

Working Paper 00-85
Economics Series 27
November 2000

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MONK BUSINESS: AN EXAMPLE OF THE DYNAMICS OF ORGANIZATIONS *

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Abstract

In this paper we present a dynamic model of an organization. It is shown that the quality of the members of the organization may cycle and that even if the organization promotes excellency, the organization may end up populated by mediocre agents only.

Keywords: Overlapping generations, quantity organization.

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* The authors is grateful to Carmen Beviá, Iñigo Iturbe-Ormaetxe, Ignacio Ortuño-Ortín and Piero Gottardi for very helpful comments on a preliminary version of this paper and to CICYT for financial support under grants PB-93-0904 and PB-98-0024.

1. INTRODUCTION.

In this paper we propose a simple model to study the dynamic features of organizations characterized by the following:

1. The organization is subject to entry and exit. We model this by means of an overlapping generation model in which agents live for two periods.
2. Agents are heterogeneous. We assume that they belong to two categories: Talented or Untalented.
3. The Organization is hierarchic. In the first period, agents perform some routine task for which all agents are equally capable. At the beginning of the second period, one of them is chosen to be the boss. In this period, agents other than the boss perform the same task they did in the first period and obtain the same utility as before.
4. There are externalities. If the boss is talented all other agents receive more utility than that which they would receive if the boss were untalented.

In this framework, we introduce several simplifications in order to keep the model tractable: The two most important simplifications are the following: a) Agents are free to enter, but once they are inside the organization they must remain there for the rest of their lives. b) A talented agent does not create externalities if he is not the boss and his productivity is the same as the productivity of an untalented agent in the routine task. Other simplifications are that we assume two types of agents, two hierarchies, two periods and only one boss. We also ignore important features of organizations like competition among organizations, loyalties and durable capital. Our model may be suited to study some aspects of organizations like universities in Europe (where mobility across different departments is low)¹, a political party like the communist party in the extinct U.S.S.R. or the fascist party in Mussolini's Italy, or charitable organizations like the Red Cross. In order to couch the previous items in our framework it is better to think of a small branch of the organization (like a small town branch of the communist party) and not, say, the Politburo.

Our leading example is that of an abbey in medieval Europe. Early on in their lives, farmers have to decide to enter into the abbey or remain peasants. If a young peasant decides to become a monk he will spend the next period (say 25 years) copying manuscripts and farming according to the direction of the current abbot. In our model, when entering the abbey, young peasants do not know who the abbot will be, but they know the probability of the abbot being talented (or untalented).² This

¹In principle, it is not clear that in this example the free entry assumption is adequate. However, given the large demand for higher education in many parts of Europe, in practice, restrictions to enter were not very important because of the scarcity of teachers.

²An alternative assumption is that young peasants know who will be the abbot for the next period. But given that our periods are interpreted as consisting of a large number of years, we think that the formalization chosen here is more appropriate.

probability is exogenously given and it might be different for talented and untalented agents reflecting the degree of adverse selection inside the organization. At the beginning of the second period, there is a lottery involving all peasants who entered in the previous period and a new abbot is appointed (for the next 25 years). We decide to model the election as a lottery to capture the uncertainties associated with the election of the new abbot. All agents who entered in the previous period except the chosen abbot, spend this new period (25 more years) doing the same task that they did in the first period directed by the new abbot. They share duties with a new generation of young peasants.

Our equilibrium concept is very simple. Agents are expected utility maximizers and know all the relevant parameters of the model. The number of talented (resp. untalented) monks entering the abbey is such that the undiscounted expected utility of being a monk equals reservation utility. If the latter is larger than the undiscounted expected utility that a talented (resp. untalented) farmer can obtain by entering the abbey, no talented (resp. untalented) farmer enters monastic life. These requirements boil down into a pair of difference equations.

