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CONTRACTS, JOB SECURITY AND DEVELOPMENT OF THE UNIVERSITY

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CONTRACTS, JOB SECURITY AND DEVELOPMENT OF THE UNIVERSITY[2]

The research success of a university requires efficient recruiting. The talents of candidates are unobservable for administrators, and so they delegate hiring to the faculty who have better knowledge of the job market. Since professors dislike putting their own employment at risk, faculty, especially less productive, have an incentive to hire less productive candidates to insure against getting fired themselves. I argue that both tenure and strict long-term administrative positions mitigate this problem, and allow one to hire better candidates.

Keywords: tenure, academic contracts, university, job security

JEL-Codes: I23, J41, J54, L29

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Introduction

In many endeavours, in particular, developing a research university, efficient hiring is essential. It is not sufficient to have talented researchers, one should also think how to sustain and improve the current organization's potential. This brings into question the organization of the enterprise under study, and the organization of the system of contracts in it. How to improve the hiring process?

I use the establishment of a new research university as an illustrative example. Administrators, especially less experienced, have a little knowledge about abilities of candidates applying for professorships. The administration of the university is faced with a lot of restrictions. It is usually hard for new universities to hire eminent professors since the number of such professors is limited and the demand is high. This implies that the university administration will try to hire professors from a wide pool of remaining less known candidates. Therefore the university administration with insufficient experience and knowledge need to evaluate candidates from a wide market. This surely affects the quality of hiring. A freshly employed senior faculty, on the other hand, has plenty of knowledge about the abilities of candidates, and so administrators would like to employ that knowledge. However, senior professors might not choose what is the best for the university. In such a situation it is crucial to coordinate the incentives of professors concerning their academic and administrative work so that they make beneficial decisions. This paper endeavours that both tenure and strict long-term administrative positions can be used to expedite the development of the university. Particularly, if there is an institutional call for *rotation*, i.e. mandatory removal of faculty from administrative positions after a short term, tenure is the only way of guaranteeing that senior faculty are interested in hiring better junior researchers.

Tenure is a rather unusual type of contract for organizations, but it is common for research universities. The presence of tenure has multiple effects on a university (Panova, Yudkevich, 2011). McPherson and Winston show that tenure gives additional job security for professors which in turn permits them to specialize in unpopular fields of science (McPherson, Winston, 1983). These contracts encourage professors to invest in human capital (Kahn, Huberman, 1988). Tenure is applicable to resolve the (departmental chair) scarce slot problem, as shown

by Siow (Siow, 1998). In Kahn and Huberman tenure is a mechanism to resolve the two-sided moral-hazard problem in a university. Dnes and Garupa argue that in situations when a professor cannot receive compensation after being fired only tenure can improve the quality of hiring (Dnes, Garupa, 2005). Carmichael shows that tenure incites senior faculty to reveal their knowledge about the abilities of new junior faculty (Carmichael, 1988). I argue further that tenure and permanent administrative contracts allow one to get information from senior professors, facilitating hiring and improving overall welfare.

The Model

The main purpose of this work is to understand how different contract systems affect the quality of hiring. In order to answer this question, I construct a 3-period game model that describes one university. This university is a non-profit institution whose goal is to maximize its reputation[3]. The reputation is assumed to be the average level of ability of professors working at this university. In the beginning one professor is already working at the university as a senior professor. The university needs to expand, and the administration decide to hire a new junior professor. The academic market is represented by the candidates with levels of talent θ_i, $\theta_i \in [\,0, \bar{\theta}\,]$. The administration of the university cannot accurately estimate the talent of each candidate. They know that the level of the candidate's talent is a uniform random variable $\theta_i \sim U[0, \bar{\theta}\,]$. Since the senior professor already works in the university and he has sufficient knowledge to evaluate the quality of the candidates, the university administration will delegate the right to hire to him. The university administration offer him the post of the head of department. In fact, in our model we will focus on how the delegation of hiring affects the quality of hiring. Thus, there are two main actors in the university: the senior professor and the administrator. Also, we have a junior professor hired from the academic market.

The ideal situation is when the administration set the salary of the recruiter according to the quality of hiring. However, this does not happen in universities. Since the administrator does not participate in the recruitment process and has no necessary information, he cannot

[3]This may be the total productivity of the faculty and not necessarily the resulting monetary income.

determine whether it was possible to hire a more talented candidate, and so cannot determine the quality of hiring.

At the beginning, the administrator offers the senior professor to take up the position of the head of department. In this position he will have administrative duties that may bring him additional costs and benefits depending on his recruiting policy.

The level of talent of the senior professor is θ_s. His gains outside the university are normalized to zero. The objective function of the senior professor is the utility that he receives from different activities. He has two periods of work life, namely periods 1 and 2. In each period the senior professor engages in academic activity that brings him payoff V.

The senior professor can have different career paths. In period 0 the senior professor receives an offer to become the head of department. He has an opportunity to make the following decision: he can choose between *taking up an administrative post (head of department)* and *staying at a faculty post*. In other words, he chooses between a pure academic career and an administrative career with teaching and research.

If the senior professor chooses an academic career, this means that he will only do teaching and research (academic activities) during his lifespan. Academic activities yield payoff V in each period. Depending on the conditions of the academic contract, the senior professor can work one period or two. If the senior professor has a short-term contract, he can be replaced[4] by the administrator in period 2. Then his expected payoff equals $V + \delta VP$, where δ is the discount factor and P is the probability to keep his workplace in period 2. If the senior professor is tenured then $P = 1$.

