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ABSTRACT

Career Concerns and the Acquisition of Firm-Specific Skills

by Bernard Sinclair-Desgagné and Olivier Cadot[1]

This paper studies compensation schemes that can motivate a worker to acquire nonverifiable firm-specific skills, when the acquisition process is also one of learning about managerial talent. At the beginning of the employment relationship, the worker encounters opportunities to enhance her specific human capital. Greater skills may increase the chances of being promoted; but as more opportunities are taken, more is learned about the worker's talent, and someone displaying low talent is sure not to be promoted. In this context we show that first-best firm-specific skills collection can be implemented with a scheme that combines discretionary promotions, an appropriate wage schedule and subsidies of training *at the margin*.

ZUSAMMENFASSUNG

Karrierepläne und der Erwerb von unternehmensspezifischen Fähigkeiten

In diesem Beitrag werden Entlohnungssysteme untersucht, die einen Beschäftigten dazu motivieren können nichtverifizierbare unternehmensspezifische Fähigkeiten zu erwerben, wenn es sich darum handelt, in diesem Prozeß auch Managementfähigkeiten zu erlernen. Zu Beginn der Beschäftigung sieht sich der Beschäftigte Möglichkeiten gegenübergestellt, sein spezifisches Humankapital zu vergrößern. Bessere Fähigkeiten können die Wahrscheinlichkeit für eine Beförderung erhöhen. Je mehr Gelegenheiten er wahrnimmt, desto besser wird auch das Talent des Beschäftigten erkannt. Bei geringem Talent wird auch deutlich, daß keine Beförderung ansteht. In diesem Zusammenhang wird gezeigt, daß der erstbeste unternehmensspezifische Fähigkeitserwerb mit einem Entlohnungsschema umgesetzt werden kann, das Beförderungen mit Ermessensspielraum bei einem angemessenem Gehalt und ein Fortbildungsförderungssystem "am Rand" verbindet.

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"Let him who knows little, play safe, whatever his job, and even though he be not adjudged smart, he will be adjudged sound."
(Baltasar Gracián, *The Art of Worldly Wisdom*, 1647)

1. INTRODUCTION

Workers entering a new job are often expected to invest in specific skills that increase their future productivity inside the firm. Examples of such skills are the knowledge of the firm's products, markets and business environment, the ability to handle problems either with customers or on the shop-floor effectively, or an approach to decision making and implementation consistent with corporate culture. These skills are typically not verifiable by someone outside the firm, so contracts that base rewards on their acquisition are difficult to enforce. In addition, workers acquire these skills mostly by dealing with new situations and problems. But exposure to unusual events is again not contractible, for those events cannot be predicted beforehand. In this context it can be difficult to motivate workers to collect enough skills. One problem, discussed by Carmichael (1983a) and Kahn and Huberman (1988), is the presence of *dual moral hazard*: an opportunistic firm may renege on a promise to give its worker a higher wage, by claiming that the worker has not acquired the required skills even when she did; anticipating this, a worker has of course no incentive to collect firm-specific skills. Most solutions to this problem rely on discrete incentives and internal labor markets: wages are linked to jobs rather than performance, and diligent employees are rewarded through assignments and promotion (see Kahn and Huberman, 1988, Carmichael, 1983b, and Prendergast, 1993).

Another matter that may also affect the acquisition of skills in this context is a worker's *career concerns*. Clearly, firms seek to identify talented workers early in their career.[2] Some sorting is done at the recruitment stage, but key additional information is gathered during the first years of employment and this information is used at the time of promotion. Young workers would then worry about the impact of their current training

[2] Talent may be defined as leadership, practical judgment, interpersonnal skills, creativity, business flair, i.e. any intrinsic and intangible quality that matters when a worker holds a key position.

decisions on their professional reputation.[3] They might as a consequence avoid valuable experiences that would increase their skills, because of fear of endangering their promotion.

Several firms have already acknowledged this fact. For instance, in a case study of L'Oréal, Sadler (1993, pp. 159-160) describes a corporate culture that developed in order to persuade new managers in training to be proactive and ready to take risks.[4] In a recent paper, Koike (1994) mentions an interesting device used in Japanese manufacturing firms to develop blue-collar workers' skills:[5]

> **The major way [to acquire intellectual skills] is broad on-the-job training (OJT). [...] One of the most important parts of OJT is to study problems on the shop-floor. It is common practice for each worker to write short reports on significant problems he has recently encountered; on what they were, how he dealt with them, and what problems still remain. These reports are filed, and are discussed in workshop meetings.**

This procedure is exposed to career concerns, as workers may choose to reflect only on situations that were not too challenging. We will argue below that the actual organization of training on the shop-floor would prevent such behavior to occur.