We first focus on steady states (SS), where each cohort has the same number of talented and untalented monks as the previous one. We show that under a reasonable assumption, there is a unique SS. The SS can be of three different classes: A SS with zero talented monks (a SSU), a SS with zero untalented monks (a SST) and a SS with a positive number of both talented and untalented monks (a SSM). Next we study the dependence of SS on the two main parameters of the model, namely the relative probability that the abbot is talented (denoted by k) and the amount of positive externality imposed by a talented abbot (denoted by δ). When k is low, talented people are not attracted into the organization and only SSU exist. For intermediate values of k only SSM exists. Surprisingly, if δ is large enough, there is no SST, no matter how high k is. The explanation of this fact is that for k large the abbot is almost surely talented. Untalented monks receive a large externality from a talented abbot and they keep entering into the abbey even when their chances to become abbot are almost zero. However, if δ is relatively low, for large k only SST exists.

Next, we analyze the dynamic system. As expected, dynamic paths can be very complicated so we focus attention on the sharpest possibilities. If k is such that only SSU (resp. SST) exists and the initial condition is such that no talented (untalented) monk belongs to the abbey, the next cohort does not include any talented (untalented) monk, i.e. the SSU (SST) is locally stable. More surprisingly, for values of k which are a subset of those for which a SSM exists and from some initial conditions, there is a cycle: a cohort with a relatively large number of talented monks is followed by a cohort with a relatively large number of untalented monks and this cohort is followed by a cohort identical to the first one, etc. Remarkably, the average number of talented and untalented monks in the cycle correspond to those in the SSM.

2. THE MODEL.

There is a large population of potential monks composed of two kind of agents, talented and untalented. They live for two periods. At the beginning of the first period they might join the abbey and in this case they remain there for the rest of their lives. The number of talented (resp. untalented) agents entering monastic life in period t is denoted by n_T^t (resp. n_U^t). In order to simplify the analysis, we will disregard integer problems and so we will handle the number of talented and untalented monks as a continuous variable. The abbot for the period $t + 1$ is chosen among all members of the cohort that entered at t . We model the election as a lottery. The probability that a particular talented (resp. untalented) monk is chosen to be the abbot in period $t + 1$ is

$$\frac{k}{kn_T^t + n_U^t}, \text{ (resp. } \frac{1}{kn_T^t + n_U^t}).$$

Thus, the probability that the abbot belongs to the group of talented (resp. untalented) monks is

$$\frac{kn_T^t}{kn_T^t + n_U^t}, \text{ (resp. } \frac{n_U^t}{kn_T^t + n_U^t}).$$

The parameter k measures the taste for talent inside the organization. If $0 < k < 1$ any particular talented person has lower chances of becoming an abbot than any particular untalented person. If $k = 1$, all agents have equal chances (this might be interpreted as pure adverse selection). Finally when $k \rightarrow \infty$ the probability that the chosen abbot is talented approaches one. We remark that the election of the abbot might be governed by deterministic rules. In this case, k reflects the uncertainties associated with the process of election (coalitions, loyalties, etc.). We will assume that k is exogenously given, i.e. it is set by the Vatican or by customary uses inside the monastery.

In the first period, monks perform a routine task for which all of them (talented or untalented) are equally capable. Let w be the utility of a monk in his first period if the abbot is untalented and δw his utility if the abbot is talented. Since a talented abbot will provide better design and organization of the basic tasks performed by the monks we assume that $\delta > 1$. Let V be the utility of the abbot³. Finally, let u_T (resp. u_U) be the reservation utility of a talented (resp. untalented farmer). We assume that $u_T > u_U$. Since talented and untalented agents perform the routine task equally well inside the abbey the reader may wonder why they perform differently outside the abbey. The reason for this is that inside the abbey all tasks are organized by the abbot and not by the monks themselves. If a talented person decides to become a

³In order to simplify notation, we assume that the utility of the abbot is independent of his type. It can be shown that all our main conclusions hold if the utility of the abbot depends on his type.

farmer he organizes his own business. Talented agents also have greater chances to escape to the city and become successful entrepreneurs there.

