Strategic recruiting in ongoing hierarchies

Susanne Goldlücke*

May 20, 2017

Abstract

This paper describes a hierarchy with peer hiring to explore the reasons behind the management rule "A's hire A's and B's hire C's". Workers are promoted based on talent and therefore like to hire less talented co-workers. This is why B's hire C's. The same logic should cause A's to hire B's, but there is a trade-off in the model: A's are more likely to be promoted, and a manager profits from more talented subordinates. If this effect is strong enough, then indeed A's hire A's.

Keywords: peer hiring, hierarchies, promotions

JEL codes: M51, D23, J41

1 Introduction

The goal of this paper is to explore how the management rule "A's hire A's and B's hire C's" can make sense in a game-theoretic model. This rule serves as a catchy reminder for recruiters to maintain high standards in hiring. Whether it also contains some empirical truth is not known, nor does it come with a precise understanding of why it should hold. It is often attributed to Steve Jobs:

> "It's too easy, as a team grows, to put up with a few B players, and they then attract a few more B players, and soon you will even have some C players," he recalled. "The Macintosh experience taught me that A players like to work only with other A players, which means you can't indulge B players." (Isaacson, 2011, p. 181)

This paper spells out a simple game in which this kind of behavior emerges in equilibrium, thereby telling a story about the reasons behind the rule. The game models peer hiring in an ongoing hierarchy staffed with overlapping generations of workers, drawing on models by Waldman (1984) and Demougin and Siow (1994).

There are many possible reasons why this business saying may contain some truth. One is that talent might be positively correlated with skill in hiring talent,

*Department of Economics, University of Konstanz, 78457 Konstanz, Germany. Phone: +497531882989. Email: susanne.goldluecke@uni-konstanz.de.

because a talented worker finds it easier to detect talent in others. Another is that less talented workers may want to shine compared to their coworkers, while more talented workers care only about an inspiring work environment. This would mean that there is a correlation between talent and making social comparisons, because otherwise B players surrounded by B players would feel as (un)comfortable as A players surrounded by A players.

In contrast to these explanations, we assume that the types only differ in their productivity. It is then not obvious why the types would not make similar choices. Our explanation is that workers face a trade-off between hiring less productive types to increase their own probability of promotion and hiring equally productive types to increase future output and hence the prize of being promoted. A's resolve this trade-off differently from B's - not always, but for a large range of parameter values.

The underlying problem that workers may deliberately hire weak co-workers has been formalized before by Friebel and Raith (2004), who also coined the term "strategic recruiting". They show how the threat of being replaced by a more productive subordinate shapes the communication channels in a firm, since a manager will only hire talented new workers if the new workers have no direct connection to the boss. Strategic hiring can also be found in a model of the academic labor market by Carmichael (1988), who argues that to give senior faculty an incentive to reveal their information about the most promising ideas and skills of young faculty, senior faculty need to have tenure to not feel threatened by productive juniors.

2 The Model

We study a two-layer-hierarchy of individuals of different generations that can either represent one firm or part of a larger organization. The stylized firm consists of a manager and two workers. All individuals are active in the labor market for three periods. We assume that at the start of the firm, the manager is old and there is one middle-aged worker, who hires a young co-worker. Old individuals retire at the end of a period, and an old manager then appoints one of the workers as her successor, so that in the next period, the new manager will be either old or middle-aged. If she is old, the constellation will be as before. If she is middle-aged, there is an old worker who hires a young co-worker. In the following period, the boss will be old with one middle-aged worker who hires a new young worker, hence we are back in the initial constellation.

At the beginning of each period, a vacancy is filled by the incumbent worker, who can choose between three possible worker types denoted by A, B, and C, where the type represents the observable talent of a worker. We assume that workers receive a fixed wage $\bar{w}$ that is independent of the type and normalized to zero. All individuals are risk-neutral.

The workers produce output for the manager according to production function $f(\theta_0, \theta_1, \theta_2)$. More precisely, $f(\theta_0, \theta_1, \theta_2)$ with $\theta_i \in \{A, B, C\}$ is the payoff of the manager if she is of type θ_0, the incumbent worker is of type θ_1 and the new worker is of type θ_2. If the manager is residual claimant, f is equal to output, but it can also just be a fraction of output or an objective function induced by an incentive contract. The function f is strictly monotonic: $f(\theta) > f(\theta')$ if $\theta \geq \theta'$ and $\theta \neq \theta'$, where the types are ordered alphabetically. We also assume that $f(\theta_0, \theta_1, \theta_2) = f(\theta_0, \theta_2, \theta_1)$. This game goes on forever. Next period's payoffs are discounted by δ, which is set to 1.