This paper focuses on compensation schemes that motivate workers to invest in firm-specific human capital, when investment is subject to *both* dual moral hazard and career concerns. Our analysis builds on the respective works of Prendergast (1993) and

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[3] Gibbons and Murphy (1992) find empirical support for the existence of career concerns amongst new CEOs; they conjecture that the same phenomenon should prevail as well, perhaps even more strongly, in internal labor markets. Indeed, in a study of training and evaluation sponsored by the American Management Association, Boyatsis (1982, pp. 165-169) reports that entry level managers demonstrate less perceptual objectivity than do executive level managers: that is, they are less able "to remove a degree of personal involvement, or the strength of their personal position, from examining the issue or event."

[4] To summarize, L'Oréal believes that the best training for its new managers is to take up challenging assign-ments. First, by doing so they get to know the business better; second, it is then easier to identify people with high potential. The company deems, however, that the latter might undermine the former. Hence, a key element of its culture is the *right to fail*: "If you want risk-takers, said the vice-president responsible for human resources, they must know they won't get in trouble if they fail."

[5] Koike also argues that the training methods used by Japanese manufacturing firms are basically the same ones, extended to cover blue-collar workers, that were originally developed for white-collar workers in the West.

Holmström and Ricart I Costa (1986). Like the latter but unlike the former, we assume that the worker controls the information generated on her talent: more is learned about it if she decides to get more exposure to the firm's specific activities. Unlike the former, we also have that a worker whose talent is revealed to be low would not be promoted, whatever the amount of skills she may have collected; hence, the ex ante probability of promotion may exhibit a discrete drop as training increases. These two features are accountable for the presence of career concerns.[6] In this context we find that promotion and a wage schedule alone do not guarantee that the worker would acquire enough firm-specific skills. First-best firm-specific skills collection by the worker can only be achieved if the firm supplements promotion and wage incentives with schemes that decrease the worker's *marginal* cost of training.[7]

The paper is organized as follows. Section 2 contains a description of the model. Section 3 shows that first-best firm-specific skills collection cannot be implemented using only wages and promotion. Section 4 demonstrates that the worker will acquire the optimal amount of firm-specific skills if the firm also splits the marginal cost of training. Section 5 presents some implications of the analysis. In particular, it discusses the link between recruitment and career development policies of the firm. Section 6 summarizes and concludes the paper.

2. THE BASIC MODEL

Consider a two-period employment relationship involving a worker and a firm. Both parties are risk neutral and do not discount the future.[8] Information is symmetric

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[6] Unlike most articles on career concerns (e.g., Holmström and Ricart I Costa, 1986, or Gibbons and Murphy, 1992), we do not need here that the worker be risk averse. Making this assumption would not change the qualitative results.

[7] Hashimoto (1981) has argued that one reason investment in firm-specific human capital might be shared between the worker and the firm is to minimize the loss from non-optimal separation. Here, the cost of acquiring firm-specific skills is shared because this induces the worker to collect a larger amount of such skills. With cost sharing the worker takes actions that bring information about her managerial talent. This leads to more, not less, promotion denials.

[8] Assuming that the firm and the manager have the same discount factor would not change the results.

throughout the relationship. It is not known initially whether the worker is talented (h) or not (l). The prior probability that she is talented is q.

At the start of the first period, a contract is signed which specifies the worker's first-period task *a* (> 0) and wage *w*, together with what would be the second-period task *A* (> *a*) and wage *W* if the worker were promoted after the first period. Wages are paid at the beginning of each period.

