

Status and Coordination in Organizations*

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Abstract

Firms can motivate workers by offering them social status. Much of the literature argues that a rise in status is a powerful work incentive while ignoring its impact on coordination. However, when workers need to collaborate while having individual vested interests, too large a difference in status distorts how workers coordinate, i.e., one worker compromises too much with respect to his most preferred choice and the other compromises too little. On the contrary, small status differentials can be profitable when status confers power and cost advantages.

Keywords: status, coordination, authority

JEL Classification: D2, L2, J3

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1 Introduction

Collaboration and teamwork play an important role in supporting business processes within an organization.¹ However, when vested interests are at work, firms often have difficulty in coordinating their workers. Let us consider that the marketing department anticipates new marketing channels through mobile computing and social networks and that the IT department develops new technology to implement these ideas. The decisions favored by the former may not be preferred by the latter: e.g., the IT department favors sophisticated design while the marketing department prefers simplicity and user-friendliness. So, if the two departments do not coordinate and as a result release a product that consumers do not like, it will hurt the firm's profits. To improve coordination, the firm may hire a leader (e.g., through promoting one department head, the CIO or the CMO, to CEO to oversee the firm's departments), but this raises some concern over status, which, in turn, affects the workers' behavior.² In particular, many sociological studies have documented that status leads to power and cost advantages, which may be tied to a better access to resources (among others, large and well-equipped offices, private jets and chauffeur-driven cars, country club memberships). Interestingly, I show that status differences do not necessarily increase profits when they confer power or when they provide cost advantages. Yet, they can increase profits in the presence of both.

Moreover, status differences affect not only coordination but also the optimal organizational structure. Some interesting questions are, e.g.: how does status affect the way high-status workers coordinate with lower-status workers? And, under what conditions

¹A survey of Accenture (2014) shows growing collaboration between IT and marketing departments in recent years.

²Recent experimental studies find that higher-status individuals have a significant impact on lower-status individuals, so that status can help solve coordination problems (Eckel and Wilson, 2007; Eckel et al., 2010; Simpson et al., 2012).

it is profitable for the firm to introduce status differentiation? Furthermore, how does status affect the design of jobs on the career ladder and, in particular, should promotions involve empowering the leader to take a very different or rather a similar role?

To answer these questions, I consider a firm with two workers. Each worker can choose an action while preferring a different action. Each obtains half of the firm's output, which is maximized when both workers choose the same action.³ In other words, the total output depends on how well the workers cooperate, which in turn depends on how willing they are to compromise their preferred actions. The firm can choose whether to promote one of the workers as the leader. In the absence of promotion, both workers have an identical status, whereas in the case of promotion, the leader receives a higher status than the other. The sociological and managerial literature shows that a higher status often comes with a set of benefits: a high status worker might have a cost advantage (Podolny, 1993)—for example, due to better access to resources (Belliveau et al., 1996; Ibara and Andrews, 1993)—and/or more power (Castellucci and Piazza, 2013). In the same vein, Lucas and Baxter (2012) documented a number of reasons for why status leads to power, e.g., high-status individuals are perceived to be more competent and they hold more valuable resources than low-status individuals. Therefore, I consider two consequences of status: First, introducing a status difference decreases the perceived cost of “compromising”, i.e., deviating from one's most preferred action, of one worker but increases the perceived cost of the other worker, and such a perceived cost is measured by the actual cost of compromising adjusted for status concerns. For example, increasing status may reduce the leader's perceived cost of compromising when the leader has better access to resources, which makes his action choice more flexible than the follower's. However, increasing status may increase the leader's perceived cost

³As shown Section 3.1, my results are driven by coordination issues rather than by the assumption of interdependent payoffs.

of compromising when the leader faces high opportunity costs in cooperating with his teammate, such as the need to forgo time and resources spent on other activities, which makes his action choice less flexible than the follower's. Interestingly, my results are valid whether the high-status or the low-status worker is more willing to compromise than his teammate. The second effect of introducing a status difference is that it empowers the leader to instruct the follower what action to take, which the follower chooses to obey or not. If the follower disobeys, he incurs a cost, which is increasing in the leader's status. These two elements are discussed separately in Sections 2.2 and 2.3. The objective of the firm is to choose the organizational mode maximizing its profit, which is measured by the difference between output and actual costs of the workers.

I show that introducing a status difference increases output but causes distortion to the way workers coordinate: on the one hand, a status difference has a positive effect on the organizational value as it lowers the average cost of compromising; on the other hand, it has a negative effect as it may induce too much compromising effort from the worker with the lower perceived cost, and too little from the worker with the higher perceived cost. The negative effect is especially strong when there is a large status difference. Because the organizational value depends on actual costs rather than perceived costs,⁴ unbalanced coordination efforts are not desirable from the firm's point of view. As a result, the firm benefits from introducing some but not too much status differentiation. In the case where the leader does not have authority over the follower, it is to the firm's benefit only when a status difference is more effective in reducing a worker's perceived cost than in raising another worker's cost (see Propositions 2). In the case where the leader also has authority and he has a lower cost of compromising than the follower, status

⁴In Section 2, I provide some examples that explain why status differences affect workers' perceived costs, whereas the organizational value depends on workers' actual costs. Footnote 15 also explains what would happen if this assumption is dropped.

differentiation is more likely to increase the firm's profit compared to the case without authority, because the leader has an additional instrument, which is the power to make recommendations, to improve coordination (see Proposition 3). This implies that it can be profitable for the firm to introduce status differences when status confers both power and cost advantages. However, notice that the benefits of introducing a status difference do not hinge on the fact that status creates more money for the firm by altering workers' perceived costs, as shown in Section 3.2. In other words, high status does not serve as a substitute for high wages, which makes this paper very different from the literature that focuses on monetary incentives.

These results have interesting implications for the design of employees' tasks in promotions: if promotion involves changes in responsibilities, for example, from routine tasks performed by junior workers to supervisory or more creative tasks performed by managers, the firm may benefit from introducing more differential treatment between senior and junior employees compared to the case where responsibilities remain the same on the promotion ladder. This explains why, in practice, some workers receive longer vacation, a larger and better equipped office, and other luxurious perks owing to seniority in a company; and sometimes the more so when the roles of the leaders change upon promotion.

