities.

In the following section we present the detailed model which is then followed by conclusions.

2. The Model

We describe a model that consists of workers (agents) and a supervisor (principals - manager). The supervisor does not know the exact productivity level of the workers. Information asymmetry exists because agents know the level of productivity while the principal does not. This situation can be exploited by employees who may make false presentations regarding ideas and future plans - in other words, spend time in privilege

seeking activities and may increase their income beyond their real contribution to the firms production.

Each individual has an endowment of labor time normalized to unity which is allocated between productive activities A_i and time L_i spent in privilege-seeking activities, i.e., lobbing activities:

$$A_i + L_i = 1 \tag{1}$$

The employees differ in relative productive efficiency, and therefore in individual comparative advantage between productive and privilege seeking activities. We normalize the absolute efficiency in privilege seeking activities to unity. Hence w_i will define the absolute and relative productive efficiency for one unit of time. It is assumed that the wage is competitively determined per efficiency-normalized unit of labor supplied. An employee's income is negatively related to the number of units of time spent in privilege seeking activities.

The workers total contribution to the firm's output is denoted by:

$$q_i = w_i (1 - L_i) \tag{2}$$

For reasons of exposition we review a firm in which there are two workers and one manager. [1] Worker i's income for a given period will be denoted by X_i, which constitutes a percentage $o < \alpha < 1$ of the total perceived contribution to output of worker i as assessed by the manager. The manager's assessment of a certain employee's production consists of the real production $q_i( )$, in addition to $f_i( )$, which the manager is falsely led to believe has been produced by the worker. $f_i( )$ is a function of the privilege seeking activities of both workers. [2]

A worker's income can therefore be described as follows:

$$X_i = \alpha \left(q_i + f_i \right) = \alpha \left(w_i (1 - L_i) + f_i (L_i , L_j) \right) \tag{3}$$

The function $f_i(L_i,L_j)$ represents imaginary output which positively affected by L_i : investing more time in privilege seeking activities (management relations) increases the employee's spurious contribution to production and as a result increases his reward. This assumption allows us to suppose that L_j, time devoted by worker j to privilege seeking activities (management relations), will negatively affect the reward

[1] All the results hold true for any number of workers.

[2] On creating an optimal contest between workers see Epstein and Nitzan (2004).

to worker *i* assuming, obviously, that the reward for spurious production is relatively stable.

We can think of the privilege seeking activities as a contest between the workers competing for the share of output where the manager cannot determine the production level of each worker. Our contest is a variant of the type of activity described in the rent-seeking literature (see Nitzan, 1994, for a comprehensive survey). We require a specification for a contest-success function (see Hirshleifer 1989) and opt here for a popular choice, that of Tullock (1980), which has a natural probabilistic interpretation. Prospects of success improve the more an individual has contributed to the contest relative to the total value of the resources allocated (in contrast to the type of function described by Hillman and Riley (1989) where the higher bidder wins). The probability of worker *i* winning the contest while competing against worker *j* is denoted by:

$$\Pr ob_i(L_i, L_j) = \frac{L_i}{L_i + L_j} \quad \forall\ i \neq j \tag{4}$$

Moreover, we assume that each worker gets a share of the total amount of income when the manager cannot determine the productive level of each worker:

$$f_i(L_i, L_j) = \left(\frac{L_i}{L_i + L_j} - \frac{L_j}{L_i + L_j} \right) v \tag{5}$$

while *v* denotes the undetermined level of income produced by the workers. As we can see it holds that the total amount of transfers between the workers is zero:

$$\sum_{i=1}^{2} f_i(L_i, L_j) = 0 \tag{6}$$

This means that the workers can only "steal" from each other and not from the manager. [3] Notice that the manager is harmed by privilege seeking activities, i.e. the more the workers invest in privilege seeking activities the less time they have for actual production and thus total output and the profits of the firm decrease. Also, as worker *i* increases the level of privilege seeking activities, all other things given, his

reward increases. As worker *j* increases his level of privilege seeking activities the reward of worker *i* decreases:

$$\frac{\partial f_i(L_i, L_j)}{\partial L_i} = \frac{2L_j}{\left(L_i + L_j\right)^2} v > 0 \quad and \quad \frac{\partial f_i(L_i, L_j)}{\partial L_j} = -\frac{2L_i}{\left(L_i + L_j\right)^2} v < 0 \qquad (7)$$

Each worker maximizes his expected income by determining the level of privilege seeking activities, thus his expected income is determined by a Nash equilibrium. The first order condition for worker number *j* is:

$$\frac{\partial X_j}{\partial L_j} = \alpha \left(-w_j + \frac{2L_i}{\left(L_i + L_j\right)^2} v \right) = 0 \qquad (8)$$

Thus:

$$L_j = 2 \frac{w_i}{\left(w_i + w_j\right)^2} v \qquad (9)$$

It is clear that the second order conditions hold.