We also assume the following:

$$V > u_T (> u_U), \text{ and } V > \delta w (> w).$$

This assumption can be aptly described as "It's good to be the king" after the famous line by Mel Brooks (History of the World, Part One, 1981).

Let us now concentrate on the decision problem of a potential monk. In the first period he can obtain w with probability

$$\frac{n_U^{t-1}}{kn_T^{t-1} + n_U^{t-1}}$$

and δw with probability

$$\frac{kn_T^{t-1}}{kn_T^{t-1} + n_U^{t-1}}.$$

Thus his expected utility in the first period is

$$\frac{w(\delta kn_T^{t-1} + n_U^{t-1})}{kn_T^{t-1} + n_U^{t-1}}.$$

We remark that expected utility in the first period is independent of the type. However in the second period expected utility of a talented and an untalented monk are different. Let us consider the case of a talented agent first. In the second period there are three possible outcomes. An untalented monk may be chosen to be the abbot with probability

$$\frac{n_U^t}{kn_T^t + n_U^t}$$

and, in this case, he would get w . He can be the abbot with probability

$$\frac{k}{kn_T^t + n_U^t}$$

so he would get V . Finally another talented monk different from him may be the abbot. Since all the probabilities must add up to one this event occurs with probability

$$1 - \frac{n_U^t + k}{kn_T^t + n_U^t} = \frac{k(n_U^t - 1)}{kn_T^t + n_U^t}.$$

In this case he gets δw . Adding all the terms, the undiscounted lifetime expected utility (E_T) of a talented monk is⁴

$$E_T \equiv \frac{w(\delta k n_T^{t-1} + n_U^{t-1})}{k n_T^{t-1} + n_U^{t-1}} + \frac{kV + w n_U^t + k\delta w(n_T^t - 1)}{k n_T^t + n_U^t}. \quad (1)$$

A similar argument for a typical untalented monk shows that his expected lifetime utility (E_U) is

$$E_U \equiv \frac{w(\delta k n_T^{t-1} + n_U^{t-1})}{k n_T^{t-1} + n_U^{t-1}} + \frac{V + k w \delta n_T^t + w(n_U^t - 1)}{k n_T^t + n_U^t}. \quad (2)$$

Let the right hand side of equation (1) (resp. (2)) above be written as

$$E_T(n_T^{t-1}, n_U^{t-1}, n_U^t, n_T^t) \text{ (resp. } E_U(n_T^{t-1}, n_U^{t-1}, n_U^t, n_T^t)).$$

Definition 1 A *Dynamic Equilibrium (DE)* given an initial condition (n_U^0, n_T^0) is a sequence $(n_U^t, n_T^t)_{t=1, \dots, \infty}$ fulfilling the following two conditions:

$$E_T(n_T^{t-1}, n_U^{t-1}, n_U^t, n_T^t) \leq u_T \text{ and if strict inequality holds then } n_T^t = 0, \quad (3)$$

$$E_U(n_T^{t-1}, n_U^{t-1}, n_U^t, n_T^t) \leq u_U \text{ and if strict inequality holds then } n_U^t = 0. \quad (4)$$

Thus, a *DE* requires for each cohort that entry into the abbey reaps up any possible utility gain that agents can obtain by entering into monastic life.⁵

A first glimpse into the properties of a *DE* can be obtained by studying the particular case in which in each period, the entering cohort is identical to the previous one. This motivates the following definition:

Definition 2 A *Steady State (SS)* is a pair (n_U^*, n_T^*) fulfilling the following two conditions:

$$E_T(n_T^*, n_U^*, n_U^*, n_T^*) \leq u_T \text{ and if strict inequality holds then } n_T^* = 0, \quad (5)$$

$$E_U(n_T^*, n_U^*, n_U^*, n_T^*) \leq u_U \text{ and if strict inequality holds then } n_U^* = 0. \quad (6)$$

Taking into account (1) and (2), equations (5) and (6) can be written as:

$$n_T^*(2w - u_T) + k(V - w\delta) \leq k n_T^*(u_T - 2w\delta), \quad (7)$$

$$n_U^*(2w - u_U) + V - w \leq k n_T^*(u_U - 2w\delta). \quad (8)$$

⁴It can be shown that all our main conclusions hold if we discount utility by a constant number.