During the first period, while performing task *a*, the worker encounters opportunities to acquire firm-specific skills. Denote by $e \in [0,1]$ the percentage of those opportunities that she takes. This percentage - thereafter called *exposure* - may be observable by the firm but it is not verifiable, hence it cannot be made part of the contract.[9] The acquired skills have no value outside the firm. Exposure *e* costs the worker an amount c(e), where the function c(·) is increasing and strictly convex; c(0) = **0. It also triggers a binary event ù (again observable by the worker and the firm but not** verifiable by an outsider) which may be good (g) or bad (b), the probability of the former being $f^h(g;e)$ if the worker is talented or $f^l(g;e)$ if she is not. Observation of this event leads the firm to update its prior assessment of the worker's ability; according to Bayes's

$$Q(w;e) = \frac{q\ f^h(w;e)}{q\ f^h(w;e) + (1-q)\ f^l(w;e)} \quad .$$

rule the updated probability that the worker is talented is given by

We shall make the following assumptions concerning the probability distribution functions. The interpretation of these assumptions is given thereafter.

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[9] The probability that the worker is talented could be referred to as her *type*, and the worker's exposure as her *action*. Both being observable but not necessarily verifiable, the model folds into the general framework of implementa-tion theory. Using this machinery one could design a mechanism that implements first-best exposure (see Maskin, 1985, theorem 2). In section 4 we provide an alternative to this mechanism that is simpler and (like the one analyzed in Hermalin and Katz (1991), but without allowing renegotiation) captures several features of internal labor markets.

Assumption 1. $f^h(g;e)$ is increasing in e, with $f^h(g;0) = 0.5$ and $f^h(g;1) = 1$. On the other hand,

$f^l(g;e)$ is decreasing in e, with $f^l(g;0) = 0.5$ and $f^l(g;1) = 0$.

Assumption 2. $f^h(b;e)/f(b;e)$ is concave in e, where $f(b;e) = qf^h(b;e)+(1-q)f^l(b;e)$.

Assumption 3. $f(g;e) = qf^h(g;e)+(1-q)f^l(g;e)$ is concave and increasing in e.

The first assumption captures the relationship between exposure and learning. Greater exposure implies that more is learned about the worker's talent. When exposure is maximal, i.e. when e = 1, it becomes known with certainty whether the worker is talented or not. The next two assumptions make the firm's and the worker's maximization problems concave. Note that assumption 1 implies that 1-Q(b;e) - the posterior probability that the worker is not talented given a bad signal - increases with exposure. Assumption 2 adds that it does so at an increasing rate. Assumption 3, on the other hand, says that greater exposure raises (at a decreasing rate) the probability that a good signal will occur. These three assumptions are satisfied, for example, by the following simple distributions:

$$f^h(g;e) = \frac{(1+e)}{2} \quad , \quad f^l(g;e) = \frac{(1-e)}{2} \quad , \quad q > \frac{1}{2} \ .$$

Now, at the beginning of period two, the firm decides on the basis of Q(ù;e) whether or not to promote the worker. A promotion is observed by the market and so affects the worker's outside opportunities. The worker who is promoted performs task *A* at the contractual wage *W* in period two. In addition to *A*, the firm gets a rent B(e) from the worker's investment in the previous period, and a random premium Ù. The function B(·) is increasing and strictly concave, with B(0) = 0. Let us assume that B'(e) > c'(e) for all e, so that skills collection by the worker has diminishing but positive social returns. **The premium Ù follows a distribution J^h** if the worker is talented or J^l if she is not; the mean of J^h, noted H, and the mean of J^l, noted L, are respectively positive and negative. Let us write $J(x) = xJ^h + (1-x)J^l$. With no firm-specific skills collection and no additional information on the worker's talent, the stipulated marginal product A should be an

unbiased estimate of the worker's performance if she is assigned task A, that is: $E^{J(q)}(\dot{U}) = qH + (1-q)L = 0$. In general, the firm's expected payoff from promoting the

$$A + B(e) + E^{J(Q)}(\Omega) - W \ .$$

worker in period two will be given by

To make the firm's promotion decision nontrivial we shall suppose that A + B(1) + L < a, i.e. the payoff from promoting a worker who is known not to be talented is always dominated.

The worker who is not promoted may either stay with the firm, performing again task *a* at wage _ = *a*, or get an equivalent outside job at the same wage. We will assume without loss of generality that she leaves. She is replaced for task *A* by an outsider paid _ = *A*. The firm then gets *A*, a rent B(0) = 0, and a random premium Ù distributed according to J(q). Its net expected payoff from not promoting the worker in period two is then 0.