In order to gain a better understanding of the results, let us look at the ratio of these activity levels for both employees.

$$\frac{L_j}{L_i} = \frac{w_i}{w_j} \qquad (10)$$

Moreover we can calculate the success function $f_j(\ )$:

$$f_j(L_j, L_i) = \frac{w_i - w_j}{w_i + w_j} v \qquad (11)$$

The interesting question in this context is who invests more in privilege seeking activities, the more or the less productive worker ? We may conclude from the above two equations that:

Proposition 1

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[3] Another model could be $f_i(L_i, L_j) = \frac{L_i}{L_i + L_j} v$. In this case the workers are "stealing" directly from the manager (as $\sum_{i=1}^{2} f_i(L_i, L_j) = v$). Both options give the same results. For convenience we opt for the frist choice.

The less productive workers invest more time in privilege seeking activities and have a higher probability of increasing their income from fictitious productive activities. [4]

2.1 Monitoring

The manager rewards his employees according to his assessment of their perceived output. Each worker receives a proportion $\left(0 < \alpha < 1\right)$ of his perceived production. The manager can invest in monitoring in order to decrease the amount of transfers between workers. Monitoring the workers increases the manager's knowledge thus enabling a better understanding of the contributions of each of the workers. This decreases the uncertainty and the amount of income transfer between the workers. Notice that as the value of the total transfers decreases, *v*, the levels of the privilege seeking activities decrease and thus the total output of the firm increases.

We denote the level of monitoring of the manager by *m*, thus the total amount of income which the workers compete for is given by *v(m)*. *v(m)* decreases with an increase in the level of monitoring *m.*

The manager maximizes the firm's profits by determining the optimal level of monitoring. Assuming for simplicity sake, that prices are set at unity, then the firm's profits are equal to the firm's net output as shown:

$$Q(L_i, L_j) = q_i + q_j - \alpha\left((q_i + f_i) + (q_j + f_j)\right) - cm \qquad (12)$$

where *c* is the marginal cost of a unit of monitoring.

Substituting the optimal level of privilege seeking activities by the workers as determined in the Nash equilibrium (9) we get that the net output of the manager is:

(13)

[4] I.e. $\frac{\partial\left(\frac{L_j}{L_i}\right)}{\partial w_j} < 0$, $\frac{\partial\left(\frac{L_j}{L_i}\right)}{\partial w_i} > 0$, $\frac{\partial L_j}{\partial w_j} < 0$, $\frac{\partial L_j}{\partial w_i} > 0$, $\frac{\partial f_j}{\partial w_j} < 0$ *and* $\frac{\partial f_j}{\partial w_i} > 0$

$$Q(L_i^*,\ L_j^*) = (1-\alpha)\, w_j \left(1 - 2\frac{w_i}{\left(w_i + w_j\right)^2}\ v(m) \right) + (1-\alpha)\, w_i \left(1 - 2\frac{w_j}{\left(w_i + w_j\right)^2}\ v(m) \right) - c\,m =$$

$$= (1-\alpha) \left(w_i + w_j - 4\frac{w_i\, w_j}{\left(w_i + w_j\right)^2}\ v(m) \right) - c\,m$$

In order to get specific results we opt for a specific formulation for the monitoring function. It is assumed that $v(m) = \frac{a}{m}$, i.e. as the level of monitoring increases, the total pie that the workers can compete for, decreases.

The first order conditions for maximization of the firm's profits is:

$$\frac{\partial Q}{\partial m} = (1-\alpha) 4 \frac{w_i\ w_j}{\left(w_i + w_j\right)^2}\ \frac{a}{m^2}\ - c\ = 0 \tag{14}$$

It is clear that the second order conditions hold.

Solving this we obtain:

$$m = \sqrt{4(1-\alpha) \frac{w_i\, w_j}{\left(w_i + w_j\right)^2} \frac{a}{c}} \tag{15}$$

As we can see the optimal level of monitoring, *m,* decreases with an increase in its costs. We now look at what happens to the level of monitoring as one of the workers becomes more productive.[5] We get that

$$\frac{\partial m}{\partial w_i} = \frac{1}{2} \sqrt{4(1-\alpha) \frac{a}{c} \frac{\left(w_i + w_j\right)^2}{w_i w_j}}\ \frac{w_j \left(w_j^2\ - w_i^2\right)}{\left(w_i + w_j\right)^4} \tag{16}$$

From (16) we see that as the level of productivity of the more efficient worker increases, the level of monitoring decreases and as the level of productivity of the less efficient worker increases, the level of monitoring increases. We may summarize this result in the following proposition:

[5] These results may still hold when the workers' level of output are random variables and the manager may change his decision as the information about the workers is reveald. See Epstein (1996a, 1996b) where conditions are generated about a decison maker who will not change his/her ruling in the process of execution even though new information is received.