1.1 Related Literature

The importance of status for explaining behavior has long been recognized (Veblen, 1934; Frank, 1985). However, the literature focuses largely on monetary incentives. For instance, Frank (1984) empirically shows that workers care about their relative ranking in a company. In particular, workers at the top are willing to accept a remuneration that is below than their productivity for being at the top (see also Lazear and Rosen, 1981;

Lazear, 1989; Lazear, 1991). In contrast to the literature, this paper focuses on non-monetary sources of status.⁵ Postlewaite (1998) compares different approaches to model status: people either value status itself or seek status for another purpose. I follow the latter approach, in which status changes worker's perceived costs and confers authority.⁶ In the case of lower perceived costs, status differential may come from a worker's access to nonmonetary privileges; for example, having larger networks of contacts makes action choices more flexible, which lowers the worker's cost of compromising. In the case of higher authority, the leader's power to make recommendations creates status differential.

Moreover, this paper contributes to the literature by considering the effect of status on coordination. Essentially, the literature focuses either on the work motivation effect of status or on the signaling effect of status. On work motivation, theories in the tournament literature show that when agents care about their relative ranking in organizations, status can be used to provide work incentives (Moldovanu et al., 2007; Auriol and Renault, 2008; Dubey and Geanakoplos, 2010). Hopkins and Kornienko (2010) further distinguish the effect of inequality of rewards and endowments on incentives, and show that different types of inequality have opposite effects. However, the tournament literature treats agents separately while this paper provides a model that explains the effect of status on coordination by allowing agents to work in teams. On signaling, the literature shows that status can generally improve the matching of workers and firms (Fershtman, Hvide, and Weiss, 2006; Truyts, 2010). Since matching is positively assortative, i.e., the best job is allocated to the most successful candidate, workers will care about their relative position in the population. But again, the element of coordination is missing.

⁵This seems more realistic because plenty of evidence shows that relative concerns, not only in terms of income, but also in terms of property and cars matter for human behavior—as noted by Hirsch (1976).

⁶This paper differs from the literature on equality concerns in teams (see, e.g., Gill and Stone, 2015) in that workers in this model do not have a preference for equality.

Finally, this paper is related to the literature on internal organization of firms, which studies coordination vs. specialization. See, for example, Hart and Moore (2005), Dessein and Santos (2006), and Alonso et al. (2008), although they do not consider status. For surveys on promotions, see Gibbons and Waldman (1999), Waldman (2013), and Lazear and Oyer (2013). Also see Fama (1980), Gibbons and Murphy (1992), and Holmström (1999), who provide models that explain how the prospect of promotion creates incentives yet do not focus on coordination. In summary, standard models on status and promotions capture work incentives but lack coordination between workers; standard models on internal organization allow coordination but lack status. This paper explores the interaction between these interesting features, which so far the literature has largely ignored.

2 Model

Consider an organization with two workers, 1 and 2, who take actions $a \in [0, 1]$ and $b \in [0, 1]$ respectively. The success of the organization depends on the coordination between the two workers: the firm obtains a value of one with probability $1 - (a - b)^2$, which is maximized when $a = b$.⁷ The revenue is shared equally between the two workers.⁸

Let s denote the worker's status. Status is valued in relative terms: if worker 1 has status s , then worker 2 has status $-s$. Assume without loss of generality that $s \geq 0$. Status affects the cost of action for the workers in two ways. First, there is a cost

⁷Note that as in the literature on coordination and adaption, such as Dessein and Santos (2006) and Alonso et al. (2008), it is standard to model coordination in this way. Note also that although the value of the action does not affect the gross revenue, it affects the net profit, as discussed in the socially optimal case below.

⁸For example, revenue-sharing schemes are commonly used in partnerships, joint ventures, and co-operatives. Moreover, a change in bargaining power further from one-half does not affect the results qualitatively, as does the introduction of wages (see Section 3.3). Thus, for expositional simplicity, I focus on equal shares.

of “compromising”, i.e., deviating from one’s most preferred action. More specifically, worker 1 bears a cost of $f(s)(1-a)^2$ for taking action a , whereas worker 2 bears $f(-s)b^2$ for taking action b , which can be interpreted as follows.⁹ The cost-minimizing action is $a = 1$ for worker 1, and $b = 0$ for worker 2, meaning each worker has a vested interest. Thus, $1 - a$ and b can be seen as a compromise that each worker makes in order to coordinate with one another. Assume also $f(0) = 1$, so that when there is no status differential, both workers’ marginal cost of compromising is the same. Notice that the analysis does not rely on the assumption of $f(\cdot)$ being decreasing or increasing, which means that the high-status worker may have lower or higher cost of compromising than the low-status worker. For instance, the former could be more reasonable in a situation where introducing a status difference gives the leader better access to resources, which allows him to adopt more flexible action choices, and thus the cost of compromising for the high-status worker is lower than that for the low-status worker. However, the latter could be more reasonable in a situation where the opportunity cost of time and other resources that the high-status worker need to spend on cooperating with his teammate is high. Thus, the cost of compromising for the high-status worker is higher than that for the low-status worker. In any case, what matters for the results is not the sign of $f'(\cdot)$, but the ranking of the marginal effect of status on the high-status worker versus that on the low-status worker.

Second, status may empower the leader (worker 1) to get his way by making a recommendation to the follower (worker 2), and the follower incurs a disobedience cost if he does not follow the recommendation. More specifically, suppose worker 1 makes a recommendation b_l to worker 2.¹⁰ Since worker 2 has effective control over action b , he

⁹The assumption that status is complementary with costs is discussed in more detail in Section 3.2, but it is essentially a common assumption in the literature (see, for instance, Hopkins and Kornienko, 2004; Auriol and Renault, 2008).

¹⁰My results do not rely on which worker is making the recommendation, as there are no restrictions

can choose whether and to what extent to follow the recommendation. However, if he decides to disobey worker 1, he incurs an additional cost of $g(s)(b - b_l)^2$.¹¹ For simplicity, assume that $g(s) = s$, so the lower the worker's status, the higher the cost of disobeying.¹² Notice also that $g(0) = 0$, so that the cost of disobeying is zero when there is no status differential, that is, $s = 0$.

Thus, the costs of workers 1 and 2, denoted $c_1(s, a)$ and $c_2(s, b)$ respectively, are given by

$$c_1(s, a) = f(s)(1 - a)^2,$$

and

$$c_2(s, b) = f(-s)b^2 + s(b - b_l)^2.$$

I do not consider monetary transfers, but focus instead on nonmonetary sources of status, which is an interesting issue because nonmonetary incentives are widely used in practice.¹³ The value of the organization is defined by the total value created minus the total costs:

$$V = 1 - (a - b)^2 - (1 - a)^2 - b^2. \tag{1}$$

Notice that V depends on the actual cost of taking actions and not on the perceived cost imposed on the sign of f' .

