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On the strength of corporate cultures

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Abstract

We model corporate culture(s) as production technologies for which employees have to undertake culture-specific investments that improve their effectiveness. At a later date, the organization can adopt cultural changes that make this investment partially redundant. This leads to under-investment. However, as agents invest more, the organization's opportunity cost of a change increases, which in turn increases each agents' incentives to invest. This externality among agents leads to multiple equilibria. Otherwise similar organizations can thus exhibit either high investment levels and low probability of changes (strong culture) or low investment levels and high probability of changes (weak culture). We also explore some implications for the nature and management of corporate culture. © 1999 Elsevier Science B.V. All rights reserved.

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1. Introduction

It is increasingly recognized that organizations develop cultures. Moreover, as numerous observers have argued, an organization's culture can affect its performance, to the point that some business successes and failures have been

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attributed in part to corporate cultures. Clearly, the notion of culture extends beyond the corporate realm to administrations, private non-profit organizations, etc. However, in spite of its relevance, organizational culture remains rather ill defined in economic theory.[1] This paper develops an economic model of organizational culture that allows to address the question of why otherwise similar organizations can develop different cultures, with different long-run economic performances. It also proposes some insights into why culture and its management are sensitive issues within organizations' politics.

We model an organization's culture as a production technology used by its agents.[2] Each agent can undertake investments that improve his effectiveness under the firm's culture, e.g. he can acquire a culture-specific skill. The organization will try and provide its agents with incentives to engage in such investments, e.g. by screening out less skilled agents. Still, when making their investment decisions, the agents should be concerned by the risk that, at a later date, the organization decides to adopt a new culture that proves more performant. Indeed, the organization will adapt its incentive and screening schemes to the new culture. Hence, the agent's initial investment can be less useful than under the initial culture. Consequently, the prospect of a cultural change might induce an initial under-investment by the agents.

However, the likelihood of such a cultural change is itself determined by the agents' level of investment. Indeed, since an agent's aptitude under one culture is only imperfectly correlated with his aptitude under an alternative culture, the organization's opportunity cost of adopting the new culture increases with its agents' 'fit' with the current culture. Hence, as the agents' initial investment increases, a cultural change becomes less likely.

There is thus an externality among agents in that each agent's culture-specific investment is protected against the organization's opportunistic behavior by the other agents' investments. This externality can result in a multiplicity of equilibria. The organization can have a 'strong culture': its agents engage in more culture-specific investments and the organization's culture is unlikely to be altered. However, that same organization could also have a 'weak culture', with its agents undertaking little culture-specific investments and cultural changes being more likely.

In a variation on this theme, we show that the externality among agents concerns not only the level but also the nature of their investments. Agents are assumed to have the choice between acquiring a 'specialized' skill which is specific to the organization's current culture or a 'generalist' skill, less efficient

[1] See Kotter and Heskett (1992) for a detailed analysis of the interaction between economic performance and corporate culture in different organizations. See also Schein (1986a,b) for several competing definitions of 'corporate culture'.

[2] We assume that all agents use the same technology. See Carrillo and Gromb (1997) for a theory of cultural uniformity within organizations.

but more adaptable to alternative cultures. Under the organization's current culture, the specialized skill is more effective than the generalist skill. The organization's opportunity cost of adopting a new culture is thus lower if its agents have invested in the generalist skill. Hence, each agent's investment in the specialized skill is more protected against the organization's opportunistic cultural changes if other agents are also specialized. Once again, this externality gives rise to multiple equilibria.

Finally, we focus on the choice of screening intensity as a way to manage the organization's culture. More intense screening increases the fit between the organization's agents and its current culture because agents who are less adapted to the current culture are more likely to be detected and screened out. As a consequence, increased screening implies a higher opportunity cost of adopting a new culture. The resulting lower likelihood of a culture change benefits agents. This is because a change in culture means that agents have to go through *two* different screens. Interestingly, if screening is costly, it is possible that agents will favor *more* intense screening than the organization would be willing to pay for.

The plan of the paper is as follows. We first present the model (Section 2). We then show how multiple equilibria with different cultural 'strengths' (Section 3) and degrees of specialization (Section 4) can emerge. Last we analyze the agents' demand for screening (Section 5) and conclude (Section 6).

2. The model

Consider a three-period model ($t = 1, 2, 3$) with no discounting. A firm employs a continuum of agents of at most mass 1 in each period, and then closes down.