If the senior professor chooses an administrative career, then he has additional duties apart from the academic ones. These duties include, in particular, the hiring of a new junior professor. The additional administrative duties result in cost C. At the same time, this duty brings an additional gain from hiring the particular candidate, with whom the senior professor will work. If the senior professor hires a junior professor with talent θ_j^s, he receives additional gain $\alpha\theta_j^s$. I assume that the senior professor has perfect information about the talents of candidates and can hire any professor with $\theta_j^s \in [\,0, \bar{\theta}\,]$. Consequently, in the first

[4]Instead of considering the dismissal, we can consider situation when the condition of job worsens dramatically.

period the senior professor as the head of department will receive $V - C + \alpha\theta_j^s$.

At the very end of period 1 the senior professor, depending on the conditions of his administrative contract, has an opportunity to quit his post as the head of department.

If the senior professor is able to stay on as the head of department during the second period as well, he will not be dismissed and he will have the same duties. The senior professor will receive the expected payoff $(V - C)(1 + \delta) + \alpha(\theta_j^s + \delta\theta_{j2}^s)$, where θ_{j2}^s is the junior professor's talent working at the university in the second period. If the senior professor decides to quit as the head of department or is forced to do so, then he can be dismissed afterwards by the administrator. This happens when the senior professor has a short-term academic contract. His expected payoff will be $V - C + \alpha\theta_j^s + \delta((V + \alpha\theta_j^s)P_1(\theta_s, \theta_j^s) + VP_2(\theta_s, \theta_j^s))$, where $P_1(\theta_s, \theta_j^s)$ is the probability that both the senior professor and the junior professor stay at the university, and $P_2(\theta_s, \theta_j^s)$ is the probability that only the senior professor stays at the university and the junior professor is replaced. If given tenure, his expected payoff will be $V - C + \alpha\theta_j^s + \delta(V + \alpha\theta_j^s P(\theta_j^s))$, where $P(\theta_j^s)$ is the probability that the junior professor stays at the university.

Let us now describe the behaviour of the administrator. The administrator is responsible for hiring policy if either the professor refuses the administrative career or the professor leaves the administrative post[5]. We assume that in these cases the administrators are not represented by the same person. In the first case, the administrator is engaged in recruiting at periods 1 and 2. In period 1, he hires a junior professor, and in period 2 he decides whether to fire and hire someone else. In the second case the administrator makes a decision only at period 2. In both cases he interacts with the senior professor with talent θ_s, with the junior professor with talent $\theta^j = \{\theta_j^s, \theta_j\}$[6] and with the candidates.

The administrator is benevolent, which means that he is interested in increasing the reputation of the university. At the same time he has imperfect knowledge about the talents of candidates, he cannot distinguish among different professors in the market. The level of the candidate's talent is a random variable $\theta_i \sim U[0, \bar{\theta}]$. The expected payoff (E) of the administrator equals the average talent of professors working at the university. If the senior

[5]We speak about the administrator as if he were a single person, in reality this is not so.

[6]θ_j^s is the talent of the junior professor, that was hired by the senior professor, θ_j is the talent of the junior professor, that was hired by the administrator

professor accepts the offer, then the administrator gains

$$E_1 = \begin{cases} (\theta_s + \theta_j^s)/2, & \text{if he keeps both professors} \\ (\theta_s + \mathrm{E}(\theta_i))/2, & \text{if he dismisses the junior professor} \\ (\theta_j^s + \mathrm{E}(\theta_i))/2, & \text{if he dismisses the senior professor.} \end{cases} \tag{1}$$

If the senior professor rejects the offer, then the administrator gains

$$E_2 = \begin{cases} (\theta_s + \theta_j)/2, & \text{if he keeps both professors} \\ (\theta_s + \mathrm{E}(\theta_i))/2, & \text{if he dismisses the junior professor} \\ (\theta_j + \mathrm{E}(\theta_i))/2, & \text{if he dismisses the senior professor.} \end{cases} \tag{2}$$

We conclude that the set of strategies of the senior professor is {take position of the head of department, stay just the senior professor}×{hire a junior professor}×{stay the head of department, quit the position of the head of department}×{fire the junior professor, keep the junior professor}. The set of strategies of the administrator is {hire a junior professor}×{fire the junior professor, fire the senior professor, keep both professors}.

This completes the description of the model and Figure 1 shows possible events that could occur in our game.