Proposition 2

The level of monitoring decreases as the variance of productivity levels between the workers increases.

To *illustrate* this let us look at a case where the worker's sum of productivity is constant i.e. $w_i + w_j = k$. Notice that if the workers do not engage in privilege seeking activities then the total level of output of the firm is the sum of productivity levels. Increasing the productivity level of one worker and decreasing the other will result in a decrease of the level of monitoring:

$$\left.\frac{\partial m}{\partial w_i}\right|_{w_i + w_j = k} = \frac{1}{2}\sqrt{4(1-\alpha)\frac{a}{c}\frac{1}{k^2 w_i (k - w_i)}}\left(k - 2w_i\right) \tag{17}$$

In other words, if the objective is to decrease the level of monitoring, the firm should be composed of different types of workers rather than the same type workers. The less productive workers invest in privilege seeking activities while the more productive workers invest in real output. Notice that in a symmetric structure where all workers are identical, the transfers are zero (see (9) and (10)) while both workers are investing in privilege seeking activities. We will return to this in the next section.

2.2 Profits and the structure of the firm

As we saw in the previous section, the variance of the productivity levels of the workers determines the optimal monitoring level. In this section we will look at the firm's profits. In order to do so we first write the firm's profits as a function of the optimal production levels of the workers (equation (9)) and the optimal monitoring level (equation (15)). Thus by substituting (15) for (13) the firm's optimal profits are:

$$Q(L_i^*, L_j^*) = \left(1-\alpha\right)\left(w_i + w_j\right) - 4\sqrt{a\,c\,(1-\alpha)}\,\frac{\sqrt{w_i w_j}}{w_i + w_j} \tag{18}$$

We now address the following question. When are the profits of the firm larger: when the workers are more or less productive?

In order to answer this question let us look at the derivative of the profits with regard to one of the productivity levels:

$$\frac{\partial Q(L_i^*, L_j^*)}{\partial w_i} = (1-\alpha) - 4\sqrt{a\,c(1-\alpha)}\,\frac{w_j\,0.5\left(w_j - w_i\right)}{\sqrt{w_i\,w_j}\left(w_i + w_j\right)^2} \tag{19}$$

It is clear from the above equation that the firm's profits increase with the productivity level of the more efficient worker. This result is quite straightforward as it is clear that as the productivity level increases the profits should increase. In order to get a better look at this effect let us hold constant the total productivity level of the workers: $w_i + w_j = k$. Notice that if the workers do not engage in privilege seeking activities then the firm's total level of output is the sum of productivity levels.

$$\left.\frac{\partial Q(L_i^*, L_j^*)}{\partial w_i}\right|_{w_i + w_j = k} = -\frac{4\sqrt{a\,c(1-\alpha)}}{k}\,\frac{1}{2}\,\frac{k - 2w_i}{\sqrt{w_i\,(k - w_i)}} \tag{20}$$

As we can see from the above equation, the total profits increase if we increase the productivity level of the more efficient worker and decrease the productivity level of the less efficient worker.

Proposition 3

For a given mean level of production, the firm's profits increase as the variance of the productivity levels between the workers increase.

This proposition is not straightforward. It tells us that a firm that wants to increase its profits can do so by employing different types of workers. This enables specialization. The more efficient workers investing more time in real production while the less efficient invest in privilege seeking activities. The manager is less concerned about this, as even if the manager increases the monitoring he will only increase the less efficient workers' contribution to the firm's profits which is not very substantial anyway. Thus it is better to have different types of workers in the firm: the profits increase and the monitoring level decreases.

2.3 A worker as a substitute to monitoring

The above results show that there is a substitution between the monitoring level and the variation in the productivity level of the workers. The question we would like to ask in this section is whether it would be optimal to add an additional less efficient

worker so that he/she could specialize in privilege seeking activities forcing the other workers to decrease these activities and increase real production. In the case of three workers the income of a worker is given as:

$$X_i = \alpha \left(q_i + f_i \right) = \alpha \left(w_i (1 - L_i) + f_i (L_i , L_j) \right) \tag{21}$$

while

$$f_i (L_i, L_j, L_k) = \left(\frac{2L_i}{L_i + L_j + L_k} - \frac{L_j}{L_i + L_j + L_k} - \frac{L_k}{L_i + L_j + L_k} \right) v \tag{22}$$

and it holds that

$$\sum_{i=1}^{3} f_i (L_i, L_j, L_k) = 0 \tag{23}$$

Once again solving this problem as a Nash equilibrium we get that:

$$L_j = 8 \frac{(-w_j + w_i + w_k)}{\left(w_j + w_i + w_k \right)^2} v \tag{24}$$