3 Results

We first answer the question under which conditions there exists an equilibrium in which workers behave as described by the management rule.

Proposition 1. *If*

$$f(A, A, A) \geq 2f(A, B, C) \text{ and } 2f(B, C, C) \geq f(B, B, C),$$

the following is a subgame-perfect equilibrium: Every worker of type A hires a co-worker of type A, and every worker of type B or C hires a co-worker of type C. The manager promotes the worker of higher ability, and in case of a tie promotes each of them with probability $\frac{1}{2}$.

Proof. Since the retiring manager is indifferent, every promotion decision is sequentially rational. There are two possible constellations in which hiring decisions have to be made. If the boss is middle-aged and the worker is old, the worker does not care about the hiring decision and may as well follow the rule. In the other constellation, in which the boss is old and the worker is middle-aged and hires a young co-worker, the incumbent worker has to be promoted when the manager retires in order to receive a positive payoff. Therefore, no-one hires a better type. This already implies that a type C always hires a C.

If a type B hires a type C, he will for sure become the manager next period, and, since this C will hire a C, receive a profit of $f(B, C, C)$. If a type B hired a type B instead, he would become the manager only with probability $\frac{1}{2}$. He expects his co-worker to hire a C, such that output would be $f(B, B, C)$ in this case. Since the condition $f(B, C, C) \geq \frac{1}{2}f(B, B, C)$ is satisfied, a type B hires a C. Similarly, an A's payoff from hiring a B would be $f(A, B, C)$ and an A's payoff from hiring a C would be $f(A, C, C)$. Given the assumption, both are smaller than $\frac{1}{2}f(A, A, A)$, which is the payoff from hiring an A. $\square$

For example, with a linear production function $f(\theta_0, \theta_1, \theta_2) = \theta_0 + \theta_1 + \theta_2$, an equilibrium with A's hiring A's and B's hiring C's exists if $A \geq 2(B + C)$, i.e., if A's are sufficiently productive compared to B's and C's.

The equilibrium is not necessarily unique. Holding the promotion decisions fixed, the following corollary gives conditions for uniqueness.

Corollary 1. *Consider only subgame-perfect equilibria in which individuals of the same type make the same hiring decisions, independent of their age and calendar time. Moreover, assume that the manager always promotes the more* *talented type and promotes both with equal probability in case of a tie. Then "A's hire A's and B's hire C's" is the unique equilibrium if* $2f(B, C, C) > f(B, B, B)$ *and* $f(A, A, B) > 2f(A, B, C)$.

Proof. The only choice in this model is whom to hire. Since C's always hire C's, B's know they get $f(B, C, C)$ if they hire a C. If B's hire B's, they get no more than $\frac{1}{2}f(B, B, B)$. Hence the first condition ensures that B's hire C's. A's get $f(A, C, C)$ if they hire a C, so they are always better off if they hire a B which yields $f(A, B, C)$. A's hiring B's can only be an equilibrium if $\frac{1}{2}f(A, A, B) \leq f(A, B, C)$, which is excluded by the assumption. □

Applying these results to the example of a multiplicative production function $f(\theta_0, \theta_1, \theta_2) = \theta_0\theta_1\theta_2$, one sees that "A's hire A's and B's hire C's" is the unique equilibrium if $A > 2C$ and $2C^2 > B^2$. For example, if $C = 3$ and $B = 4$ and $A = 7$, the equilibrium is unique, but if $C = 3$ and $B = 4$ and $A = 5$, then there are two equilibria: One in which A's hire B's and B's hire C's and the productivity of the firm goes down, and one in which A's hire As because they want to avoid precisely this negative dynamic. The intuition is similar to a stag hunt game: Creating the expectation that A's hire A's is important to coordinate on the superior equilibrium in which A's hire A's. This explains the management wisdom "A's hire A's and B's hire C's" as a reminder of the preferred equilibrium.

4 Discussion

We have shown that it can happen in equilibrium that A's hire A's and B's hire C's although the types differ only in their productivity, thereby explaining how the saying can arise from the need to select the more productive equilibrium. As we will argue now, this is more likely to occur in startup companies than in big hierarchical firms. To see that hierarchical firms may have room for B players, consider the production function of a knowledge hierarchy (Garicano, 2000).