Let á ∈ {0,1} denote the firm's promotion decision: á = 1 when the worker is promoted and 0 when she is not. At the beginning of period two, the firm solves the

$$\max_{a \in \{0,1\}} a \ [A + B(e) + E^{J(Q)} - W] \ .$$

following problem

The á that solves (4) is a function of Q(ù;e) and is therefore contingent on the realization of the first-period signal ù and on the exposure level *e*.

Taking the firm's promotion rule into account, the worker then sets her first-

$$\max_{e \in [0,1]} E [a \ W + (1 - a) a] - c(e) \ .$$

period exposure in order to solve

The firm's problem at the beginning of the first period is to design an optimal

$$\max_{w,W} \; a - w + E\,[\,a\,(\,A + B(e) + E^{J(Q)}(\Omega) - W\,)]$$

$$\textit{subject to :}$$

$$a \;\textit{solves}\,(4)$$

$$e \;\textit{solves}\,(5)$$

$$w + E[\,a\,W + (1-a)\,a\,] - c(e) \geq 2\,a$$

$$W \geq A.$$

contract that solves

The first two constraints mean that the contract must be incentive compatible for both parties. The third one is the worker's participation constraint before entering the employment relationship: the worker compares the actual contract and career path with the alternative of staying on the spot market for jobs of type *a*. The last constraint implies that the worker would not quit after being promoted.[10]

The description of the basic model is now complete. Let us first show that in this setting the worker cannot be motivated to collect the optimal amount of firm-specific skills.

3. THE DIFFICULTY OF IMPLEMENTING FIRST-BEST EXPOSURE

Suppose that the firm could dictate the worker's exposure in period 1. The firm's problem would then be to maximize its expected profit at the beginning of the first period **by choosing á and** *e*. Since the participation constraint is binding, we have

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[10] In general, this no-quitting constraint should also take into account what the other firms that observe the worker's new assignment infer about her talent (see Waldman, 1984, or in a context closer to ours, Ricart I Costa, 1988). That is, the right-hand-side of this constraint should in general be A + E[added income due to the worker's talent | the worker was promoted]. This added generality would not affect our qualitative conclusions.

$$a - w = E[\, a\ W + (1 - a\ )a\ ] - c(e) - a$$

$$= E[a\ (W - a\ )] - c(e)\ .$$

$$\max_{e,a}\ E[\, a\ (A + B(e) + E^{J(Q)}(\Omega\ ) - a)] - c(e)\ ,$$

After substituting into the objective of (6), this problem becomes
i.e. the firm maximizes total expected surplus.

The first-best level of exposure which solves (8), noted e^*, has the following properties.

PROPOSITION 1. *Sorting occurs at the first-best exposure level, and the probability of promotion is* $f(g;e^*)$.

PROOF. **In order to solve problem (8), á must be set equal to 1 if and only if A-**

$$\max_{e}\ E[\ \max(\ 0\ , A - a + B(e) + E^{J(Q)}(\Omega\ )] - c(e)\ .$$

$$f(g;e)(A - a + B(e) + (1 - \frac{f^h(g;e)}{f(g;e)}\ )L)$$

$$+\ f(b;e)\ \max[\ 0\ , A - a + B(e) + (1 - \frac{f^h(b;e)}{f(b;e)}\ )L\ ] - c(e)\ ,$$

$a+B(e)+E^{J(Q)}(Ù)$ is nonnegative. This means that this problem is equivalent to

Writing the objective function of (9) at length, one gets

since $A > a$, $L < 0$, $f^h(g;e) > f(g;e)$ and $f^h(b;e) < f(b;e)$. This expression is not smaller than $A-a+B(e)-c(e)$, which is the firm's payoff when á is fixed at 1. The inequality must be strict when $e = 1$, because the argument of $\max(0,\cdot)$ is then negative. Since $B(e)-c(e)$

is an increasing function of e, one must admit that (10) reaches its maximum at an

$$f(g;e^*)(\,A - a + B(e^*) + (1 - \frac{f^h(g;e^*)}{f(g;e^*)})L\,) - c(e^*)\ ,$$

level $e^* > 0$ where it is equal to

exposure

i.e. where Prob{á=1} = f(g;e*) < 1. This proves the result. □

We will now seek ways to implement e^*. This section's result is a negative one, however.