¹¹We can reinterpret $g(s)(b - b_l)^2$ in a moral hazard framework, where b is an unobservable action, b_l is an order from a superior worker, and $g(s)$ is a probability of monitoring. However, this paper focuses on how status affects coordination, which is an issue that is not discussed in the moral hazard literature.

¹²For example, guilt is one form of emotional distress that can be associated with the failure to act in a way desired by others, and frequently arises in interpersonal relationships, as found by Baumeister et al. (1994).

¹³For example, "cafeteria plans", under which workers may receive different benefit packages in terms of day offs, access to company cars, office space and IT equipment, priority in choosing different things, etc., exist in Belgium. The implementation of these is currently under discussion. See "Cafeteria plans—other personnel solutions," *KPMG*, September 19 2012, available at <http://www.kpmg.com/be/en/issuesandinsights/articlespublications/pages/cafeteria-plans.aspx>.

of workers that is modified by $f(s)$.¹⁴ This is because the firm, contrary to the worker, only perceives profit in monetary terms and does not consider the psychological or other material benefits conferring status. For example, priority access to resources can decrease the waiting cost of the leader and increase the waiting cost of the follower, but these time costs do not matter for the firm as the total amount of resources demanded by the leader and the follower is the same with and without status.¹⁵

To begin, consider the situation where one agent chooses both actions a and b , which corresponds to the social optimum. Since there is only one agent, there is no concern for status and $f(0) = 1$. The agent solves

$$\max_{a,b} (1 - (a - b)^2) - (1 - a)^2 - b^2,$$

which yields the following optimal actions:

$$a_{FB}^* = \frac{2}{3}; \quad b_{FB}^* = \frac{1}{3}.$$

Then the level of compromise is given by $1 - a_{FB}^* = b_{FB}^* = 1/3$.

2.1 Identical Status

When two workers work together as a “team”, they have identical status (i.e., there is no cost advantage and no authority). Then we have $f(0) = 1$. Worker 1 chooses his action so as to maximize his expected payoff:

$$\max_a \frac{1}{2} (1 - (a - b)^2) - (1 - a)^2.$$

¹⁴In sociology, status is defined as a subjective judgment of ranking pertaining to individuals or groups. See Goldhamer and Shils (1939) and Podolny (1993).

¹⁵Nonetheless, it is straightforward to incorporate workers’ perceived costs in V . As s becomes very large $f(\cdot)$ tends to zero, the firm can always achieve perfect coordination at a very small cost, making status differentiation always desirable from the firm’s point of view. However, this seems somewhat implausible as extreme status differentiation is rarely adopted in reality.

Similarly, worker 2 solves

$$\max_b \frac{1}{2}(1 - (a - b)^2) - b^2.$$

The Nash equilibrium is given by

$$a_{team}^* = \frac{3}{4}; \quad b_{team}^* = \frac{1}{4},$$

which yields a payoff of 5/16 for each worker, and 5/8 for the team. The level of compromise is given by $1 - a_{team}^* = b_{team}^* = 1/4$.¹⁶ The NE exhibits less coordination than the social optimum because each worker obtains only half of the benefits from coordination.

2.2 Differentiated Status without Authority

Suppose now that worker 1 is promoted to be the leader and enjoys a higher status s . Such a promotion changes his cost of compromising to $f(s)(1 - a)^2$, and whether this change in cost is a decrease or an increase depends on the sign of f' . Similarly for the follower: worker 2's cost of compromising changes to $f(-s)b^2$. Consider first the case in which the leader does not have authority, i.e., he cannot make any recommendation to the follower and b_l plays no role. The case with authority is discussed in Section 2.3.

Worker 1 therefore solves

$$\max_a \frac{1}{2}(1 - (a - b)^2) - f(s)(1 - a)^2,$$

whereas worker 2 solves

$$\max_b \frac{1}{2}(1 - (a - b)^2) - f(-s)b^2.$$

¹⁶Note that although compromises are substitutes (that is, $\partial(1 - a)/\partial b = \partial b/\partial(1 - a) < 0$), they are less substitutable in the NE than at the social optimum, which means that these partial derivatives are less negative in the NE. Note also that a and b being substitutable might be thought of as a free-riding problem: workers can free ride on each other's contributions, and thus $|a_{team}^* - a_{FB}^*| = |b_{team}^* - b_{FB}^*| = 1/12$. The emphasis of a free-riding problem, however, is on actions a and b alone, but not on the difference between them (i.e., the level of coordination), which is the focus here. Therefore, it cannot study the effect of status on coordination, not to mention the effect of recommendations in Section 2.3.

The equilibrium actions are given by

$$a^* = \frac{2f(s)}{1 + 2f(s)} + \frac{f(s)}{[f(s) + f(-s) + 2f(s)f(-s)](1 + 2f(s))},$$

$$b^* = \frac{f(s)}{f(s) + f(-s) + 2f(s)f(-s)}.$$

Clearly, the effect of status on the value of the organization depends on the shape of $f(s)$. However, when status affects the cost of compromising in a symmetric way, we can show that

Proposition 1. *Without authority, when status has a symmetric effect on high- and low-status workers (that is, $f(0) - f(s) = f(-s) - f(0)$), for any s , it always reduces the value of the organization, V .*

Proof. See Appendix A. □

Proposition 1 shows that if the benefit of increasing a worker's status equals the cost of decreasing another worker's status, then it is desirable for the firm to give equal treatment to its workers. This is because lower status increases the follower's cost (in the case of $f' < 0$), which discourages him from cooperating with the leader—in other words, he is less willing to compromise. However, due to the symmetric effects of status, the positive effect that status has on the leader is not enough to offset the negative effect that it has on the follower. However, notice that this result does not depend on whether it is more costly for the high-status worker to compromise (that is, $f' < 0$) or the low-status worker to compromise (that is, $f' > 0$). As long as the effect of status on these costs of compromising is symmetric, any status difference leads to a lower organizational value.