Period $t = 1$ unfolds as follows:

- The organization hires a mass 1 of agents from the job market and sets them to work under culture A. There exists a skill, denoted A, that is useful to work under culture A. An agent working under culture A generates a revenue R without skill A, and $R + \Delta_A$ with that skill.
- Agents can attempt to acquire skill A. More precisely, by incurring a personal cost $a^2/2$, an agent acquires skill A with probability $s + (1 - s)a$, with $a \in [0, 1]$. Hence, s is the 'natural' probability of acquiring skill A, i.e. absent effort ($a = 0$).
- An agent without skill A is detected with probability 1.[3] As we will see, the organization finds it optimal to replace these agents with new hires from the

[3] This perfect monitoring assumption is relaxed in Section 5.

job market and retain the rest.

Period $t = 2$ is as follows:

- With probability q, a new culture B becomes available, and the organization has the opportunity to adopt it by paying a fixed cost K. For simplicity, we assume that the decision to adopt culture B cannot be delayed.
- The organization can fire some of its agents and replace them with new hires from the job market. A priori, different agents can be set to work under different cultures. So, if culture B is adopted, then each agent (old or new recruit) can be set to work under either culture A or B. Instead, if B is not adopted, then all the organization's agents work under A.
- There exists a skill denoted B, that is useful to work under culture B. An agent working under B generates a revenue R without skill B, and $R + \Delta_B$ with that skill. Culture B is an improvement over A in that $\Delta_B > \Delta_A$.
- For simplicity, agents cannot exert effort to acquire skills A or B in this period. However, a fraction s of agents in the job market has skill A and a fraction s (independently drawn) has skill B.
- An agent with skill A can also acquire skill B with probability $\mu < 1$ (at no cost). For simplicity, we assume that the reverse is not true for agents with skill B. Hence, the fraction of agents with skill A on the job market is $\Pr[A_{\mathrm{jm}}] = s$ while that of agents with skill B is $\Pr[B_{\mathrm{jm}}] = s + (1 - s)s\mu$. The parameter μ is thus a measure of the closeness or congruence of cultures A and B. A large μ means that agents who are good at working under culture A are also likely to be good at working under culture B. Conversely, a small μ means that being good at working under A is of little use to working under B.

The timing within period $t = 3$ is as for period $t = 2$, except that no new culture is available.

All the parameters are common knowledge initially, and effort a in period $t = 1$ is not observable by the organization. Besides, only short-term contracts are feasible so, in particular, the organization cannot commit on future cultures, severance payments, or employment.[4] For simplicity, we assume that agents receive a fixed wage w in each period of employment by the organization. The outside wage is normalized to 0.

Assumption 1. $R > w$.

In each period, the organization employs at most a mass 1 of agents. However, since revenues are assumed to exceed wages, the organization prefers

[4] This allows us to avoid the issue of discriminatory firing of agents.

to employ unskilled agents rather than none. Hence, in each period the organization employs exactly a mass 1 of agents.[5]

3. The strength of a culture

In this section, we show how otherwise similar organizations can have a mass of agents with different average skills, and therefore cultures of different 'strengths'.

3.1. Allocation and firing decisions

We first analyze the organization's decision to retain or replace some of its agents.

Lemma 1. Among the group of agents with (*resp. without*) *skill A*, *the proportion of agents with skill B is above* (*resp. below*) *that of the job market.*

Proof. Denote A, $\bar{A}$, and A_{jm} the events 'agent with skill A in the organization', 'agent without skill A in the organization', and 'agent with skill A in the job market' (and similarly for B, $\bar{B}$, and B_{jm}). For a given level of effort a, we have

$$\Pr[A] = s + (1-s)a,$$

$$\Pr[A \cap B] = [s + (1-s)a][\mu + (1-\mu)s],$$

$$\Pr[\bar{A} \cap B] = s(1-s)(1-a).$$

It is therefore immediate that

$$\Pr[B|A] = s + (1-s)\mu > \Pr[B_{\mathrm{jm}}] = [s + (1-s)s\mu] > \Pr[B|\bar{A}] = s. \quad \square$$

A consequence of this lemma is that the decision to retain or fire an agent is independent of the decision to adopt culture B. More precisely, the organization at the end of period $t = 1$ retains the agents with skill A and fires the unskilled agents irrespective of whether it adopts culture B or not.