PROPOSITION 2. *Using only promotion and a contracted wage schedule, the firm cannot implement the first-best exposure level* e^*.

PROOF. When there is sorting, the worker's choice of exposure is given by the

$$(W - a)\, f_e(g;e) - c'(e) \geq 0 \quad \text{if } e = 1$$

$$= 0 \quad \text{if } e < 1\ .$$

first-order condition

$$f_e(g;e^*)(A - a + B(e^*) + (1 - \frac{f^h(g;e^*)}{f(g;e^*)})\,L)$$

$$+ f(g,e^*)[(B'(e^*) - \frac{d}{de}\,\frac{f^h(g;e^*)}{f(g;e^*)}\,L)] - c'(e^*) \geq 0 \text{ if } e^* = 1$$

$$. \qquad . \qquad . \qquad = 0 \text{ if } e^* < 1.$$

But using (11), first-best exposure is determined in turn by the first-order condition

Considering these two expressions, it is clear that e^* maximizes the worker's payoff under

$$W^* \geq \frac{\frac{d}{de}\left(A + B(e^*) + \left(1 - \frac{f^h(g;e^*)}{f(g;e^*)}\right) L\right) f(g;e^*)}{f_e(g;e^*)}$$

$$= \left[A + B(e^*) + \left(1 - \frac{f^h(g;e^*)}{f(g;e^*)}\right) L \right]$$

$$. \qquad + \left[\left(B'(e^*) - \frac{d}{de}\frac{f^h(g;e^*)}{f(g;e^*)} L\right) \frac{f(g;e^*)}{f_e(g;e^*)} \right] ,$$

sorting if and only if the second-period wage is set to

with equality if $e^* < 1$. Note now that W^* is greater than or equal to the firm's surplus at e^*, plus a second term which is strictly positive. Therefore, with $W = W^*$ the only solution to the firm's second-period problem (4) is á = 0. The worker's chosen exposure in this case would clearly not be e^*. □

The above argument uses the fact that the second-period wage *W* cannot be higher than the firm's expected payoff at $e = e^*$. This argument bears on the underlying assumption that the firm is not able to commit ex ante to promote a fixed number of workers. This lack of commitment limits the power of explicit contracts and promotion as tools to implement optimal specific skills acquisition. The firm might seek to tackle this fundamental problem through various means. It is well known, for instance, that tournament-based promotions enable the firm to commit to promote a fixed number of workers.[11] But such a device can hinder cooperation between workers.[12] Hence, it might be cheaper for the firm to simply do without committing to promotion. A solution of this kind will now be explored.

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[11] Mandatory retirement might be another way for the firm to achieve such a commitment. See Lazear (1979).

[12] There is an abundant literature on tournaments. See Milgrom and Roberts (1992), Macleod (1994) or Lazear (1995), and the references therein.

4. MARGINAL-COST SHARING

We assumed so far that the firm had only two instruments - wages and promotion - to motivate the worker to acquire firm-specific skills. Suppose now that it can also share the cost of collecting those skills. Monetary transfers from the firm to the worker are not workable, however, because of dual moral hazard. The worker who receives a subsidy beforehand has no incentives to take the offered opportunities since the firm cannot credibly retaliate. Similarly, *e* being nonverifiable, at the end of the first period the firm may well renege on a promise to compensate the worker; anticipating this, the latter would again not collect the expected amount of skills. The only possibility left to the firm is therefore to reduce the worker's *marginal* cost of exposure. For example, it may encourage mentoring, give the employee more room to try things out and learn, provide an information system that supports on-the-job training, or undertake and implement the results of an ergonomics study that lower the marginal disutility of work.[13] Let the worker's cost of exposure be now (1-s)c(e), where s is the fraction of the total cost born by the firm. The next proposition states that first-best exposure e^* (which the firm can calculate since the parameters of the model are common knowledge) is implementable with a suitable choice of *s* and *W*.

PROPOSITION 3. *Assuming an interior solution to the worker's problem, the firm implements first-best exposure* e^* *by committing to a second-period wage* W *and a cost sharing ratio* s^* *that satisfy the following conditions:*[14]

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[13] Such ways of reducing a worker's marginal cost of exposure are often labelled as *fringe benefits*. Taxation is usually invoked for explaining the existence of fringe benefits. In a recent paper Zou (1994) argues that fringe benefits may also help mitigate moral hazard in agency settings. The present section demonstrates, furthermore, that some fringe benefits might be used to make workers collect the optimal amount of specific human capital.