⁵A more stringent definition of a dynamic equilibrium would require that further entry from either type yields an expected utility for this type less than the reservation utility.

3. STEADY STATES.

Notice that a monk gets, at least, a lifetime utility of $2w$. Thus, if the reservation utility of a type is less than $2w$, an infinite number of potential monks will join the monastery. Thus, the existence of a SS requires that the reservation utility of both types be "large enough".

In the sequel we will require that the following inequalities are satisfied:

$$u_T > 2w\delta \text{ and } u_U > 2w.$$

This assumption has the interpretation that a talented (resp. untalented) farmer can get outside the monastery $2w\delta$ (resp. $2w$) by farming the land plus some extra utility afforded by the liberties civilian life provides. These liberties can not be afforded by a monk.

A consequence of the assumption above is that for a talented farmer to be attracted to monastic life he must have some chance of becoming abbot. For an untalented farmer to become attracted to monastic life he must have either the chance to become an abbot, or, at least, the chance of his work being directed by a talented abbot. In the rest of the paper we will assume that the above assumption holds.

Let us concentrate on the issue of existence of SS. It is clear that there are four possible classes of SS. A, trivial, SS, in which no monk joins the monastery, a SS in which only untalented monks join the monastery (SSU), a mixed SS in which both talented and untalented monks join the monastery (SSM) and a SS in which only talented monks join the monastery (SST). It is clear from equations (7) and (8) above that for $k > 0$ the trivial SS is impossible.

Let us first concentrate on the SSU. From (7) and (8) it follows that

$$n_T^* = 0, n_U^* = \frac{V - w}{u_U - 2w} \text{ and for } E_T^* < u_T, k < \frac{(V - w)(u_T - 2w)}{(V - \delta w)(u_U - 2w)}.$$

Thus, given our assumptions a SSU exists for sufficiently small values of k .

Let us now compute a SSM. From (7) and (8) it follows that

$$n_T^* = \frac{k(V - \delta w)(u_U - 2w) - (V - w)(u_T - 2w)}{2kw(\delta - 1)(u_T - u_U)}$$

$$n_U^* = \frac{k(V - \delta w)(2\delta w - u_U) - (V - w)(2\delta w - u_T)}{2w(\delta - 1)(u_T - u_U)}.$$

And the non negativity conditions boil down to

$$\frac{(V - w)(u_T - 2w)}{(V - \delta w)(u_U - 2w)} \leq k \leq \frac{(V - w)(u_T - 2\delta w)}{(V - \delta w)(u_U - 2\delta w)}$$

Finally, in a SST we have that

$$n_T^* = \frac{V - \delta w}{u_T - 2\delta w}, n_U^* = 0 \text{ and for } E_U^* < u_U, k > \frac{(V - w)(u_T - 2\delta w)}{(V - \delta w)(u_U - 2\delta w)}.$$

The previous arguments are summarized in the following result:

Theorem 1 *For every value of k there is a unique SS. For values of k low enough there exists SSU only. For intermediate values of k there exists SSM only. For high values of k a SST exists only if $u_U > 2\delta w$, and if $u_U \leq 2\delta w$ only SSM exists.*⁶

The interpretation of Theorem 1 is that if the value of k is low, only SSU exists since talented farmers have little chance of becoming promoted and thus they have no incentive to join the monastery. For intermediate values of k both talented and untalented farmers are attracted to the monastery. For large values of k there are two cases: If the reservation value of untalented farmers is relatively high (i.e. if $u_U > 2\delta w$), they do not enter into the monastery because their chances to become abbot, measured by