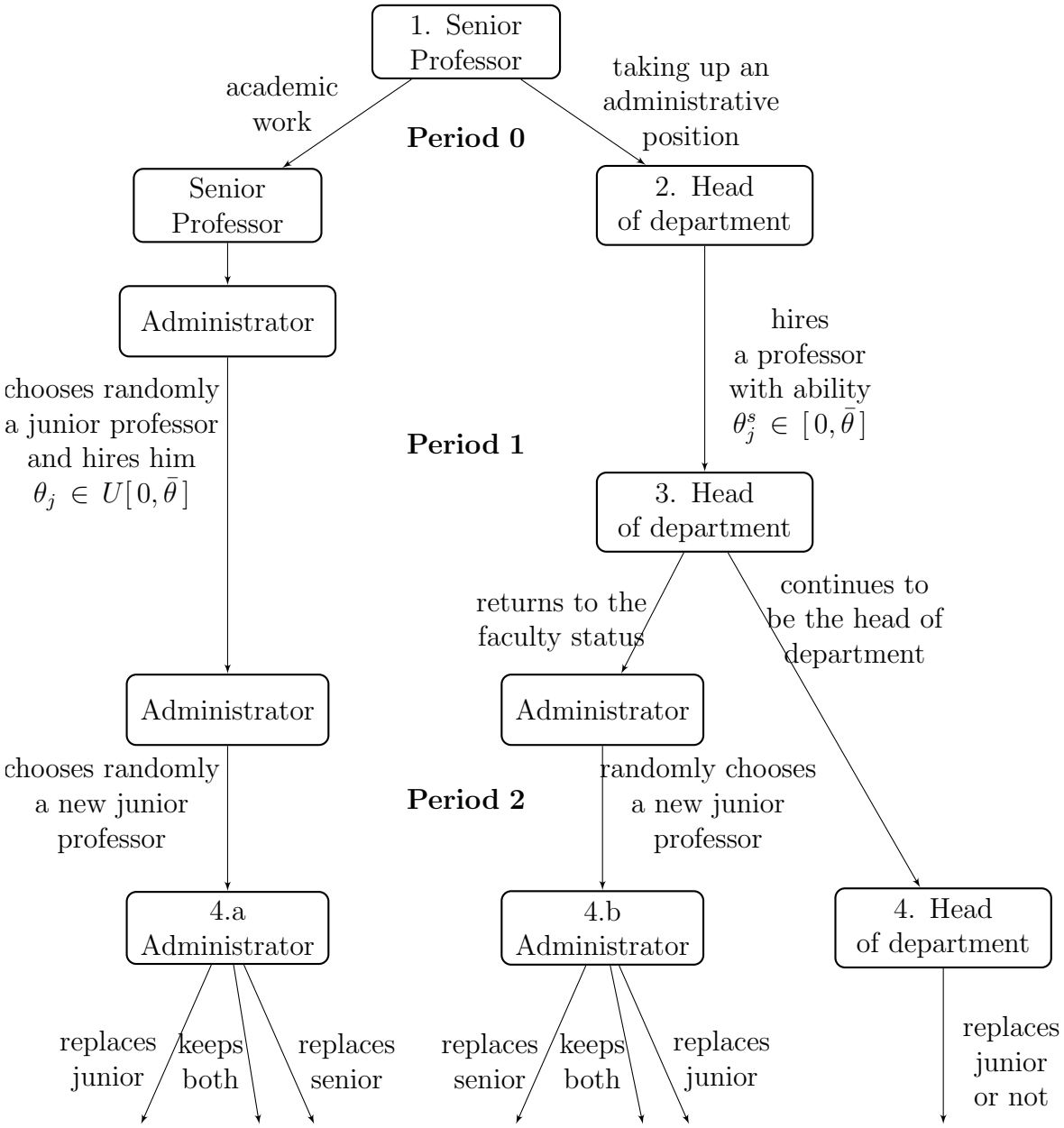

Fig. 1. Game diagram

This game has a subgame perfect Nash equilibrium. The equilibrium depends on the following parameters: talents of professors, benefit from their academic activities, administrative cost, marginal benefit from recruiting policy, and conditions of contract system. I use backward induction to find this equilibrium.

I will consider different types of contracts. First, as I have mentioned, there are two types of academic contracts: short-term contracts and tenure. The conditions of short-term academic contracts are the following: after one period the university administration decides whether to renew the contract for one more period or not. Tenure is a permanent contract that cannot be broken by the university administration. Next, we consider three types of administrative contracts. One is the short-term administrative contract, where the senior professor quits the position as the head of department after one period. Further, there are two long-term administrative contracts that either include the option for the senior professor to break them or not. We call the latter two contracts the soft and strict long-term administrative contracts.

For simplicity, I impose a number of restrictions on the parameters. I assume that the senior professor receives positive payoff from academic activities, $V > 0$, and positive marginal benefit from working with the junior professor, $\alpha > 0$. The maximum possible ability of the junior professor equals 1. I also assume that the hiring process is associated with a positive cost, $C > 0$. In addition, the senior professor appreciates equally different periods of his life, and he cannot be fired from the post as the head of department.

Let us look now at what happens in our model for different contract systems.

Tenure

In a system of tenure and soft long-term administrative contracts, the senior professor cannot be dismissed and if he decides to takes the position as the head of department, he can quit this position.

Proposition 1. *The optimal strategy profile in a system of tenure contracts and soft long-term administrative contracts depends on the administrative cost and the marginal benefit from working with a talented junior professor. The profile does not depend on the benefit from academic activities or the senior professor's talent. If the administrative cost is low*

enough, $C < 2\alpha$, then the senior professor takes up an administrative position for one period and hires the most able professor; the administrator keeps both professors in the last stage. If the administrative cost is high enough, $C > 2\alpha$, then the senior professor chooses an academic career; in the last stage the administrator cannot fire the senior professor, and he keeps the junior professor if his talent exceeds the expected talent of the candidate.