We also make the following assumption.

[5] We implicitly rule out the possibility that the organization hires more agents than needed, and screens idle agents so as to reduce the cost of replacing active ones. This option can never be optimal if screening occurs on the job, i.e. if it is impossible to evaluate idle agents.

Assumption 2. $[\mu + (1-\mu)s]\Delta_B > \Delta_A$.

Under this sufficient condition, if culture B is adopted then the organization prefers to set an agent with skill A to work under culture B rather than to let him work under A. Indeed, the payoff in period $t = 2$ from letting an agent with skill A work under culture A is $(R-w) + \Delta_A$ while the expected payoff from letting him work under culture B is $(R-w) + [\mu + (1-\mu)s]\Delta_B$. Besides, if the agent turns out not to have skill B, he can be replaced at the end of period $t = 2$. To sum up, given Lemma 1 and Assumption 2, if the organization adopts culture B, it finds it optimal to replace only unskilled agents with new hires from the job market and to set all of its agents, old and new, to work under B. Hence, in all periods, all of the organization's agents work under the same culture.

3.2. Agents' investment

We now analyze the agents' effort choice at $t = 1$. Naturally, this decision depends on whether or not culture B will be adopted if it becomes available at $t = 2$. Because each agent is atomistic, he (correctly) takes the probability of culture B being adopted as independent from his own actions. Consequently, all agents face the same optimization problem and, in equilibrium, undertake the same level of investment.

Case 1: *Culture B is not adopted even if it appears*. Each agent chooses a to maximize

$$[s + (1-s)a]w + [s + (1-s)a]w - a^2/2.$$

The FOC gives[6]

$$a^* = 2w(1-s).$$

Case 2: *Culture B is adopted if it appears*. Each agent chooses a to maximize

$$(2-q)\,[s + (1-s)a]w + q[s + (1-s)a][\mu + (\lambda - \mu)s]w - a^2/2.$$

The FOC gives

$$a^{**} = [2 - q(1-\mu)(1-s)]w(1-s).$$

Clearly,

$$a^* > a^{**}.$$

[6] We assume that w is small enough ($w < 1/2(1-s)$) so that the solution is interior.

As the congruence between the two cultures is not perfect (i.e. $\mu < 1$), an agent with skill A has a longer expected tenure in the organization if culture A is retained than if culture B is adopted. As a result, agents have a higher incentive to become skilled in the former case than in the latter.

3.3. Organization's policy

We now examine the organization's optimal choice whether or not to adopt culture B if it becomes available. This decision depends on the mass of agents with skills A and B present in the organization at the beginning of period $t = 2$.

Recall that the fraction of agents with skill A available in the job market at the beginning of period $t = 2$ is s. Hence, for a given effort a exerted by each agent at $t = 1$, the mass of agents with skill A at $t = 2$ is

$$\begin{aligned}\alpha_a &= \Pr[A] + \Pr[\bar{A}] \times \Pr[A_{\mathrm{jm}}]\\ &= s + (1-s)a + (1-s)(1-a)s\\ &= s(2-s) + a(1-s)^2.\end{aligned}$$

So, if culture B is not adopted, the organization's payoffs at $t = 2$ and $t = 3$ are

$$(R - w) + \alpha_a \Delta_A \quad \text{and} \quad (R - w) + [\alpha_a + (1-\alpha_a)s]\Delta_A$$

and the organization's total payoff is

$$\Pi_A(a) = 2(R - w) + [s + \alpha_a(2 - s)]\Delta_A.$$

Similarly, the fraction of agents with skill B available in the job market at the beginning of period $t = 2$ is $\Pr[B_{\mathrm{jm}}] = s + (1-s)s\mu$. Moreover, agents without skill A are screened out at the end of period $t = 1$. Hence, for a given effort a, the mass of agents with skill B at the beginning of period $t = 2$ is

$$\begin{aligned}\beta_a &= \Pr[A] \times \Pr[B|A] + \Pr[\bar{A}] \times \Pr[B_{\mathrm{jm}}]\\ &= [s + (1-s)a][\mu + (1-\mu)s] + (1-s)(1-a)[s + (1-s)s\mu]\\ &= s + (1-s)s\mu + (1-s)^2 s\mu + a(1-s)^3\mu\end{aligned}$$

and the organization's total payoff (gross of K) from adopting culture B is

$$\Pi_B(a) = 2(R - w) + [s + (1-s)s\mu + \beta_a(2 - s - (1-s)s\mu)]\Delta_B.$$

3.4. Equilibria

Before analyzing the equilibria, we introduce the following assumption.