$$\frac{n_U^*}{kn_T^* + n_U^*},$$

are small. In fact, this probability decreases with k and tends to zero when k tends to infinity. But if the reservation value of untalented farmers is relatively low (i.e. $u_U \leq 2\delta w$), they enter the monastery, because even though their chances to become abbot are small, the chances that they will be directed by a talented person are great and this provides extra utility with respect to the utility they would get as farmers.⁷ In the latter case, the Vatican can not achieve abbeys populated by talented monks only by setting k arbitrarily large. On the contrary, it is easily computed that

$$\frac{n_U^*}{n_T^*} \rightarrow \infty \text{ when } k \rightarrow \infty.$$

Thus an increase in the probability that a talented person becomes the abbot increases the number of *untalented* monks relatively to the number of talented monks. We will comment more on this later on.

⁶If the number of monks is bound to be an integer, several SS may exist for a given k .

⁷This extra utility is proportional to δ . Another interpretation of the above is that if δ is high, untalented farmers enter in the monastery because they get a large extra utility if they are directed from a talented abbot.

4. DYNAMIC PATHS.

In this section we will provide an analysis of the difference equations (3) and (4) in Section 3 above. In order to simplify notation let

$$a^t \equiv \frac{w(n_U^t + k\delta n_T^t)}{n_U^t + kn_T^t}.$$

From the above expression, it is easily seen that

$$\delta w \geq a^t \geq w.$$

Also notice that if $n_U^t = 0$, $a^t = w\delta$ and if $n_T^t = 0$, $a^t = w$.

With this notation in hand, expected utility for talented and untalented monks (equations (1) and (2) in Section 2) can be written as follows:

$$E_T \equiv a^{t-1} + \frac{kV + wn_U^t + k\delta w(n_T^t - 1)}{kn_T^t + n_U^t}. \quad (9)$$

$$E_U \equiv a^{t-1} + \frac{V + k\delta w n_T^t + w(n_U^t - 1)}{kn_T^t + n_U^t}. \quad (10)$$

Let us consider first the case in which we start with untalented monks only and thus, $a^{t-1} = w$. In this case the equations above read

$$E_T \equiv \frac{k(V - \delta w) + 2wn_U^t + kwn_T^t(\delta + 1)}{kn_T^t + n_U^t}, \quad (11)$$

$$E_U \equiv \frac{V - w + 2wn_U^t + kwn_T^t(\delta + 1)}{kn_T^t + n_U^t}. \quad (12)$$

Let us assume that the value of k is such that there is SSU only, i.e.

$$k < \frac{(V - w)(u_T - 2w)}{(V - \delta w)(u_U - 2w)}.$$

Suppose that in period t both types of monks enter into the monastery. Then,

$$n_T^t = \frac{k(V - \delta w)(u_U - 2w) - (V - w)(u_T - 2w)}{kw(\delta - 1)(u_T - u_U)}.$$

But, under the above assumption on k this expression is negative. This shows that a situation in which both types of monks enter is impossible. Suppose now that only talented farmers enter. This implies that

$$\frac{V - w + kwn_T^t(\delta + 1)}{kn_T^t} < u_U \text{ and } n_T^t = \frac{V - \delta w}{u_T - 2w}.$$

However the above equations for the admissible values of k imply that

$$u_U^t - w < u_U^t - \delta w,$$

which is impossible. Thus, the only possibility that is left is that only untalented farmers enter at t . In this case equations (7) and (8) imply that

$$n_U^t = \frac{V - w}{u_U - 2w} \text{ and } k(V - \delta w)(u_U - 2w) < (V - w)(u_T - 2w).$$

Since the last inequality is precisely our condition on k we have proved the following:

Theorem 2 *Suppose that k is such that only SSU exists and that $n_T^{t-1} = 0$. Then, the unique DE from t on is $(\frac{V-w}{u_U-2w}, 0)$, i.e. the SSU.*

A similar argument proves the following analogous result:

Theorem 3 *Suppose that k is such that only SST exists and that $n_U^{t-1} = 0$. Then, the unique DE from t on is $(0, \frac{V-\delta w}{u_T-2\delta w})$, i.e. the SST.*

A possible way to summarize Theorems 2 and 3 is that they say that both SSU and SST are dynamically stable.