Proof. We will use backward induction to find the equilibrium. First, we consider the fourth stage of our game and analyse the strategy of the administrator. At stages 4a and 4b (see Figure 1) the administrator should make recruitment decisions. The senior professor has a tenure contract, therefore the administrator cannot fire him. But the administrator can fire the junior professor, who was hired by him or by the senior professor, and hire a new candidate for this position. The administrator's goal is to attain the maximal reputation. His strategy can be understood by answering the following question: "Which person should not be employed at the university?" So, instead of studying the functions E_1, E_2 given by formulas (1), (2), we can study the symmetric function of loss. The goal of the administrator is to obtain the minimal loss, i.e. $min\{\theta^j, \mathrm{E}(\theta_i)\}$, where θ^j is the junior professor's level of talent. Comparing the talents of the junior professor and the candidates in the job market, we can easily determine the optimal strategy for the administrator. This strategy depends on the junior professor's talent and the expected talent of the candidates. The optimal strategy in this case is defined completely by the ratio of the talent of the junior professor and the expected talent of the candidates. The administrator will keep the junior professor if and only if the expected talent of the candidates is less than the talent of the junior professor. We find that the optimal strategy for the administrator will be the following: if the level of talent of the junior professor is less than the expected level of talent of the candidates, ($\theta_j^s < \mathrm{E}(\theta_i)$ or $\theta_j < \mathrm{E}(\theta_i)$), then the administrator fires the junior professor; if this condition is not satisfied, then he keeps the junior professor.

Now we will discuss the strategy of the senior professor. The stage 4 is available for the senior professor since the administrator offered him a soft long-term administrative contract. If the senior professor stays on as the head of department, he makes a decision in that stage. He fires the junior professor and hires a new one if this benefits him. The gain he gets in

this period is $V - C + \alpha\theta^s_{j2}$. Since this gain is positively correlated with the level of talent of a new junior professor, he will hire the most talented candidate if this candidate is more talented than the junior professor hired in the previous period. The optimal strategy of the senior professor at this stage is the following: "dismiss the junior professor and hire the most talented candidate $\theta^s_{j2} = \bar{\theta}$, if $\theta^s_j < \bar{\theta}$, otherwise keep the junior professor".

At the end of the first period, the senior professor has to decide whether he stays on as the head of department or not. The senior professor should compare the expected payoff from leaving as the head of department and the expected payoff from staying further in this post. The payoff that he can gain in the last period depends on the optimal strategy of the administrator, on the talent of the junior professor and on the talent of the candidates. The senior professor will stay on this position if the gain of doing so is larger than the gain from quitting, $2V - 2C + \alpha(\bar{\theta} + \theta^s_j) > 2V - C + 2\alpha\theta^s_j$, i.e. $C < \alpha(\bar{\theta} - \theta^s_j)$.

Prior to this the senior professor should employ a new junior professor. He chooses a junior professor, keeping in mind what he can gain in the second period and what strategy is better for him. The senior professor hires the most talented candidate, as his expected payoff depends positively on the level of talent of the junior professor. For a tenure contract, the optimal hiring policy for the head of department is simple, it is to hire always the most talented candidate. This means that $\theta^s_j = \bar{\theta}$ and that if the senior professor decides to be the head of department, he takes this position for one period.

At the very beginning, when the administration of the university offers the senior professor the head of department position, the senior professor should decide if he takes it or not. He should keep in mind what he can gain from each strategy. He takes this offer if this is more profitable than refusing the offer, i.e. $2V - C + 2\alpha\bar{\theta} > 2V$. Thus, we find that in a system of tenure and soft long-term administrative contracts the following happens. If the administrative cost is less than the marginal benefit of hiring the candidate, $C < 2\alpha\bar{\theta}$, then the senior professor agrees to temporarily take the position of the head of department, otherwise he refuses. Taking into account our assumptions, the proposition is proved. □

In the case of short-term administration contract we obtain the same equilibrium.

Proposition 2. *In a system of tenure and short-term administrative contracts the optimal strategy profile depends on the administrative cost and the marginal benefit from working with a talented junior professor. It does not depend on the benefit from academic activities or on the senior professor's talent. If the administrative cost is low enough, $C < 2\alpha$, then the senior professor takes up an administrative position for one period and hires the most able professor; the administrator keeps both professors in the last stage. If the administrative cost is high enough, $C > 2\alpha$, then the senior professor chooses an academic career; in the last stage the administrator cannot fire the senior professor and he keeps the junior professor if his talent exceeds the expected talent of the candidates.*

When the senior professor receives the administration's offer with the conditions of a strict long-term administrative contract the situation is different. The administrative cost should be lower to encourage the senior professor to take the the head of department post. Only when the administrative cost does not exceed the marginal benefit from the hired candidate, i.e. $C < \alpha$, the senior professor accepts an offer.

Proposition 3. *In a system of tenure and strict long-term administrative contracts the optimal strategy profile depends on the administrative cost and the marginal benefit from working with a talented junior professor. It does not depend on the benefit from academic activities or the senior professor's talent. If the administrative cost is low enough, $C < \alpha$, then the senior professor takes up an administrative position for one period and hires the most able professor; the administrator keeps both professors in the last stage. If the administrative cost is high enough, $C > \alpha$, then the senior professor chooses an academic career, in the last stage the administrator cannot fire the senior professor; he keeps the junior professor if his talent exceeds the expected talent of the candidates.*

Thus, in a system of tenure the optimal strategy of the senior professor depends on the ratio of the administrative cost and the marginal benefit of hiring the candidate. It can be easily seen that the growth of the administrative cost, C (or decrease of the marginal benefit from hiring the candidate, α) leads the senior professor refusing an administrative career. Changes in the benefit from academic activities does not affect the decision of the senior professor. In fact, the senior professor makes a choice between a temporary administrative post

in which he hires the most talented candidate, and a purely academic position. The quality of the hiring policy is the following. If the senior professor takes the head of department position, he hires the best candidate, but if the senior professor refuses the administrative position, then the administrator is responsible for the hiring policy.