Although status difference lowers the value of the organization, this does not mean that status difference hurts coordination. In fact,

Corollary 1. *For any s , status difference improves coordination, that is, $\partial(a^* - b^*)/\partial s < 0$.*

Proof. See Appendix B. □

Thus, even with symmetric effects, status difference improves coordination. This is because the worker with the lower cost of compromising is more willing to coordinate. However, this is also precisely why status difference may hurt the organization, because most coordination efforts are now provided by the high-status worker, and such a situation is not desirable for the firm. Recall that $a_{FB}^* = 2/3$ and $b_{FB}^* = 1/3$ at the social optimum. Thus, the firm prefers more balanced coordination efforts.

Apart from the symmetric case, we can also show that in the neighborhood of $s = 0$,

Proposition 2. *Without authority, introducing a small status differential increases the value of the organization, V , compared to the case of identical status if*

$$f'(0^+) < f'(0^-). \tag{2}$$

Proof. See Appendix C. □

The condition in Proposition 2 provides a simple rule to evaluate whether a firm should differentiate status among workers, i.e., when status differential decreases the leader's cost more than it increases the follower's (in the case of $f' < 0$). For example, if an executive, who receives benefits afforded by status (e.g. business class travel, a larger and better equipped office, and access to certain memberships or events), generates more benefit through successful business deals, which outweighs the losses generated from a junior employee who does not receive these benefits, then it is profitable for the firm to raise the status of senior management. Notice that this result, similar to Proposition 1, does not depend on the sign of f' . As long as status is more effective in reducing a worker's cost of compromising than in raising another worker's cost (i.e., when Equation (2) is satisfied), status difference increases the organizational value.

These results are complementary to standard status models in the literature; there usually assume that $f(s)$ is continuously differentiable at zero, meaning that $f'(0^+) = f'(0^-)$ (see, for instance, Hopkins and Kornienko 2004; 2010).¹⁷ Indeed, when the effect of status is symmetric, I show that firms have no incentive to introduce status differential. This result changes when the effect of status becomes asymmetric between workers; hence, this model offers an alternative reason for introducing status differentials that has not been examined in the literature.

2.3 Authority

Next, we consider status differences that lead not only to a change in costs but also more authority. While the allocation of authority has been studied in the literature on organizations (see, for instance, Aghion and Tirole, 1997; Van den Steen, 2010), coordination between agents has not. Unlike these standard models, this paper emphasizes how status and authority affect coordination.

Suppose that worker 1 is the leader. He decides on action a , and now he also makes a recommendation b_l to worker 2. Introducing status has two effects: First, as before, the leader's cost of compromising is changed to $f(s)(1-a)^2$, while the follower's cost is changed to $f(-s)b^2$. Second, the follower chooses action b taking into account whether and to what extent to obey the leader's recommendation. In case of $b \neq b_l$, there is a cost of disobedience given by $s(b-b_l)^2$. This implies that authority creates status differential: the more powerful the leader, the higher the cost of disobedience. For the moment, I do not restrict the value of b_l . In Corollary 2, I show that the qualitative result holds even when $b_l \in [0, 1]$, i.e., when the leader has to make a middle-ground recommendation

¹⁷In terms of monetary incentives, Dye (1984) and Lazear (1989) show that wage differentials not only provide incentives for productive behavior but also create incentives for sabotage. Yet, they do not consider the interaction between status and coordination, which is the focus of this paper.

between his own preferred choice and the follower's.

The payoff of the leader is

$$\pi_l = \frac{1}{2}(1 - (a - b)^2) - f(s)(1 - a)^2,$$

and that of the follower is

$$\pi_f = \frac{1}{2}(1 - (a - b)^2) - f(-s)b^2 - s(b - b_l)^2.$$

Thus, given the recommendation made by the leader, b_l , there is an equilibrium in the second stage where the two workers choose their actions such that

$$a^*(b_l) \in \arg \max_a \pi_l,$$

$$b^*(b_l) \in \arg \max_b \pi_f.$$

Let \underline{U} denote the value of the outside option for worker 2.¹⁸ The leader's maximization problem can then be written as

$$\max_{b_l} \pi_l(a^*(b_l), b^*(b_l)) \tag{3}$$

$$\pi_f(a^*(b_l), b^*(b_l)) \geq \underline{U}. \tag{4}$$

Parallel to Proposition 2, by focusing on a small status difference, we have the following result:

Proposition 3. *With authority, introducing a small status differential increases the value of the organization, V , compared to the case of identical status if*

$$(f'(0^+) - f'(0^-))^2 < f'(0^-) - 2f'(0^+). \tag{5}$$

¹⁸Note that the qualitative result does not depend on the value of the outside option (see Appendix F). However, it is important to take into account the follower's participation constraint in the case with authority; otherwise, the leader can always ask the follower to make all the compromises by recommending $a = b = 1$, which leaves the follower a negative payoff. In the case without authority, however, there is a unique equilibrium. So, as long as the outside option is relatively small compared to the case with identical status (that is, $5/16$), both workers will participate.

Proof. See Appendix D. □

Proposition 3 shows that the firm benefits from status differentiation with authority when Equation (5) is satisfied. The crucial difference between Equation (2) and Equation (5) is as follows. Suppose that the high-status worker is more willing to compromise (that is, $f' < 0$). Then, authority makes it more likely that a status difference raises the organizational value. For example, it is clear that when status differential has a symmetric effect on high- and low-status workers, that is, $f'(0^+) = f'(0^-)$, Equation (5) is always satisfied, but never for Equation (2). The reason is that with authority, the leader can compromise less by making a recommendation, which induces the follower to compromise more. Thus, the negative effect of status, which arises because the high-status worker compromises too much and the low-status worker compromises too little, is mitigated, and this increases the organizational value.

However, if the low-status worker is more willing to compromise (that is, $f' > 0$), Equation (5) becomes more stringent than Equation (2), which implies that authority makes it more likely that a status difference reduces the organizational value. The intuition is that the follower tends to compromise more than the leader in this case because the low-status worker has a lower cost of compromising. With authority, the leader can induce the follower to compromise even more than when there is no authority, which further distorts how workers coordinate and reduces the organizational value. This, in turn, implies that it is more profitable for the firm to introduce status differences when authority is delegated to the worker who has a lower cost of compromising.