Assumption 3. $\Delta_A > \mu(1-s)\Delta_B$.

This assumption implies that the relative gain of adopting culture B decreases as the effort exerted in acquiring skill A increases. Stated formally, $\mathrm{d}[\Pi_B(a) - \Pi_A(a)]/\mathrm{d}a < 0$. Indeed, higher effort is beneficial to the organization irrespective of the decision to adopt B, i.e. $\mathrm{d}\Pi_B(a)/\mathrm{d}a > 0$ and $\mathrm{d}\Pi_A(a)/\mathrm{d}a > 0$. However, when the congruence of cultures μ is small (skill A is not easily transferable to culture B) and skill A is very effective under culture A (Δ_A close to Δ_B), then effort is relatively more valuable if culture A is retained than if culture B is adopted.

At this stage, we can state our first result.

Proposition 1. There exist two thresholds K_1 and K_2, with $K_1 < K_2$ such that

- *For all $K < K_1$, in equilibrium, $a = a^{**}$ and culture B is adopted.*
- *For all $K > K_2$, in equilibrium, $a = a^*$ and culture B is not adopted.*
- *For all $K \in [K_1, K_2]$, both equilibria coexist. Moreover, the latter equilibrium Pareto dominates the former.*

Proof. The net gain from adopting culture B is

$$\Pi_B(a) - \Pi_A(a) - K.$$

For all $K > K_1 \equiv \Pi_B(a^*) - \Pi_A(a^*)$, there exists an equilibrium in which all agents exert $a = a^*$ and culture B is not adopted. For all $K < K_2 \equiv \Pi_B(a^{**}) - \Pi_A(a^{**})$, there exists an equilibrium in which all agents exert $a = a^{**}$ and culture B is adopted.

Under Assumption 3, $\Pi_B(a) - \Pi_A(a)$ is decreasing in a. Consequently, $K_1 < K_2$ and so, for $K \in [\Pi_B(a^*) - \Pi_A(a^*), \Pi_B(a^{**}) - \Pi_A(a^{**})]$, the two equilibria coexist.

Clearly, the former equilibrium dominates the latter. Indeed, the organization's payoff increases in a irrespective of the decision to adopt culture B or not. Agents also prefer the former because, for any given level of a, the expected tenure is greater if A is retained (i.e. $2[s + (1-s)a]$) than if B is adopted (i.e. $[s + (1-s)a][1 + \mu + (1-\mu)s]$). □

The multiplicity of equilibria is of particular interest. It arises from an externality between the agents working in the organization. Consider an agent's decision to invest into acquiring skill A. When other agents invest more in that skill, the likelihood that the organization will find it optimal to adopt culture B is reduced. This in turn protects the agent's investment, and thus increases his incentives to invest in the first place. Conversely, if the other agents do not invest enough, an agent anticipates that the organization will adopt culture B if it appears. Consequently, he is less inclined to invest in acquiring skill A.

The existence of several equilibria suggests that otherwise similar organizations can have cultures of different 'strengths'. On the one hand, the organization can have a 'strong culture': its agents engage in more culture-specific investments and the organization's culture is unlikely to be altered. On the other hand, that same organization could also have a 'weak culture', with its agents undertaking little culture-specific investments, and cultural changes being more likely.[7]

Other factors might reinforce our results. For instance, suppose that the organization can develop alternative personnel management methods, authority allocation or communication channels that may result in a new culture being developed. If its agents have undertaken large investments that are specific to culture A, the organization will devote more resources to developing alternatives which build on that culture (i.e. with high congruence μ) and less to developing those that would constitute drastic changes (i.e. with low congruence μ). This in turn encourages investment in skill A.

The fact that the organization may fall in an unfavorable equilibrium begs the question of how to move to a more favorable one. There, leaders and an active communication policy can play a crucial role to organize the agents' coordination on the Pareto dominant equilibrium. For instance, a leader can influence the equilibrium if other agents believe her to have unique information, and if they observe her actions (see Hermalin, 1997). For instance, a leader will choose her level of investment to transmit information about factors affecting the probability of a new culture arising (e.g. q in our model) but also to induce other agents to invest more.