[14] Note that *s** is unique *given* W.

$$s^* = \frac{-(W-a)\ f_e(g;e^*) + c'(e^*)}{c'(e^*)}\ ,$$

$$B(e_s) + (1 - \frac{f^h(b;e_s)}{f(b;e_s)})\ L\ <\ W\ -\ A\ \leq\ B(e^*) + (\ 1\ -\ \frac{f^h(g;e^*)}{f(g;e^*)}\ )\ L$$

$$\textit{where}\ \ e_s\ \ \textit{solves}\ \max_{e\ \in\ [\ 0,1\ ]}\ \ S(e) \equiv B(e) + (1 - \frac{f^h(b;e)}{f(b;e)})\ L\ .$$

PROOF. First note that condition (16) is consistent. By assumption 2, $S(\cdot)$ is strictly concave. Since $S(0) = 0$, $S(e_s) \geq 0$ and $S(e^*) < 0$, it must then be that $0 \leq e_s < e^*$.

Now, the first-order condition (13) implies that the coefficient s^* must satisfy (15) in order to implement e^*. We must show that s^* is well defined, i.e. that $0 < s^* < 1$ for a second period wage *W* satisfying (16). Note that s^* decreases with *W*. When $W = a$, $s^* = 1$; when $W = W^*$, $s^* = 0$ by the proposition's assumption. Hence, if *W* fulfills condition (16), s^* is strictly between 0 and 1. □

Condition (15) says that the firm must absorb that fraction of the worker's cost which is given by the difference, adjusted by a factor $1/c'(e^*)$, between the worker's marginal cost and her marginal benefit at $e = e^*$. The ratio s^* can then be seen as a measurement of the worker's reluctance to accept exposure level e^*. Condition (16) says that the second-period wage *W* must be strictly higher that the market wage *A*. The reason is that e^* is never a *global* optimum of the worker's problem (5) when there is a lower exposure level at which getting promoted is a sure outcome. The firm must eliminate those *safe havens* in order to implement the first-best. It can do so by setting the second-period wage so high that it is committed to sorting. This is the case if *W-A* is higher than the left-hand side in (16).[15]

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[15] This scheme is not efficient *ex post*, for a worker who turns out to have little managerial talent would not be rewarded for collecting skills. Moreover, this scheme is not renegotiation-proof. If $e_s > 0$ and the manager selects an exposure level $e \in (0,e_s)$, then *both parties* have an interest to renegotiate the contract at the start of period 2. But if renegotiation takes place, it is impossible to implement the first-best e^* and there will be underinvestment in firm-specific skills (see, for example, Hart and Moore, 1988). First-best firm-specific skills acquisition bears strongly on the firm's capacity to commit to the contracted wage schedule (but not necessarily to promotion).

One striking illustration of the combined use of promotion and cost sharing is the case of the Japanese manufacturing firms mentioned in the introduction. The incentive system that prevails in those firms is typical of internal labor markets: jobs are ranked, workers move between jobs through promotion, and payments are attached to jobs rather than results. In addition, those firms make on-the-job training alternate with short periods of formal training. According to Koike (1994, p. 50), this is meant to help workers articulate their previous experience in order to make it more valuable: it is believed that, "without systematizing or theorizing the experience, intellectual skills cannot be established at the level that enables workers to deal with problems effectively." Proposition 3 provides a further rationale for this practice. Formal training is certainly costly to the firm but it makes the identification and analysis of significant problems on the shop-floor easier to workers; in particular, it decreases workers' cost of writing rewarding reports. Hence, it enhances the incentives provided by internal labor markets so that workers should optimally invest in specific human capital.

5. FURTHER IMPLICATIONS

Recruitment, compensation and career development (training and promotion) are standard pieces of the firm's overall management of human resources.[16] The literature often studies each one separately. In this section we want to consider the relationships that exist between them.