Figure 2 shows the expected payoffs of the senior professor with different strategies and different combinations of the administrative cost and the marginal benefit from hiring candidate. Figure 3 shows the quality of hiring. The quality of hiring does not depend on the talent of the senior professor, but depends on his decision to become the head of department or not. In order to improve the quality of the hiring policy the university administration can ask the senior professor to take this position temporarily, therefore improving the quality of hiring. This can be done only if the administrative cost does not exceed $2(V + \alpha)$.

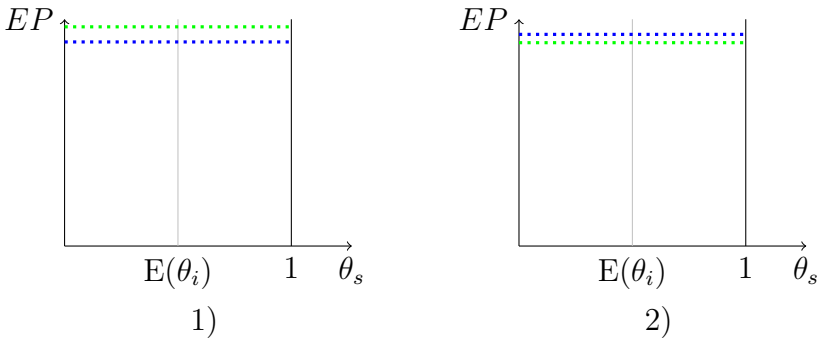

Fig. 2. The expected payoffs of the senior professor from his strategies for a tenure contract and a short-term administrative contract, or a soft long-term administrative contract. 1) If the administrative cost is higher than the marginal benefit from hiring, $C > 2\alpha$. 2) If the administrative cost is lower than the marginal benefit from hiring, $C < 2\alpha$.

..... to be the head of department for one period
..... to refuse administrative career

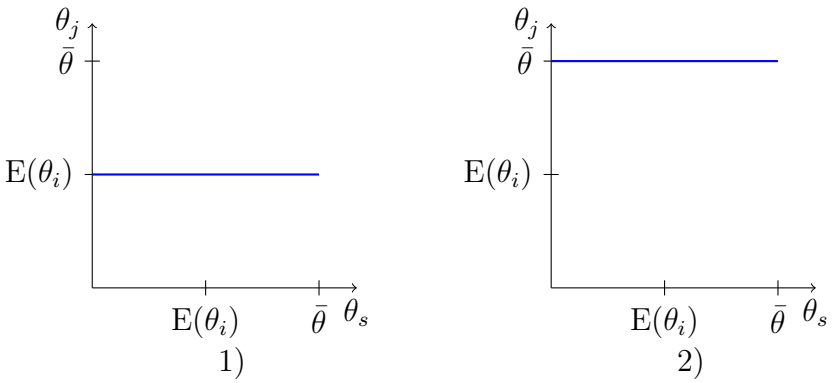

Fig. 3. The expected quality of the junior professor in the case of tenure contract. 1) If the administrative cost is higher than the marginal benefit from hiring, $C > 2\alpha$. 2) If the administrative cost is lower than the marginal benefit from hiring, $C < 2\alpha$.

Short-term academic contract

In a system with short-term academic contracts, the optimal strategy of the senior professor and the hiring policy will be different. As we shall see, the career path of the senior professor depends on his level of talent and on the benefit from academic activities. Thus, the hiring policy depends crucially on the senior professor's talent. If the talent of a senior professor is higher than the expected level of talent of candidates, he will be called a high-talented professor. Otherwise, he will be called a low-talented professor.

Let us discuss the behaviour of the administrator in a system of short-term academic contracts. Recall that the administrator's goal is to obtain the minimal loss, i.e. $min\{\theta_s, \theta^j, \mathrm{E}(\theta_i)\}$. The administrator can keep both the senior and junior professors at the university, he can replace the junior professor with a new one, or he can replace the senior professor with a new one. Comparing the talents of the senior professor, junior professor, and candidates in the job market, we can determine the optimal strategy for the administrator. This strategy depends on the talents of the senior professor, junior professor and candidates. If the expected level of talent of the candidate is lower than the talents of both professors, it is not profitable for the administrator to fire the professors and he keeps them. If the talent of at least one of the professors is less than the expected talent of the candidate, then the administrator gains more if he fires the professor with the lowest level and hires instead the candidate. Summarizing all the above, we obtain the following optimal strategy of the administrator is to keep at the university the most talented professors:

- if $\theta_s \geq \mathrm{E}(\theta_i)$ and $\theta^j \geq \mathrm{E}(\theta_i)$, then the administrator keeps both senior and junior professors
- if $\theta^j < \mathrm{E}(\theta_i)$ and $\theta_s \geq \theta^j$, then the administrator keeps the senior professor
- if $\theta_s < \mathrm{E}(\theta_i)$ and $\theta_s \leq \theta^j$, then the administrator keeps the junior professor.