The conclusions for the case of two workers still hold true. The profits of the firm are shown as: (25)

$$Q(L_i^*, L_j^*, L_k^*) = (1-\alpha) w_j \left(1 - 8 \frac{-w_j + w_i + w_k}{\left(w_i + w_j + w_k \right)^2} v(m) \right) + (1-\alpha) w_i \left(1 - 8 \frac{-w_i + w_j + w_k}{\left(w_i + w_j + w_k \right)^2} v(m) \right) +$$

$$+ (1-\alpha) w_k \left(1 - 8 \frac{-w_k + w_i + w_j}{\left(w_i + w_j + w_k \right)^2} v(m) \right) - c\,m =$$

$$= (1-\alpha) \left(w_i + w_j + w_k - 8 \frac{-(w_i^2 + w_j^2 + w_k^2) + 2w_i w_j + 2w_k w_j + 2w_k w_i}{\left(w_i + w_j + w_k \right)^2} v(m) \right) - c\,m$$

The specific monitoring function is denoted by: $v(m) = \frac{b}{m}$ while $a \le b$, i.e., the total amount of transfers increases with the number of workers. In this case the optimal level of monitoring will be:

$$m = \sqrt{(1-\alpha) 8 \frac{-(w_i^2 + w_j^2 + w_k^2) + 2w_i w_j + 2w_k w_j + 2w_k w_i}{\left(w_i + w_j + w_k \right)^2} \frac{b}{c}} \tag{26}$$

In order to simplify this let us assume that the two first workers are identical so that: $w_i = w_j = w$ *and* $w_k = d\,w$. Thus, for $d < 1$ the third worker is less productive than the other two. We will now calculate the firm's profits from the two original workers given the existence of a the third worker. This profit is the result of both workers minus the cost of monitoring the three workers:

$$Q\left(L_i^*, L_j^*\Big|_{L_k^*} \right) = 2(1-\alpha)w - 16\frac{\sqrt{d}}{2+d}\sqrt{\frac{b\,c\,(1-\alpha)}{8\,(4-d)}} - \sqrt{8\frac{b\,c(1-\alpha)\,d\,(4-d)}{(2+d)^2}} \qquad (27)$$

Notice that this is the firm's profit from two identical workers only while disregarding the direct contribution from worker number three. Of course, these profits do include the indirect contribution of the third worker via the privilege seeking contest between the three.

To see whether the third worker has contributed indirectly to the profits of the firm we have to compare (27) and (18). Adding a third worker will increase the profits generated by the two original workers if it holds that:

$$16\frac{\sqrt{d}}{2+d}\sqrt{\frac{b\,c\,(1-\alpha)}{8\,(4-d)}} + \sqrt{8\frac{b\,c(1-\alpha)\,d\,(4-d)}{(2+d)^2}} \;<\; 2\sqrt{(1-\alpha)a\,c} \qquad (28)$$

In the case where $a=b$ then (28) will hold true if $d \le 0.3$ and in the case where $b=\frac{3}{2}a$ then (28) holds true for $d<0.19$. In other words, adding a less efficient worker will increase the contributions of the more efficient workers to the firm's profits by forcing them to invest more in real production rather than in privilege seeking activities. Notice that adding less efficient workers causes the more efficient ones to invest in real production and, on the other hand, the cost to the firm increases as a result of the need to increase the monitoring. We may summarize the results in the following proposition:

Proposition 4

The firm can increase its profits by adding less efficient workers that will force the more efficient ones to invest more time in real production rather than in privilege seeking activities.

This result coincides with the former propositions as it tells us that it may be optimal for the firm to employ different types of workers rather than the same type. Moreover, it may well be optimal to add a less efficient worker, not for his direct contribution to production, but for his indirect contribution via the contest in the firm.

3. Conclusions

The fact that, in most cases in the banking system (Nadler, 2004), one can neither calculate nor estimate the exact contribution of a worker to the total output of the firm. This enables the employee to invest in influence activities that mislead his supervisors regarding his actual output. Those workers who have a relative advantage in "influence activities" / "privilege seeking activities" may benefit, and generate a decrease in their real production and an increase in their fictitious output.

We have shown that the variance of the worker's level of productivity in a bank has an important impact on the firm's profit and the level of monitoring. It has been shown that a firm should be composed of different productive level workers. Moreover, it may well be optimal to employ workers, from the manager's point of view, who are good at privilege-seeking-activities which force the remainder of the workers to invest time in real production rather than compete.

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