Let us now concentrate on the case in which a SSM exists. In this case equations (3), (4), (9) and (10) above imply that:

$$n_T^t = \frac{k(V - \delta w)(u_U - w - a^{t-1}) - (V - w)(u_T - w - a^{t-1})}{kw(\delta - 1)(u_T - u_U)}, \quad (13)$$

$$n_U^t = \frac{k(V - \delta w)(\delta w + a^{t-1} - u_U) - (V - w)(\delta w + a^{t-1} - u_T)}{w(\delta - 1)(u_T - u_U)}. \quad (14)$$

The corresponding non-negativity constraints are:

$$Ru_U - u_T + w(1 - R) \geq a^{t-1}(R - 1) \geq \delta w(1 - R) + Ru_U - u_T. \quad (15)$$

where

$$R \equiv \frac{k(V - \delta w)}{(V - w)}.$$

Notice that the bounds for k in a SSM and $\delta > 1$ imply that $R > 1$ and thus this equation can be written as

$$\frac{Ru_U - u_T}{R - 1} - w \geq a^{t-1} \geq \frac{Ru_U - u_T}{R - 1} - \delta w. \quad (16)$$

It is easily seen that there are values of the parameters of the model such that the inequalities in (16) above are satisfied. Moreover, (16) implies that the inequalities defining a SSM hold, since

$$Ru_U - u_T + w(1 - R) \geq a^{t-1}(R - 1) \geq w(R - 1), \text{ which implies that}$$

$$\frac{u_T - 2w}{u_U - 2w} \leq R, \text{ and} \quad (17)$$

$$(R - 1)w\delta \geq a^{t-1}(R - 1) \geq \delta w(1 - R) + Ru_U - u_T, \text{ which implies that}$$

$$\frac{u_T - 2\delta w}{u_U - 2\delta w} \leq R. \quad (18)$$

It is easy to check that (17) and (18) are identical to those defining an SSM.

In order to solve the difference equations (3) and (4) we plug equation (13) and (14) in the definition of a^t and we get

$$a^t = \frac{k(V - \delta w)(u_U - a^{t-1}) - (V - w)(u_T - a^{t-1})}{k(V - \delta w) - (V - w)}. \quad (19)$$

From $\delta w \geq a^{t-1} \geq w$, it is easily computed that if a^{t-1} belongs to the interval defined by (16) above, a^t also belongs to this interval. Moreover $\frac{\partial a^t}{\partial a^{t-1}} = -1$. Thus, in this case, the *DE* is very simple. We start with a value of a^0 which implies certain value of a^1 given by equation (19) above. In period 2, we have that $a^2 = a^0$, in period 3, $a^3 = a^1$, so on and so forth. Therefore, n_T^t and n_U^t take only two values. In other words, the *DE* is cyclical: Suppose that $a^1 > a^0$ (the case $a^1 < a^0$ is analogous). Thus in period 1 we have a "high" value of n_T^t and a "low" value of n_U^t . In period 2 we have a "low" value of n_T^t and a "high" value of n_U^t . In period 3 we obtain the same values of n_T^t and n_U^t that in period 1, etc.

It is also interesting to remark that

$$\frac{n_T^t + n_T^{t+1}}{2} = n_T^* \text{ and } \frac{n_U^t + n_U^{t+1}}{2} = n_U^*,$$

i.e. the average of n_T^t and n_U^t during the cycle equals the corresponding value in the SSM.

All these findings are summarized in the following:

Theorem 4 *For values of n_T^0 and n_U^0 and k such that (16) above is satisfied, the *DE* exhibits permanent cyclic behavior with two values only. The average values of n_T^t and n_U^t equals those in the SSM.*

In order to tackle the case where (16) above does not hold, let us assume that the bounds defining an SSM (equations (17) and (18) above). Suppose that the first inequality in (16) is violated, i.e.

$$\frac{Ru_U - u_T}{R - 1} - w < a^{t-1}.$$

This implies that $n_T^t = 0$ and, thus, $a^t = w$. We will show that in period t

$$\frac{Ru_U - u_T}{R - 1} - w > a^t.$$

Suppose not, so $R(u_U - 2w) \leq u_T - 2w$. But this inequality violates those defining an SSM (equation (17) above).