Furthermore, these results have interesting implications for the design of employees' tasks on the promotion ladder. The case of status differentiation without authority can be interpreted as the firm introduces status differentiation by promoting a worker to

be the leader without changing his job duty, which means that he is responsible for the same task (that is, task a) before and after promotion. For example, in academia, the main responsibility of professors is to teach and to do research, whether they are promoted or not; the same holds for healthcare and other specialized professions.¹⁹ The case of status differentiation with authority can be interpreted as changing the leader's responsibilities upon promotion, for example, while he performs task a before promotion, he is responsible for both tasks a and b after promotion. This is applicable to many private and public sectors where managers perform a very different role from junior workers. The result then implies that if promotion involves job changes and authority is delegated to the worker who has a lower cost of compromising, it does not hurt to increase status differentiation among workers compared to the case when promotions do not involve a change in responsibilities.

Suppose now that the leader is constrained in making his recommendation such that $b_l \in [0, 1]$. This constraint matters only when the leader recommends $b_l > 1$ in the unconstrained case as discussed in Proposition 3. We can show that

Corollary 2. *If $\underline{U} = 5/16$ and $-1/8 \leq f'(0^-) - 3f'(0^+) \leq 21$, then $b_l \leq 1$ is not binding, and introducing a small status differential increases the value of the organization, V , compared to the case of identical status when Equation 5 holds. However, if $\underline{U} < 5/16$, or when $\underline{U} = 5/16$ and $f'(0^-) - 3f'(0^+) > 21$, then the constraint is binding, implying that $b_l = 1$, and introducing a small status differential increases the value of the organization if*

$$f'(0^+) < f'(0^-) + 3. \tag{6}$$

¹⁹Although Auriol and Renault (2008) also discuss incentives and promotions, promotions in their model do not involve job changes.

Proof. See Appendix E. □

This implies that when the leader is constrained in making his recommendations, it is more likely that authority increases the value of the organization, i.e., Equation (6) is less stringent than Equation (2). The reason is that when the leader is constrained, he can induce less compromising effort from the follower compared to when he is not constrained, and this is desirable from the firm's point of view, as the firm prefers more balanced coordination efforts. Notice also that when the follower's outside option is low enough (that is, $\underline{U} < 5/16$, where $5/16$ is the follower's payoff when $s = 0$), the constraint is always binding and $b_l = 1$. This means that when the follower's outside option is relatively low, the leader has incentives to recommend actions that are very different from the follower's preferred action, so as to induce more compromising effort from the follower.

Proposition 3 is derived for small status differentials (that is, $s \rightarrow 0$), and it is robust to variation in the functional form of $f(s)$. However, for large status differentials, the impact on a firm's profits depends on the functional form of $f(s)$ and, in particular, the limits of $f(s)$ as $s \rightarrow \infty$ matter. To illustrate, consider the following example:

$$f(s) = \begin{cases} \frac{1}{1+s} & \text{if } s \geq 0 \\ 2 - \frac{1}{1-s} & \text{if } s < 0. \end{cases}$$

We can then show that

Proposition 4. *With authority, large status differentiation reduces the value of the organization, V .*

Proof. See Appendix F. □

When large status differentiation is introduced, the low-status worker becomes very unhappy (since $f' < 0$ in this example) and a large distortion in the leader's action

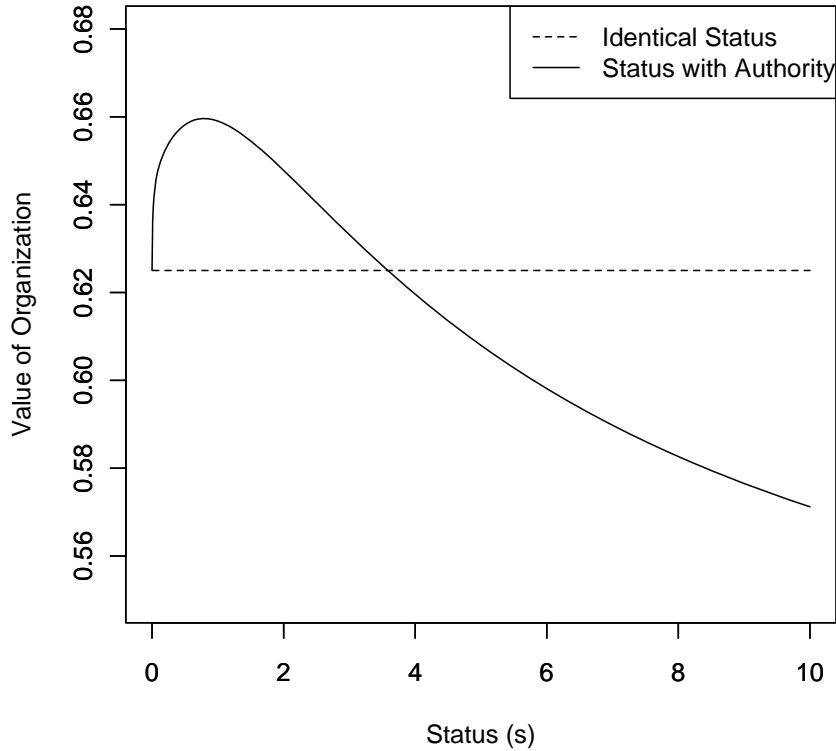


Figure 1: Identical vs. Differentiated Status.

with respect to the socially optimal level is needed in order to induce the follower to participate. In particular, the larger the status differential, the lower the leader’s cost, and the more willing he is to distort his action in order to compensate the disutility of the follower arising from lower status. As a consequence, it is not optimal to differentiate status among workers when such a loss from distortion more than offsets the gain in improved coordination.²⁰ In other examples where $f' > 0$, the intuition is similar, with the only difference that the high-status worker becomes unhappy in this case, and thus a status difference is desirable when the benefit of improved coordination outweighs the cost of distorting the action of the low-status worker.

Figure 1 illustrates Propositions 3 and 4. It compares the value of the organization

²⁰Note that, as shown in Corollary 1, although a very large status difference would seem to generate “perfect” coordination (that is, $a - b = 0$), this is not the most desirable way of coordination from the firm’s point of view.

with status differentials (shown as the solid line) and that without status differential (shown as the dotted line). The figure illustrates that it is profitable for the firm to introduce some—but not too much—status differentiation.

This result extends the literature on status as follows. The basic result of this literature is that workers are willing to work hard to improve their status in organizations, and therefore status generates work incentives (see, e.g., Moldovanu et al., 2007; Auriol and Renault, 2008; Dubey and Geanakoplos, 2010). However, agents in these models do not differ in their favorite choice of action. In fact, differences of opinion between individual workers and departments within a firm on production—ranging from product design to input sourcing, manufacturing and delivery of the final product—are very common. When vested interests are at work, I show that too large a difference of status distorts how workers coordinate. This result highlights the cost of status, which must be traded off against the benefit of raising work incentives emphasized in the literature.