4. Specialists vs. generalists

We now extend the previous insight to show that the externality among agents concerns not only the level but also the nature of their investments. We consider a variation of the model in which the agents have the choice between a 'specialized' or a 'generalist' investment. The model is modified as follows.

[7] In Kremer (1993)'s general equilibrium analysis of a production function with high complementarities between workers, these will be matched with others of similar skill level. Indeed, the strong complementarity implies that a high skill worker will be most valuable for a firm that already has highly skilled employees. Hence, each firm's workers have similar skill levels but this level can vary across otherwise similar firms. We obtain a similar outcome but for different reasons. In particular, in our model, complementarity is endogenous. Moreover, the disparity in skill levels itself is endogenous. Our result is more related to Acemoglu (1997)'s model of worker training and technological innovation.

- In period $t = 1$, each agent can exert effort in one of two dimensions a and c. For simplicity, these are assumed to be mutually exclusive. The agent can, as before, acquire skill A with probability $s + (1 - s)a$ at cost $a^2/2$. Alternatively, he can acquire skill C with probability $s + (1 - s)vc$ at cost $c^2/2$.
- An agent with skill C has also both skills A and B. In contrast, an agent with skill A can also acquire skill B (at no cost) but only with probability μ.
- Moreover, an agent investing $a > 0$ acquires skill B with probability s, independently of his succeeding in acquiring skill A. This does not hold for investments in c.

Assumption 4. $\mu < v < 1$.

The assumption formalizes the idea of specialized vs. generalist investments. Compare an agent investing a to another agent investing c, with $c = a$. The assumption that $v < 1$ implies that the former agent acquires skill A with greater probability than the latter. By contrast, $\mu < v$ implies that the latter agent acquires *both skills* A and B with a higher probability than the former (i.e. $[s + (1 - s)vc] > [s + (1 - s)a][\mu + (1 - \mu)s]$). We thus refer to the former type of investment ($a > 0$ and $c = 0$) as specialized and to the latter ($a = 0$ and $c > 0$) as generalist.

4.1. Agents' investment

Now, the agents' choice is twofold. First, each agent has to decide the skill, A or C, to try and acquire. Second, he has to decide on the level of his effort. Both these decisions depend on whether culture B is adopted if it becomes available at $t = 2$.

Case 1: *Culture B is not adopted even if it appears.* Given that only skill A is and will be useful, it is in the interest of each agent to make a specialized rather than a generalist investment, so as to maximize the probability of acquiring that skill. As before, the agents' optimal effort is given by

$$a^* = 2w(1 - s).$$

Case 2: *Culture B is adopted if it appears.* The fraction of agents with skill B in the job market at $t = 2$ is $s + (1 - s)s\mu$.[8] Therefore, as in the previous section, the proportion of agents with skill B among the group of agents with (resp.

[8] We have implicitly assumed that agents in the job market at $t = 2$ undertake a specialized investment with $a = 0$. If we rather think of them as making a generalist investment with $c = 0$, the mass with skill B would be s. However, our results would still hold.

without) skill A is above (resp. below) that of the job market. This is true independently of whether they have invested in skill A or C.[9]

As a result, if the agent chooses to invest in skill A, he maximizes as before:

$$u_B^A(a) = (2-q)\,[s+(1-s)a]w + q[s+(1-s)a][\mu+(1-\mu)s]w - a^2/2$$

and his effort is

$$a^{**} = [2-q(1-\mu)\,(1-s)]w(1-s).$$

If the agent chooses to invest in skill C, he maximizes

$$u_B^C(c) = 2[s+(1-s)vc]w - c^2/2.$$

The FOC gives

$$c^{**} = 2vw(1-s).$$

Hence, if culture B is adopted, agents find it optimal to invest in skill C rather than A if and only if $u_B^C(c^{**}) > u_B^A(a^{**})$. As can be checked, the following is a sufficient condition for this inequality to hold.

Assumption 5. $2v > 2 - q(1-\mu)\,(1-s)$.