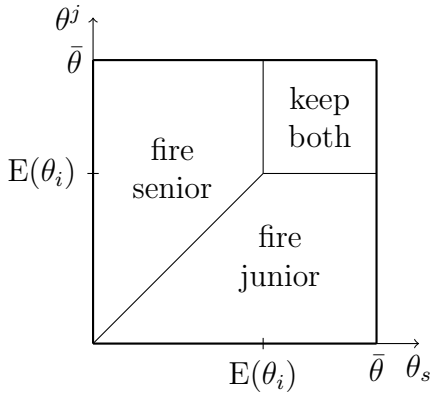

Fig. 4. The optimal strategy of the administrator. Short-term academic contracts.

We can easily confirm that a high-talented senior professor with a short-term academic contract behaves as a tenured professor.

Proposition 4. *In a system of short-term academic contracts and soft long-term administrative contracts with a high-talented senior professor, the optimal strategy profile depends on the administrative cost and the marginal benefit from working with a talented junior professor. The optimal strategy profile does not depend on the benefits from academic activities or on the senior professor's talent. If the administrative cost is low enough, $C < 2\alpha$, then the senior professor takes up an administrative position for one period and hires the most able professor; the administrator keeps both professors in the last stage. If the administrative cost is high enough, $C > 2\alpha$, then the senior professor chooses an academic career; in the last stage the administrator cannot fire the senior professor and he keeps the junior professor if his talent exceeds the expected talent of the candidate.*

We can easily prove this proposition as Pro. 1.

When the senior professor is low-talented, the set of his optimal strategies is more diverse.

Proposition 5. *In a system of short-term academic contracts and soft long-term contracts where a low-talented senior professor works in the university, the optimal strategy profile depends on the administrative cost and the marginal benefit from working with a talented junior professor, the benefit from academic activities, and the senior professor's talent.*

1. *If the administrative cost is high,* $C > \max\{V, 0.5V + \alpha\}$*, then a low-talented senior professor prefers an academic career and the administrator is responsible for hiring. In the last stage, the administrator fires the most untalented professor, if his talent is less than the expected talent of the candidate and hires the candidate; otherwise he keeps both professors.*

2. *If the administrative cost is low,* $C < \min\{1.5\alpha, 0.25V + \alpha\}$*, then a low-talented senior professor prefers a permanent administrative career and hires the most talented candidate.*

3. *If the administrative cost satisfies the following conditions,* $2\alpha < C < \min\{V, 0.5V + 0.5\alpha\}$*, then a low-talented senior professor prefers a temporary administrative career and hires the less talented candidate,* $\theta_j^s = \theta_s$*. In the last stage, the administrator fires the least talented professor, if his talent is less than the expected talent of the candidate and hires the candidate; otherwise he keeps both professors.*

   Otherwise,

4. *If the following condition is satisfied,* $(2\alpha - V)(\alpha - C) < 0$*, then a low-talented senior professor with talent lower than* $(\alpha - 2C)/\alpha$ *prefers a permanent administrative career and hires the most talented candidate; the low-talented senior professor with a talent higher than* $(\alpha - 2C)/\alpha$ *prefers an academic career.*

5. *If* $(2\alpha - V)(\alpha - C) > 0$ *is satisfied, then while the level of talent of a low-talented senior professor grows, his optimal strategy can switch in the following way: from a permanent administrative career to a temporary administrative career; or from a permanent administrative career, first to a temporary administrative career, and next to an academic career; or from a temporary administrative career to an academic career.*

Therefore the main difference here from the system of tenure is the appearance of conditions where the senior professor prefers a permanent administrative career and hires the most talented candidate, and when the senior professor prefers a temporary administrative career and hires the less talented candidate. The main risks are related to the situation when the senior professor prefers a temporary administrative career. This leads to hiring of low-talented candidates and decreases the organization potential of the university.

Now we will analyse cases 1, 2, and 3. These three cases are illustrated in Figure 5. These graphs show expected payoffs from the various strategies of the senior professor. The optimal strategy gives the maximum benefit. The graph of the expected payoff of the optimal strategy is above the other graphs. Since we know the optimal hiring policies of the senior professor and administrator, we can find the expected junior professor's talent in these three cases (Figure 6).

In case 1 it is not profitable for a low-talented senior professor to accept the offer of administration, he prefers an academic career. Indeed, the benefits from an academic career are high despite the risk of dismissal. Even a temporary administrative career is not profitable for a low-talented senior professor because benefits from job security do not cover the loss from administrative duty. If the administrative cost is higher than 2α, then the high-talented senior professor refuses the offer of administration; if the administrative cost is lower than 2α, then the high-talented senior professor accepts the offer of the administration and becomes the head of department for one period.

In case 2, a low-talented senior professor prefers a permanent administrative career and hires the most talented candidates. At the same time, a high-talented senior professor prefers a temporary administrative career and hires the most talented candidate.

In case 3, a low-talented senior professor prefers a temporary administrative career and hires the less talented candidate. At the same time, a higher-talented senior professor prefers an academic career.