The connection between employment policy and wages has been studied by Lazear (1989), who showed that firms relying strongly on relative performance evaluation and incentive pay would do more screening of employees to eliminate "hawks", i.e. workers who in this context would engage in sabotage activities. The link between compensation and training was emphasized in the early works on human capital (e.g., Becker, 1964, and Hashimoto, 1981). The present model also relates wages and firm-specific skills investment. One first prediction, which is consistent with human

[16] A somewhat less conventional mean for managing human resources is the capital structure. In a recent paper Jaggia and Thakor (1994) show that a firm requiring greater investments by its workers in firm-specific skills might rely less on debt than on equity; for rational workers would foresee that debt financing allows the firm to declare bankruptcy and legally renege on long-term contracts when times are rough.

capital theory, is that the second-period wage W is larger than the market wage A. Let

$$w = a + (1 - s^*) \bullet c(e^*) - f(g;e^*)(W - a)$$

$$= a + (W - a)\left(\frac{f_e(g;e^*)}{c'(e^*)}\, c(e^*) - f(g;e^*)\right) .$$

us now look at the first-period wage w. It is determined by the participation constraint

$$\frac{f_e(g;e^*)}{f(g;e^*)} < \frac{c'(e^*)}{c(e^*)} .$$

of problem (6):

This wage is smaller than the marginal product and market wage *a* if

Inequality (18) has an interesting interpretation. It means that an increase in the worker's exposure from the first-best level contributes more (in percentage) to augment her cost than to raise the chances of promotion. If this is the case, the firm needs to provide stronger monetary incentives. It will then adopt an ascending wage schedule where $w < a < A < W$. Such a wage schedule corresponds to the one predicted in the human capital literature. In this literature the worker's effort level has no influence on the firm's inference about her talent, so $f_e(g;e^*) = 0$ and (18) is automatically satisfied.

Let us finally study the relationship between the firm's recruitment and development policies. The parameter q can be interpreted as a proxy for how selective the firm is when it hires new people. Let us assume that q is always bigger than 0.5, for it is plausible that only workers who seem somewhat talented be hired. The relationship between q and s* in the present model is negative; i.e.

$$\frac{d s^*}{d q} = \frac{-(W - a)(f_e^h(g; e^*) - f_e^l(g; e^*))}{c'(e^*)} < 0$$

by assumption 1 and proposition 3. Hence, when there is more uncertainty about the talent of incoming workers (i.e. when q is close to 0.5), either because applicants screening is rather loose or because the pool of workers is more diverse, the firm must spend more resources on training.

6. CONCLUDING REMARKS

The development of specific human capital raises two main issues. First, it involves investments that are typically not easily verifiable. This leaves room for dual moral hazard. Another aspect of the development of specific human capital is that it involves *two kinds of learning*. While the worker learns to deal more effectively with materials, information, customers, colleagues, and organizational processes, she and her employer also learn about herself and her own talent. Examining the trade off between these two kinds of learning has been a central theme of the abundant literature on career development (see, e.g., Dalton, 1989, and the references therein, but also Gibbons, 1997, p. 14). It was observed that such double-edged learning fuels *career concerns*: the worker worries about maintaining a sense of competence, about engendering self-respect and the respect of others; she becomes discouraged when facing unstable career patterns.

In this paper we analyzed the development of specific human capital under the simultaneous presence of dual moral hazard and career concerns. We found that a *combination* of organizational devices - marginal cost sharing and discrete incentives - is sufficient to implement *first-best* firm-specific skills collection.[17] The deployment of these tools presupposes, as usual, that the firm can at least commit to a wage schedule.

[17] In Cadot and Sinclair-Desgagné (1992) we show, however, that the first-best cannot be reached in the political arena. Indeed, the incentive devices that firms can use are more diverse and powerful than those available to voters.

Our model captures a two-party relationship.[18] It would well fit situations where an investment in specific skills possesses high value for the firm but few workers would or could get the exposure. Examples are voluntary membership on a committee of critical importance to the organization, or learning of a highly specialized business function. There are other contexts, however, where the required skills - being a "good citizen", for instance (i.e. arranging social functions and handling bureaucratic details) - can be collected by several people at the same time. In this case, organizational devices like tournaments may enhance skills acquisition better at a lower cost. Most business positions require in fact various types of firm-specific skills. Further disaggregated studies of human capital should therefore lead to the formulation of *eclectic career systems*, i.e. dynamic human resource management policies that integrate several incentive devices.

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[18] Hence, it takes the hierarchy structure as exogenously given. This assumption is relaxed in a recent paper by Demougin and Siow (1994) which does not, however, include career concerns.

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