However it might be that the second inequality is not fulfilled, i.e.

$$w \leq \frac{Ru_U - u_T}{R - 1} - \delta w,$$

because it is easily seen that the previous equation is equivalent to

$$R \geq \frac{u_T - w - \delta w}{u_U - w - \delta w}, \quad (20)$$

which is compatible with the bounds of a SSM, see equations (17) and (18). If the second inequality does not hold, $n_U^t = 0$, and then, $a^{t+1} = \delta w$. Now, in period $t + 1$ we can not have

$$w\delta < \frac{Ru_U - u_T}{R - 1} - \delta w$$

because this would imply that $u_T - 2\delta w < R(u_U - 2\delta w)$ contradicting the bound for a SSM in equation (18) above. The other bound in equation (16) is satisfied also because if it were not

$$\frac{Ru_U - u_T}{R - 1} - w < \delta w,$$

and this contradicts equation (20) above. Thus, eventually, there is some t' for which $a^{t'}$ enters in the interval defined by (16) above and Theorem 4 applies. A similar analysis can be done to deal with the case where the other inequality in (16) is violated, i.e.

$$a^{t-1} < \frac{Ru_U - u_T}{R - 1} - \delta w.$$

Summing up,

Theorem 5 *For values of n_T^0 and n_U^0 and k such that (16) above is not satisfied, the DE converges in two periods to values of n_T^0 and n_U^0 and k such that (16) above is satisfied, and, thus, Theorem 4 holds.*

Why do cycles occur? Suppose that we start with a situation in which the relative number of untalented monks is high. Thus, in the next period there is a high probability that abbot will be untalented and this implies that the number of both talented and untalented farmers entering the monastery in the next period will drop, but given our assumptions, the number of untalented will drop more, so in the next period the relative number of talented monks rises. Thus, in the next period the abbot will be talented with a high probability and this will attract both talented and untalented farmers to enter the abbey, but given our assumptions, the untalented will enter in larger numbers, and so on.

5. CONCLUSIONS.

None of the basic ideas of this paper is new: The overlapping generation structure was introduced by Samuelson and used extensively in monetary economics. Externalities have been around, at least, from Pigou. Hierarchies played an important role in the writings of Williams. Finally, the idea of a type, originated in the work of Vickrey and Harsanyi, pervades many areas of economics like game theory and incentives.

Our analysis has produced two unexpected conclusions.

On the one hand, the number of talented and untalented people in a organization may cycle. In our case, the cycle is very specific, taking only two possible values. We admit that this conclusion may not be robust: In more general models, cycles may occur but it is unlikely that they take two values only. In any case, our point is that the quality of an organization (measured, say, by the ratio $\frac{n_t^t}{n_U^t}$) may cycle in equilibrium.

On the other hand, an organization with high standards of promotion can be mostly populated by untalented persons. Why? Because untalented people may live very well under the direction of a talented person. This provides an explanation to the casual observation that, very often, intelligent leaders are surrounded by not-so-intelligent people. The usual explanation of this fact is that, some intelligent people do not like to be surrounded by potential challengers. Without denying that this may be the case in some instances, our analysis provides an alternative answer: Intelligent bosses provide an umbrella under which the mediocre prosper. In other words, if untalented agents profit more in relative terms than the talented ones from having a good boss, untalented agents will enter in larger numbers than talented agents. Of course, in real organizations, there might be forces operating in the opposite direction, for instance, the entry of untalented agents may be restricted by entry examinations. However our point is that there is a tendency for the relatively untalented to enter in large numbers, no matter how high the standard of promotion is. An unpleasant consequence of this is that the outcome of a policy of excellency may be not excellency but mediocrity.

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