In our simplified version of this model, workers independently draw a project from a pool of projects with difficulties that are uniformly distributed on $[0, 1]$. Completed projects have a value of v but workers can only complete projects if the difficulty is smaller than their type. The manager can either do a project on her own or help both her subordinates in completing their projects. There is hence a clear advantage of a heterogenous team. Working on a project costs $k \geq 0$ with $k < Cv$.[1] If the manager has the same or smaller skill than the subordinates, she cannot help them anyway and takes on her own project. For this model, it holds that $2f(B, C, C) > f(B, B, C)$. However, $f(A, A, A) = 3Av - k$ and $f(A, B, C) = \max\{2Av - (2 - B - C)k, (A + B + C)v - k\}$ such that $f(A, A, A) < 2f(A, B, C)$. Hence A's will hire B's.

The knowledge hierarchy adequately describes how consulting (e.g., legal or medical services) or public administration is organized. It is not a model

[1] We also assume here that the wage is positive with $k \leq \bar{w}$.

of an innovative firm or startup that Steve Jobs referred to when describing the "MacIntosh experience" in the quote from the introduction. Success in these firms requires teamwork, in which every member of the team needs to be successful, such that the multiplicative model, $f(\theta_0, \theta_1, \theta_2) = \theta_0\theta_1\theta_2$, seems more appropriate. Hence, one would expect to hear the business saying foremost in innovative firms.

The second point that is addressed in this discussion is the realism of the model. The model is very stylized and for example takes the organizational form as given. It can be expected that firms organize the screening and decision-making processes at the hiring stage in such a way that the identified incentive effects cannot occur. Nevertheless, in a large survey conducted by McKinsey in 2000, most executives agreed that "line managers should be held accountable for the strength of the talent pool they build", but only a small fraction of them agrees that their firm actually does this (Axelrod et al. 2001).

Obvious ways to overcome the strategic hiring problem are basing promotions on seniority or letting empty positions be filled by the manager instead of the worker on the same layer of the hierarchy. A more realistic model would describe a multi-layered hierarchy, in which hiring decisions are made by a superior. Strategic hiring effects will still be present if promotion dynamics allow that hired workers will soon be promoted to the same layer.

A more realistic model should also allow the manager to design incentive contracts for the workers, take competition for skilled workers into account and describe promotions as tournaments.[2] In such a model, institutional responses can more meaningfully be studied. Future research can for example address the role of human resource departments, promotion pools[3] and other strategies to improve hiring and career management.

References

Axelrod, E. L., Handfield-Jones, H., Welsh, T. A., 2001. War for talent, part two. McKinsey Quart., 9-9.

Carmichael, H.L., 1988. Incentives in Academics: Why is There Tenure? J. Polit. Economy 96, 453–472.

Demougin, D., Siow, A., 1994. Careers in Ongoing Hierarchies. Amer. Econ. Rev. 84, 1261–1277.

[2]Recent models that go into this direction, but do not study incentives to recruit, are Ke et al. (2018), who analyze how firms should manage careers in order to motivate workers and at the same time organize production efficiently, and Hvide and Zhang (2016), who consider promotion tournaments with a generational structure.

[3]If a promotion pool is formed by requesting department heads, who like to retain their best workers, to name promising candidates to receive special training, there will be a similar problem of "strategic promotion" of weak subordinates. An explanation for this practice may be that it counteracts the strategic hiring problem, since once one B player is singled out for promotion, the department head can safely hire A players.

Friebel, G., Raith, M., 2004. Abuse of Authority and Hierarchical Communication. Rand J. Econ. 35, 224–244.

Garicano, L. 2000. Hierarchies and the organization of knowledge in production J. Polit. Economy 108, pp. 874–904.

Hvide, H.K., Zhang, Y., 2016. Too Big to Succeed? Overstaffing in Firms. https://ssrn.com/abstract=2806289.

Isaacson, W., 2011. Steve Jobs. Simon and Schuster.

Ke, R., Li, J. and Powell, M., 2018. Managing Careers in Organizations, J. Lab. Econ. 36-1, forthcoming.

Waldman, M., 1984. Worker Allocation, Hierarchies and the Wage Distribution. Rev. Econ. Stud. 51, 95–109.