The interpretation is simple. First, note that the expected tenure implied by a given choice of c is increasing in v. Similarly, the expected tenure implied by a given choice of a is increasing in μ. Hence, a generalist investment is relatively more attractive the higher v and the smaller μ. Last, the benefit of a generalist investment is that the probability of acquiring both skills A and B is greater than for a specialized investment of the same level. The cost is that the probability of acquiring skill A in a first place is smaller. Therefore, skill C is more attractive the higher the likelihood of a switch in cultures.[10]

4.2. Organization's policy and equilibria

We now examine the organization's optimal choice whether or not to adopt culture B. Notice that, as previously, the decision of whether to retain or fire agents is independent of the decision to adopt B. We have

[9] Formally, if they invest in skill C, we have: $\Pr[B|C] = 1 > s + (1-s)s\mu > \Pr[B|\bar{C}] = 0$. If they invest in skill A, the proof is as in Lemma 1.

[10] In our model, for a given effort $a = c$, the probability of acquiring skill B is greater for the generalist than for the specialized investment. However, this property is not necessary for our analysis. What matters is the probability of acquiring skill A and the probability of acquiring both skills. Hence, the results would still hold if a specialized investment allowed to acquire either skill A or B but rarely both.

Proposition 2. There exist two thresholds K_3 and K_4, with $K_3 < K_4$ such that

- *For all $K < K_3$, in equilibrium, $c = c^{**}$ and culture B is adopted.*
- *For all $K > K_4$, in equilibrium, $a = a^*$ and culture B is not adopted.*
- *For all $K \in [K_3, K_4]$, both equilibria coexist.*

Proof. We need to show that $K_3 \equiv \Pi^a_B(a^*) - \Pi^a_A(a^*) < K_4 \equiv \Pi^c_B(c^{**}) - \Pi^c_A(c^{**})$ where the superscript denotes the dimension in which agents have invested. We first show that $\Pi^a_A(a^*) > \Pi^c_A(c^{**})$ and then that $\Pi^a_B(a^*) < \Pi^c_B(c^{**})$.

(i) Denote, as previously, α_a and α_c the mass of agents with skill A in the organization at the beginning of period $t = 2$, when they have exerted effort a^* and c^{**}, respectively. We have

$$\Pi^i_A = 2(R - w) + [2\alpha_i + (1 - \alpha_i)s]\Delta_A, \quad i \in \{a, c\}.$$

Note that

$$\alpha_a = [s + (1 - s)a^*] + (1 - s)(1 - a^*)s$$

and

$$\alpha_c = [s + (1 - s)vc^{**}] + (1 - s)(1 - vc^{**})s.$$

Since $a^* > c^{**} > vc^{**}$, $\alpha_a > \alpha_c$, and therefore $\Pi^a_A(a^*) > \Pi^c_A(c^{**})$.

(ii) Denote, also as before, β_a and β_c the mass of agents with skill B in the organization at the beginning of period $t = 2$, when they have exerted effort a^* and c^{**} respectively. We have

$$\Pi^i_B = 2(R - w) + [2\beta_i + (1 - \beta_i)(s + (1 - s)s\mu)]\Delta_B, \quad i \in \{a, c\},$$

where

$$\beta_a = [s + (1 - s)a^*][\mu + (1 - \mu)s] + (1 - s)(1 - a^*)[s + (1 - s)s\mu],$$

$$\beta_c = [s + (1 - s)vc^{**}] + (1 - s)(1 - vc^{**})[s + (1 - s)s\mu].$$

Given that $c^{**} = va^*$, we have

$$\beta_c - \beta_a = s(1 - \mu)(1 - s) + (1 - s)[s + (1 - s)s\mu]a^*(1 - v^2)$$
$$+ (1 - s)a^*[v^2 - \mu - (1 - \mu)s]$$
$$= s(1 - \mu)(1 - s) + a^*(1 - s)^2[(1 - \mu) - (1 - v^2)(1 - s\mu)].$$

From Assumption 5, we have that $(1 - \mu)(1 - s) > 2(1 - v) > (1 - v^2)$. Hence, $\beta_c > \beta_a$, and therefore $\Pi^c_B(c^{**}) > \Pi^a_B(a^*)$. □

Comparing the equilibria with c^{**} and a^{*}, one notices that the probability of having both skills A and B is greater in the former equilibrium, even though $c^{**} = va^{*} < a^{*}$. Indeed

$$s + (1 - s)vc^{**} - [s + (1 - s)a^{*}][\mu + (1 - \mu)s]$$

$$\propto s(1 - \mu) + a^{*}[(1 - \mu)(1 - s) - (1 - v^{2})]$$

which is positive again by Assumption 5.