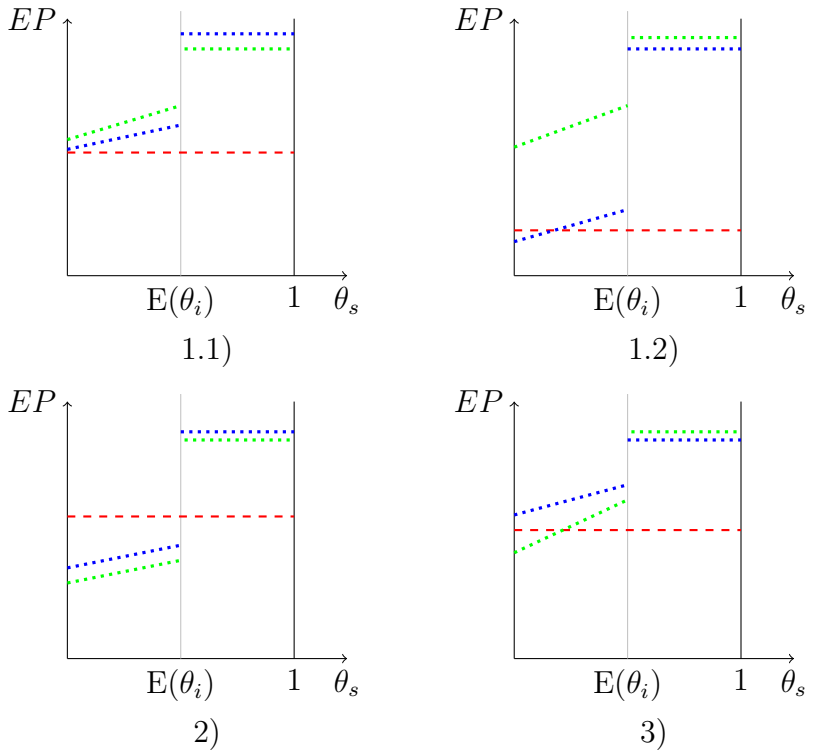

Fig. 5. The expected payoffs from the strategy in a system of short-term academic contracts and soft long-term administrative contracts. 1) $2\alpha > C > \max\{V, 0.5V + \alpha\}$; 2) $C > \max\{V, 0.5V + \alpha, 2\alpha\}$; 2) $C < \min\{1.5\alpha, 0.25V + \alpha\}$; 3) $2\alpha < C < \min\{V, 0.5V + 0.5\alpha\}$.

- - - - - to be the head of department during all period
..... to be the head of department for one period
..... to refuse an administrative career

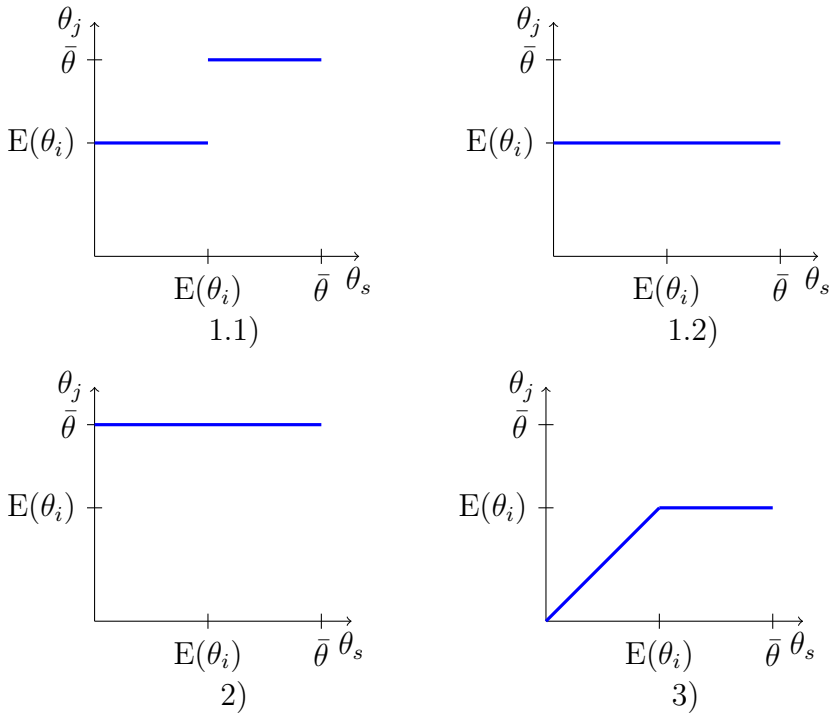

Fig. 6. The expected quality of the junior professor

When the parameters change, a transition from one optimal strategy profile to another occurs. As the administrative cost C grows, at first the low-talented senior professor prefers to permanently keep the head of department position, then he prefers to stay temporarily on this position, and finally he refuses the offer to become the head of department. As the marginal benefit from hiring or the benefit from academic activities grows, the senior professor starts to prefer an administrative career.