3 Discussion

In this section, I discuss the importance of coordination, the assumption of complementarity, and the consequence of introducing wages.

3.1 The importance of coordination

To better understand the results (i.e., how status affects the organizational value through its impact on coordination), consider two slightly different settings, where there is no need for coordination. The first concerns independent production with interdependent payoffs: each worker still gets half of the team’s output, which is now redefined as the sum of workers’ compromise (that is, $1 - a + b$), so that there are no coordination issues.

The problem of worker 1 becomes

$$\max_a \frac{1}{2}(1 - a + b) - f(s)(1 - a)^2,$$

which leads to

$$1 - \hat{a} = \frac{1}{4f(s)},$$

and it is independent of the choice of worker 2. Similarly, the problem of worker 2 is

$$\max_b \frac{1}{2}(1 - a + b) - f(-s)b^2,$$

which leads to

$$\hat{b} = \frac{1}{4f(-s)}.$$

Then it is easy to see that the value of the organization, defined as $V = (1 - a + b) - (1 - a)^2 - b^2$ as before, is given by

$$V = \frac{1}{4f(s)} + \frac{1}{4f(-s)} - \frac{1}{16f^2(s)} - \frac{1}{16f^2(-s)}.$$

When status has symmetric effects on workers' costs of compromising (that is, $f(s) + f(-s) = 2$), we can show that $V(s) > V(0)$ if $x \in (0, \sqrt{3}/3)$, where $2x = |f(s) - f(-s)|$. Recall that in Proposition 1, when there is a need for coordination, a status difference always reduces the organizational value with symmetric effects. In both cases, status has two effects. First, it increases the total compromise level, since both $1 - a^* + b^*$ (in the case with coordination) and $1 - \hat{a} + \hat{b}$ (in the case without coordination) are increasing in status differences. Second, status distorts how workers coordinate: while the firm prefers more balanced coordination efforts from its workers, status differences lead the worker, who has a lower cost of compromising, to compromise too much. We can show that the latter is the same in both cases, as $\frac{1 - a^*}{b^*} = \frac{1 - \hat{a}}{\hat{b}} = \frac{f(-s)}{f(s)}$. However, the former is weaker when there is a need for coordination than when there is not, that is, $\frac{\partial 1 - a^* + b^*}{\partial s} < \frac{\partial 1 - \hat{a} + \hat{b}}{\partial s}$. This result therefore highlights that the need for coordination creates some substitutability

between workers' compromise, which leads status differences to reduce the organizational value (the negative effect of status).

Alternatively, we can consider independent production with independent payoffs: each worker chooses an effort level e , which generates payoff e at a cost $f(s)e^2$. Thus, when there is a status difference, the efforts are given by

$$e^+ = \frac{1}{2f(s)}; \quad e^- = \frac{1}{2f(-s)},$$

where e^+ and e^- are the efforts of the high-status worker and the low-status worker respectively. The value of the organization now becomes

$$V = \frac{1}{2} \left[\left(\frac{1}{f(s)} - \frac{1}{2f^2(s)} \right) + \left(\frac{1}{f(-s)} - \frac{1}{2f^2(-s)} \right) \right].$$

Define $h(t) = \frac{1}{t} - \frac{1}{2t^2}$. Then we can easily show that $h(t)$ is maximized at $t = 1$ for all $t \geq 0$, which implies that the value of the organization is maximized at $s = 0$ and any status difference reduces the organizational value. Since some status differences may be desirable in the case with coordination, this result highlights the role of status in raising the organizational value via its impact on coordination (the positive effect of status).

In sum, in a model with interdependent production and interdependent payoffs, a status difference that helps improve coordination (as measured by $a - b$) may also distort how workers coordinate (the choice of action with respect to the social optimum).

3.2 Does status create or destroy money?

The literature frequently assumes complementarity between status and costs, but this can result in status "creating" or "destroying" money for the firm depending on the precise effect of status on cost, that is, $f(s)$ here. More specifically, creating money means that workers are better off by simply gaining a high status label. Thus, by introducing status, the firm can pay workers less without losing them. However, in this case, the result that

it is profitable for the firm to introduce status will not be interesting because it is driven by the fact that status creates extra money for the firm. In what follows, I show that in this model, a small status differential increases the value of the organization and at the same time destroys money, so that my results are not driven by the assumption of complementarity.

Let C denote the total costs of compromising for the workers:

$$C = f(s)(1 - a)^2 + f(-s)b^2.$$

Status destroys money when evaluated at $s = 0$ if the total costs for the workers are higher with status than without. Formally,

$$\frac{\partial C}{\partial s} \Big|_{s=0} > 0,$$

which is satisfied if

$$\frac{1}{16}(f'(0^+) - f'(0^-)) + \frac{1}{2}\left(\frac{\partial b(s)}{\partial s} - \frac{\partial a(s)}{\partial s}\right) \Big|_{s=0} > 0. \quad (7)$$

If the impact of status on cost is symmetric between workers, then the first term on the left-hand side is zero and Equation (7) is reduced to Equation (5), see Appendix D for details. This implies that a small status differential increases the value of the organization and at the same time destroys money. Even if the impact of status is asymmetric (e.g., when $f'(0^+) - f'(0^-) > 0$), the result in Proposition 3 remains valid provided Equation (5) is satisfied.

3.3 Wages

Instead of sharing the revenue equally, one can allow for a more general setting where a firm or a manager hires two workers, 1 and 2, and pays w_1 proportion of the revenue to worker 1 and w_2 of the revenue to worker 2, where these wages can be different from

one-half, but $w_1 + w_2 \leq 1$. Then worker 1's problem becomes

$$\max_a w_1(1 - (a - b)^2) - f(s)(1 - a)^2,$$

and that of worker 2 becomes

$$\max_b w_2(1 - (a - b)^2) - f(-s)b^2.$$

The equilibrium actions are given by

$$a^* = \frac{f(s)(f(-s) + w_2)}{f(s)f(-s) + w_1f(-s) + w_2f(s)},$$

$$b^* = \frac{f(s)w_2}{f(s)f(-s) + w_1f(-s) + w_2f(s)}.$$

Then the manager gets

$$\pi_F = (1 - w_1 - w_2)(1 - (a(w_1, w_2) - b(w_1, w_2))^2).$$

Consequently, given wages w_1 and w_2 , introducing status is profitable only if

$$\frac{\partial(a - b)(w_1, w_2)}{\partial s} < 0,$$

which implies

$$\frac{w_1}{f^2(s)}f'(s) < \frac{w_2}{f^2(-s)}f'(-s).$$

For small status differentials (that is, $s \rightarrow 0$), this condition simplifies to

$$w_1f'(0^+) < w_2f'(0^-),$$

which is equivalent to Equation (2) if $w_1 = w_2$. Thus, with wages, instead of comparing the marginal effect of status on workers' costs of compromising, this new condition compares the wage-adjusted marginal effect of status.