To sum up, cultures of different strengths can also result from the agents' choice of the type of investments. For instance, the opportunity cost for the organization of a cultural switch is inversely related to the workers' capacity to adapt to a changing environment. At the same time, the agents' incentives to look for skills that are adaptable to different cultures is related to the likelihood of changes.

5. Intensity of screening

We analyze the agents' demand for screening. To better focus on the interaction between imperfect monitoring and cultural strength, we study a simplified version of the model presented in Section 2. In particular, we abstract from effort considerations in period $t = 1$. The changes introduced are the following:

- Agents hired in period $t = 1$ are set to work under culture A, but they cannot exert effort to acquire skill A, i.e. $a \equiv 0$.
- The congruence μ is strictly positive but arbitrarily close to zero.
- At the end of each period, agents without skill A working under culture A and agents without skill B working under culture B are detected with probability p.[11]

The first concern is to analyze the optimal replacement strategy of the organization.

Lemma 2. Among the group of agents detected (resp. not detected) without having skill A, the proportion of agents with skill B is below (resp. above) that of the job market.

[11] The analysis easily extends to different detection probabilities under different cultures ($p_A \neq p_B$).

Proof. Denote 'd' and 'nd' the events 'agent detected without skill A', and 'agent not detected without skill A'. We have

$$\Pr[B|\mathrm{nd}] = \frac{s[\mu + (1-\mu)s] + (1-s)s(1-p)}{s + (1-s)(1-p)}$$

$$> \Pr[B_{\mathrm{jm}}] = s + (1-s)s\mu > \Pr[B|\mathrm{d}] = s. \qquad \square$$

Since there is a positive correlation between having the two skills, an agent without skill A is less likely to have skill B than an agent in the job market. Similarly, an agent with 'soft evidence' of having skill A (i.e. not detected) is more likely to have skill B than an agent in the job market. Hence, as previously, agents known not to have skill A are replaced while agents undetected are retained, independently of whether the organization adopts culture B or not. Note also that, given Assumption 2, if culture B is adopted then agents not detected under culture A are switched to B.

We can now examine the organization's payoff for a given detection probability p. Denote by $\alpha(p)$ and $\beta(p)$ the mass of agents with skill A and B respectively, at the beginning of period $t = 2$. We have[12]

$$\alpha(p) = s + (1-s)ps,$$

$$\begin{aligned}\beta(p) &= \Pr[A]\times\Pr[B|A] + \Pr[\bar{A}]\times\Pr[B|\bar{A}]\times\Pr[\mathrm{nd}|\bar{A}]\\ &\quad + \Pr[\bar{A}]\times\Pr[\mathrm{d}|\bar{A}]\times\Pr[B_{\mathrm{jm}}]\\ &= s[\mu + (1-\mu)s] + (1-s)\,s(1-p) + (1-s)\,p[s + (1-s)s\mu]\\ &= s + s\mu(1-s) + ps\mu(1-s)^2.\end{aligned}$$

Therefore, the organization's payoff when culture A is retained $\Pi_A(p)$, and when culture B is adopted $\Pi_B(p)$, are respectively

$$\Pi_A(p) = 2(R-w) + [ps + \alpha(p)(2-ps)]\Delta_A,$$

$$\Pi_B(p) = 2(R-w) + [p(s + (1-s)s\mu) + \beta(p)(2 - p(s + (1-s)s\mu))]\Delta_B.$$

Assumption 6. $(3 - 2ps)\Delta_A > \Delta_B$.

Note that increased screening is beneficial to the organization both if A is retained ($\mathrm{d}\Pi_A(p)/\mathrm{d}p > 0$) and if B is adopted ($\mathrm{d}\Pi_B(p)/\mathrm{d}p > 0$). Assumption 6 implies that, for μ sufficiently small, the relative gain of adopting culture B decreases as the intensity of screening increases, i.e. $\mathrm{d}\Pi_B(p)/\mathrm{d}p < \mathrm{d}\Pi_A(p)/\mathrm{d}p$. Indeed,

[12] We can easily check that $\alpha(1) = \alpha_a$ and $\beta(1) = \beta_a$ when $a^* = 0$.

when cultures A and B are not very congruent (μ is small) and the value of skill A under culture A is high relative to the value of skill B under culture B (Δ_A close to Δ_B), then screening is relatively more valuable if culture A is retained than if culture B is adopted.

We can now state our last result.

Proposition 3. Agents may benefit from an increase in the screening intensity.