Proposition 6. *If the university has a system of short-term academic and administrative contracts and the senior professor is low talented, then the optimal strategy profile depends on the administrative cost and the marginal benefit from working with a talented junior professor. The profile also depends on the benefit from academic activities and on the senior professor's talent.*

- *If the administrative cost is low,* $C < \min\{V, \quad 0.5V + 0.5\alpha\}$*, then a low-talented senior professor prefers a temporary administrative career and hires the less talented candidate* $\theta_j^s = \theta_s$*; in the last period the administrator fires the least talented professor if his talent is less than the expected talent of the candidate and hires the candidate; otherwise, he keeps both professors.*

- *If the administrative cost is high,* $C > \max\{V, \quad 0.5V + 0.5\alpha\}$*, then a low-talented senior professor prefers an academic career and the administrator is responsible for hiring. In the last stage, he fires the least talented professor if his talent is less than the expected talent of the candidate and hires the candidate; otherwise, he keeps both professors.*

- *If the administrative cost satisfies the following condition,* $V < C < 0.5V + 0.5\alpha$*, then a low-talented senior professor, with talent lower than* $(V - C)/(V - \alpha)$*, prefers an academic career and the administrator is responsible for hiring. A low-talented senior professor with talent higher than* $(V - C)/(V - \alpha)$ *prefers a temporary administrative career and hires the less talented candidate* $\theta_j^s = \theta_s$*.*

- *If the administrative cost satisfies the following condition,* $V > C > 0.5V + 0.5\alpha$*, then a low-talented senior professor with talent lower than* $(V - C)/(V - \alpha)$ *prefers a*

temporary administrative career and hires the less talented candidate $\theta_j^s = \theta_s$. A low-talented senior professor with talent higher than $(V - C)/(V - \alpha)$ prefers an academic career and the administrator is responsible for hiring.

The system of short-term academic and administrative contracts can essentially worsen the potential of the university.

A high-talented senior professor in the system of short-term academic and administrative contracts behaves in the same way as a tenured professor (Pro. 2).

Proposition 7. *If the university has a system of short-term academic contracts and strict long-term administrative contracts, and the senior professor is low-talented, then the optimal strategy profile depends on the administrative cost and the marginal benefit from working with a talented junior professor, the benefit from academic activities, and the senior professor's talent.*

- *If the administrative cost is low, $C < 0.25V + \alpha$, then the low-talented senior professor prefers a permanent administrative career and hires the most talented candidate.*

- *If the administrative cost is high, $C > 0.5V + \alpha$, then the low-talented senior professor prefers an academic career and the administrator is responsible for hiring. In the last stage, he fires the least talented professor if his talent is less than the expected talent of the candidate and hires the candidate; otherwise, he keeps both professors.*

- *If the administrative cost satisfies the following condition, $0.25V + \alpha < C < 0.5V + \alpha$, then a low-talented senior professor with the talent lower than $(V - 2C + 2\alpha)/V$ prefers a permanent administrative career. A low-talented senior professor with talent higher than $(V - 2C + 2\alpha)/V$ prefers an academic career and the administrator is responsible for hiring. In the last stage, the administrator fires the least talented professor if his talent is less than the expected talent of the candidate and hires the candidate; otherwise he keeps both professors.*

A high-talented senior professor in a system of short-term academic contracts and strict long-term administrative contracts behaves in the same way as a tenured professor. (Pro. 3)

Comparison of the contract systems

The tenure contract system is better than the system of short-term academic and administrative contracts. It gives a higher expected payoff for low-talented professors and higher expected level of talent of junior professors. A high-talented senior professor behaves in the same way in tenure and short-term contract systems. The problem arises when in a system of short-term contracts, a low-talented senior professor becomes a temporary administrator. He uses his position to secure a guarantee of employment and hires a weak professor. In comparison with a system of short-term academic contracts and long-term administrative contracts, a tenure contract system gives a higher expected payoff for low-talented senior professors. If the benefit from academic activities is high enough and the administrative cost is higher than the marginal benefit from hiring, the system of short-term academic contracts and strict long-term administrative contracts is better for the university. It provides higher expected level of talent of junior professors.

Conclusion

The university administration are forced to delegate hiring policy to professors, because they often do not have the knowledge to estimate the quality of candidates on the academic market. As a result, it becomes crucial to coordinate the incentives of those who hire so that they make decisions in the interests of the university. Our model allows us to understand how the system of academic and administrative contracts affects the quality of hiring policy. In a university with short-term academic contracts it is better to delegate the hiring policy for a long period. The rotation (short-term administrative contract) undermines the incentives of the faculty to hire talented candidates. A low-talented senior professor is afraid to be fired. If the senior professor hires the best candidate available, the administrator has an incentive to improve the average performance of the university by sacking the senior professor. Therefore, the senior professor might not choose what is best for the university, i.e. he might not hire the best candidate as he is afraid to lose benefit from academic activities. The higher this academic

payoff is, the more probable it is that the professor will behave in this way. This worsens the quality of the junior faculty. In such a situation it is crucial to coordinate the incentives of professors concerning their academic and administrative work so that they make beneficial decisions. If the hiring policy is delegated for a long time (strict long-term administrative contracts) then a senior professor with a short-term academic contract is interested in holding the head of department position, as he uses it for job security. When universities set tenure contracts, rotation has no negative consequences. Rotation is necessary when no one wants to take up the head of department position — the burden of administrative work is not compensated by benefits from participating in hiring better junior faculty. Tenure permits increasing the quality of staff without making the senior professor suffer at an administrative position. It is better for a university to set tenure contracts when the administrative cost is low. It is better for a university to set strict long-term administrative contracts when the administrative cost is higher than the marginal benefit from hiring, and the benefit from academic activities is high enough.

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