4 Conclusion

While the literature typically focuses on how status concerns, at the micro level, affect work incentives within organizations, and at the macro level, the quality of matches between firms and workers and the determination of equilibrium wage, this paper addresses their impact on the organizational value when coordination is important. In particular, I show that it is profitable for firms to introduce status differentiation when status affects workers in an asymmetric way and/or when status confers authority. This implies that status differentiation can be more beneficial to a firm when promotion involves a change in job duties than when it does not.

There are several directions in which this analysis can be extended. First, one may want to endogenize s . In this model, status is related to the cost of action, which is exogenously determined, but I can easily show that the optimal s^* is at some intermediate value (see Figure 1). It would be equally interesting to correlate status with workers' effort. This is because workers may compete for a higher position, and the firm can promote—and thus award a higher status to—the worker who produces larger profits. To see this, we can introduce a new stage of competition for promotion before the previous game. In this new stage, two workers with identical status compete for promotion, and the one who produces higher profit (or equivalently lower cost) wins the leading position and is awarded a higher status in the next stage. Such an award gives him entitlement to certain privileges, which lowers the leader's cost in the next period. Worker 1 will choose $a > 3/4$, since it improves his chance of winning the promotion and thereby enjoying higher status as a leader in the next period, even though it lowers his first-period payoff, while worker 2 will choose $b < 1/4$ for similar reasons. Increasing status differentiation therefore negatively affects coordination. This is because the prospect of promotion causes the two workers to focus on their own agenda to minimize costs rather

than improve coordination.

Second, status is only one of the many incentives provided in organizations. Another important incentive contract is wages. However, the main tradeoffs remain unchanged even if we consider wages (as shown in Section 3.3) because introducing wages only affects the share of revenues between workers but does not affect the cost of action, e.g., priority access to resources and the power of issuing orders, and hence it will not affect the analysis of status. However, other more sophisticated compensation schemes might improve efficiency over the revenue-sharing schemes considered here. By assuming that actions are unobservable (hence, noncontractible), this analysis abstracts from contracting problems. More generally, optimal contracts have been analyzed elsewhere (see Gibbons and Roberts (2013) for a survey), yet no research has been done on the comparison of status rewards and other incentive contracts. Thus, further work on this issue could be fruitful.

Finally, it would be interesting to consider the possibility of hiring a leader from outside the firm instead of promoting a worker from within, which broadens the modes of coordination from one (internal leader only) to two (internal vs. external leader). In fact, there are advantages and disadvantages to recruiting internally or externally. Whereas external recruitment brings fresh ideas to the firm, internal candidates know the firm's culture better and the firm knows the candidates' abilities better. So, external recruitment may be preferable in industries where priority is on innovation, though not in all.

Appendices

A Proof of Proposition 1

Substituting a^* and b^* into Equation (1), we obtain

$$V = \frac{2f(s)f(-s)[1 + 2f(s) + 2f(-s)]}{[f(s) + f(-s) + 2f(s)f(-s)]^2}. \quad (\text{A.1})$$

When status affects workers' costs of compromising in a symmetric way, we have $f(s) + f(-s) = 2$. Letting $f(s) = 1 - x$ and $f(-s) = 1 + x$, where $x \in [0, 1)$, Equation (A.1) becomes

$$V = \frac{5(1 - x^2)}{2(2 - x^2)^2},$$

which can be easily shown to be smaller than $5/8$ for any x .

B Proof of Corollary 1

Let $f(s) = 1 - x$ and $f(-s) = 1 + x$. Then we have

$$a^* - b^* = \frac{1 - x^2}{2 - x^2}.$$

Differentiating it with respect to x , we have

$$\frac{\partial a^* - b^*}{\partial x} = -\frac{2x}{(2 - x^2)^2}.$$

Therefore, $a^* - b^*$ is maximized at $x = 0$, i.e., when there is no status difference.

C Proof of Proposition 2

Differentiating Equation (A.1) with respect to s , we have

$$\frac{\partial V}{\partial s} \Big|_{s=0} = -f'(0^+) + f'(0^-)$$

Therefore, when status differentiation is limited (that is, $s \rightarrow 0$),

$$\frac{\partial V}{\partial s}|_{s=0} > 0 \text{ if } f'(0^+) < f'(0^-).$$

D Proof of Proposition 3

Given b_l , the equilibrium actions are given by

$$a_v^* = \frac{f(s) + 2f(s)(s + f(-s)) + sb_l}{f(s) + f(-s) + s + 2f(s)(f(-s) + s)},$$

$$b_v^* = \frac{f(s) + sb_l(1 + 2f(s))}{f(s) + f(-s) + s + 2f(s)(f(-s) + s)}.$$

Since $a_v^*|_{s=0} = 3/4$ and $b_v^*|_{s=0} = 1/4$, the impact of introducing a small status differential on the value of the organization is as follows:

$$\begin{aligned} \frac{\partial V}{\partial s}|_{s=0} &= [-2(a - b)\left(\frac{\partial a}{\partial s} - \frac{\partial b}{\partial s}\right) + 2(1 - a)\frac{\partial a}{\partial s} - 2b\frac{\partial b}{\partial s}]_{s=0} \\ &= \frac{1}{2}\left(\frac{\partial b(s, b_l)}{\partial s} - \frac{\partial a(s, b_l)}{\partial s}\right)|_{s=0}. \end{aligned}$$

Using $b_v^* = (1 + 2f(s))a_v^* - 2f(s)$, we obtain

$$\frac{\partial V}{\partial s}|_{s=0} = \frac{1}{3}\frac{\partial b}{\partial s}|_{s=0} - \frac{1}{12}f'(0^+),$$

so introducing a small status difference increases the organizational value if $b'_s > f'(0^+)/4$,

where $b'_s = \lim_{s \rightarrow 0} \frac{\partial b}{\partial s}$.