Proof. From Assumption 2, $\Pi_B(p) > \Pi_A(p)$ for all p. Hence, for all $K \in [\Pi_B(1) - \Pi_A(1), \Pi_B(0) - \Pi_A(0)]$, there exists a value $p^*(K)$ such that if $p < p^*(K)$ then culture B is adopted, and if $p > p^*(K)$ then culture A is retained. Suppose that $\underline{p} < p^* < \bar{p}$, and denote $u_i(p)$ the utility of an agent when culture $i \in \{A, B\}$ is retained for period $t = 2$. We have

$$u_A(p) = [s + (1-s)(1-p)]w + [s + (1-s)(1-p)^2]w,$$

$$u_B(p) = [s + (1-s)(1-p)]w + (1-q)[s + (1-s)(1-p)^2]w$$
$$+ q[s[\mu + (1-\mu)s] + s(1-s)(2-\mu)(1-p) + (1-s)^2(1-p)^2]w.$$

Naturally, $u_A(p) > u_B(p)$ for all p. Therefore, if $u_A(\bar{p}) > u_B(\underline{p})$, then the agent strictly prefers a probability of detection $\bar{p}$ rather than $\underline{p}$. □

From the agents' viewpoint, screening has costs but also benefits. On the one hand, more intense screening forces the agents to bear the investment cost and increases the likelihood of being fired for not having skill A. On the other hand, it decreases the likelihood of being replaced due to a switch to a new culture. Indeed, more intense screening increases the fit between the organization's agents and its current culture because agents who are less adapted to the current culture are more likely to be detected and screened out.[13] As a consequence, increased screening implies a higher opportunity cost of adopting a new culture. The resulting lower likelihood of a culture change benefits agents. This is because a change in culture means that agents have to go through two different screens, first for skill A and then for skill B.[14] When the opportunity for a culture change is likely (q is large), the agents are better off with a sufficiently high level of screening. Conversely, when being skilled is costly (i.e. w small), the

[13] In a model with effort, screening increases the fit between the organization's culture and its agents for another reason. Indeed, the first effect itself provides agents with more incentives to adapt, by undertaking investments that are specific to the current culture.

[14] In a model with effort, a low probability of culture change is also beneficial in that it protects their investments specific to the current culture.

benefits of a quite life under slack screening dominate. Interestingly, if screening is costly, it is possible that agents will favor *more* intense screening than the organization would be willing to pay for. Indeed, when evaluating the benefits of screening, they take into account its effect on the probability of a change.

Corollary 1. If screening involves a cost that is partly borne by the organization, the agents may prefer a more intense screening than optimal from the organization's viewpoint.

These results suggest that an active management of organizational culture is key to controlling the tensions between the organization's performance and the welfare and incentives of its agents. They also imply that these very tensions can generate conflicts between the organization and its agents or between different groups of agents.

6. Concluding remarks

In the last decade, practitioners and scholars have increasingly recognized the importance of 'group phenomena' within organizations. Of particular interest is the idea that the behavior of some agents can influence that of others even if there are no direct externalities between agents, and thus shape the organizations' long run behavior and performance. It has been suggested that such power may harm the organization's performance, as in the case of herd behavior in a career concern context (Scharfstein and Stein, 1990) or improve it, as in the case of long-run cooperation between overlapping generations of agents (Crémer, 1986; Kreps, 1990). Group and individual behavior can also interact in the selection among multiple equilibria (Carrillo, 1996) or when individual behavior perpetuates the existing reputation of the group vis-à-vis outsiders (Tirole, 1996). Formal models of corporate culture have stressed the benefits of a strong cultural identity. For instance, it can accelerate the organization's reputation building (Kreps, 1990) or encourage communication (Crémer, 1993; Lazear, 1995). In this perspective, our contribution may be seen as a partial theory of organization structure based on the idea that individuals' incentives and behavior influence others, which in turn impacts on the organization's long-run behavior and performance. This model can also help analyze a number of other issues. Of particular interest are the strategies that an organization can implement in order to promote culture-specific investments by its agents. Carrillo and Gromb (1997) proposes a theory of the costs and benefits of cultural uniformity within organizations that is based on this perspective: uniformity commits the organization to some degree of inertia in its culture. This in turn provides incentives for its agents. Related issues of importance are the implications for cultural stability of the organization's age, its growth rate, and other factors that affect the 'strength' of its culture.

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