Differentiating π_l with respect to b_l gives

$$\begin{aligned} \frac{\partial \pi_l}{\partial b_l} = 0 &\Leftrightarrow 2f(s)(1 - a_v^*)\frac{\partial a_v^*}{\partial b_l} - (a_v^* - b_v^*)\left(\frac{\partial a_v^*}{\partial b_l} - \frac{\partial b_v^*}{\partial b_l}\right) = 0 \\ &\Leftrightarrow 2f(s)(1 - a_v^*)\frac{\partial a_v^*}{\partial b_l} - 2f(s)(b_v^* - a_v^*)\frac{\partial a_v^*}{\partial b_l} = 0 \\ &\Leftrightarrow b_v^* = 1. \end{aligned}$$

Hence, the leader will choose a b_l such that $a_v^* = b_v^* = 1$, which violates the follower's participation constraint, Equation (4). Therefore, the choice of b_l is such that Equation

(4) is binding, which means

$$\pi_f(a_v^*(s, b_l), b_v^*(s, b_l)) = \underline{U}.$$

By using the Implicit Function Theorem, we obtain the following equation:

$$b'_s = \frac{-\frac{1}{12}f^+ + \frac{1}{16}f^- - (\frac{1}{12}f^+ + \frac{1}{4}f^-)^2 + \frac{16}{9}(b'_s)^2}{\frac{32}{9}b'_s + \frac{1}{6} - \frac{2}{9}f^+ - \frac{2}{3}f^-},$$

where $f^+ = f'(0^+)$ and $f^- = f'(0^-)$. Then, we can solve for b'_s and show that $b'_s > f'(0^+)/4$ if

$$(f'(0^+) - f'(0^-))^2 < f'(0^-) - 2f'(0^+).$$

E Proof of Corollary 2

Suppose now that $b_l \in [0, 1]$. It is clear that the leader always want to recommend a larger b_l to the follower because $\partial\pi_l/\partial b_l > 0$. Define b_l^* such that $\pi_f(a_v^*(s, b_l^*), b_v^*(s, b_l^*)) = \underline{U}$. If $b_l^* \leq 1$, then the analysis in Appendix D continues to hold. However, if $b_l^* > 1$, then the leader is constrained in his recommendation, and he is obliged to recommend $b_l = 1$, which leaves the follower a higher payoff than his outside option. Then, the value of the organization is simply given by $V(a_v^*(s, 1), b_v^*(s, 1))$. It is straightforward to show that $(\partial V/\partial s)_{s=0}$ is positive if

$$f'(0^+) < f'(0^-) + 3,$$

which is again less stringent than Equation (2), irrespective of whether the high-status worker has a higher or lower cost of compromising.

Then we derive the condition under which the constraint $b_l \leq 1$ is binding. Recall that b_l^* is such that

$$\pi_f(a_v^*(s, b_l^*), b_v^*(s, b_l^*)) = \underline{U}.$$

It can be written as

$$Ab_l^2 - Bb_l + C = 0,$$

where

$$A = 2s[(1 + 2s)f^2(s) + f(-s)(s + f(-s))(1 + 2f(s))^2 + 2f(s)f(-s)(1 + 2f(s))],$$

$$B = 4sf^2(s)[1 + 2(s + f(-s))],$$

$$C = 2f^2(s)(s + f(-s))[1 + 2(s + f(-s))] - [f(s) + (s + f(-s)(1 + 2f(s))]^2(1 - 2\underline{U}).$$

The solution to the above equation is

$$b_l = \frac{B + \sqrt{B^2 - 4AC}}{2A}.$$

It is easy to see that $B \rightarrow 0$ and $A \rightarrow 0$ as $s \rightarrow 0$. Then by using L'Hôpital's rule, we have

$$b_l = \frac{B' + \frac{1}{2} \frac{(B^2 - 4AC)'}{\sqrt{B^2 - 4AC}}}{2A'}.$$

Moreover, we have $A' \rightarrow 32$ and $B' \rightarrow 12$ as $s \rightarrow 0$, and

$$(B^2 - 4AC)' = 2BB' - 4A'C - 4AC'.$$

Thus, if $\lim_{s \rightarrow 0} C < 0$, we have $b_l \rightarrow +\infty$ as $s \rightarrow 0$. Indeed, we can show that $\lim_{s \rightarrow 0} C < 0$ if $\underline{U} < 5/16$, and $\lim_{s \rightarrow 0} C = 0$ if $\underline{U} = 5/16$. Therefore, $b_l \leq 1$ is binding if $\underline{U} < 5/16$.

When $\underline{U} = 5/16$, we can further show that

$$\lim_{s \rightarrow 0} b_l = \frac{3 + \sqrt{1 - 24f^+ + 8f^-}}{16},$$

and thus, $b_l \leq 1$ is binding if $f^- - 3f^+ > 21$. Furthermore, if $f^- - 3f^+ < -1/8$, there is no b_l satisfying the follower's participation constraint, i.e., the follower obtains his outside option in this case.

F Proof of Proposition 4

When status differential is very large (that is, $s \rightarrow \infty$),

$$\begin{aligned} \lim_{s \rightarrow \infty} f(s) &= \lim_{s \rightarrow \infty} \frac{1}{1 + s} = 0, \\ \lim_{s \rightarrow -\infty} f(s) &= \lim_{s \rightarrow -\infty} \left(2 - \frac{1}{1 - s}\right) = 2, \end{aligned}$$

and

$$a = b = b_l.$$

Since the disobedience cost is too high with large status differential, the follower will choose $b = b_l$. The leader will choose $a = b$, creating perfect coordination, because his cost of compromising is very small.

The optimal b_l is determined by the follower's participation constraint:

$$\frac{1}{2} - 2b_l^2 = \underline{U}.$$

Clearly, b_l is decreasing in \underline{U} , and $b_l = 1/2$ if $\underline{U} = 0$. Moreover, the value of the organization, given by

$$V = 1 - (1 - b_l)^2 - b_l^2,$$

is maximized at $b_l = 1/2$ (i.e., when $\underline{U} = 0$). Even if the follower's outside option is zero, the value of the organization with status differential, $V = 1/2$, is less than that without, $5/8$. Thus, for any positive outside option, it is not optimal to differentiate workers.

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