PROMOTIONS And CAREER CONCERNS

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Fama (1980) argues that "market forces alone will frequently remove moral hazard problems, because managers will be concerned about their reputations in the labour market. Thus, there will be no need to resolve incentive problems using explicit contracts, since markets already provide efficient implicit incentive contracts."

Holmström's (1982/1999) purpose was "to investigate in some more detail Fama's rather provocative but interesting idea that career concerns induce efficient managerial behaviour."

Results : Under some narrow assumptions, Holmström shows that Fama's conclusion is correct. In general, however, it is not. Risk-aversion and discounting place obvious limitations on the market's ability to provide adequate incentives.

The simple-task additive-normal career concerns model
Dewatripont, Jewitt and Tirole (1999)

Two periods : today and tomorrow

Today's performance (*y*) is the sum of his talent (*Θ*), current effort (*e*) and the realization of a white noise (ϵ).

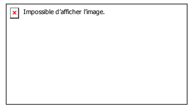
$$y = e + \theta + \varepsilon$$

The distribution of talent has full support and is unknown to everybody.

Effort is observed only by the manager and costs him *c(e).*

Performance is observable, but not describable *ex ante* in a formal compensation contract.

The agent is paid a fixed wage t1 today, and so exerts effort only to influence his wage tomorrow t2.

His wage tomorrow is the market's assessment of his productivity: t2 = 

The agent maximizes *t1 – c(e) + δ t2(y),* where *δ* corresponds to the discount factor between the two periods.

Technical assumption : *Θ and ϵ are independent random variables, normally distributed with respective means EΘ and 0, respective variances* σ_θ^2 *and* σ_ε^2

PART I: Choice of Effort

Suppose the market anticipates equilibrium effort e*. The agent chooses *e* so as to maximize his expected utility

$$\max \delta \times \underset{y}{E}[\underset{\theta}{E}(\theta \mid y, e^*)] - c(e)$$

Assuming an interior solution, the FOC for a (pure strategy) equilibrium is

$$\delta \times \frac{d}{de}\left(\int \left(\int \theta \frac{f(\theta, y \mid e^*)}{g(y \mid e^*)} d\theta \right) g(y \mid e) dy \right) \Bigg|_{e=e^*} = c'(e^*)$$

$$\Leftrightarrow \int \int \theta \frac{g_e(y \mid e^*)}{g(y \mid e^*)} f(\theta, y \mid e^*) dy d\theta = c'(e^*)$$

Using the fact that the likelihood ratio has zero mean (*$E(g_e / g) = 0$*), we obtain we well known formula

$$\operatorname{cov}\left(\theta, \frac{g_e}{g}\right) = c'(e^*)$$

Which, in the case of normal laws reduces to

$$\delta \frac{\sigma_\theta^2}{\sigma_\theta^2 + \sigma_\varepsilon^2} = c'(e^*)$$

Two clear cut results:

1. e* is strictly increasing in σ_θ^2

The less the market knows you, the more the market can modify what it thinks about you, the more you exert an effort in order to convince it that you are good so as to increase your wage tomorrow.

1. e* is strictly decreasing in σ_ε^2

The more important the extraneous (white) noise, the less accurate the first-period signal (y) about your talent, the lower the effort you exert in order to impress the market and to obtain a higher wage tomorrow.

Extension to a multi-period model (Holmström 1982/99)

Now, we have: $$y_t = \theta_t + e_t + \varepsilon_t \qquad t = 1, 2, 3...$$

Why Θ_t and not simply Θ. Because, else reputation formation would be valuable only temporarily. Holmström assumes:

$$\Theta_t = \Theta_{t-1} + \gamma_{t-1}$$

Then, $$U(w_t, e_t) = \sum_{t=1}^{\infty} \delta^{t-1} \left(w_t - c(e_t) \right)$$

Looking for a stationary equilibrium of effort e*, we obtain.

Proposition 1. *The stationary level of labor supply e* is never greater than the efficient level of effort [c(e*)=1]. It is equal to* e^{FB} *if* $\delta = 1$, σ^2_ϵ *and* $\sigma^2_\gamma > 0$. *It is closer to* e^{FB} *the bigger is* δ, *the higher is* σ^2_γ *and the lower is ,* σ^2_ϵ.

In words, the comparative statics results tell us that reputation formation will work more effectively if the **ability process is more stochastic** or if the **observations on outputs are more accurate**. Both features will speed up learning and move forward the returns from labor investments, reducing the negative effects of discounting.

Coming back to the first clear cut result : e* is strictly increasing in σ_θ^2

Miklos-Thal and Ullrich, 2015, Belief Precision and Effort Incentives in Promotion Contests

What changes? Agent now compete for a promotion. This makes the return to reputation non-linear. Then, they show that effort can increase with belief precision about talent.

Promotion contest: What does it mean?

- **Traditional contest (Lazear and Rosen, 1981):** One-period model, in which several (2 at least) agents compete for a given reward. The agent is not necessarily characterized by his (unknown) talent, but there is always a moral hazard problem.
  At the end of the period, the agent with the highest output wins the price:
  Agent i wins if $y_i > y_j$.

- **Promotion contest:** Two-period model, in which agents compete during the first period, and the *best of them* is promoted in the second period. The promotion is associated with a better wage (could be interpreted as a reward).
  At the end of the period, the agent with the highest updated reputation is promoted.
  Agent i wins if $E(\theta_i \mid y_i) > E(\theta_j \mid y_j)$.

A simple Model of Promotion (M-T and U, 2015)

- Two periods: Period 1 and Period 2
- First Period Profit: $\boldsymbol{y_1 = e_1 + \theta + \epsilon_1}$
- Competitive labor market. Everybody observes $\boldsymbol{y_1}$
- At the end of the first period, updating of beliefs process: $\boldsymbol{E(\theta \mid y_1)}$
- No slot constraints: an agent is promoted if: $\boldsymbol{E(\theta \mid y_1) \geq \underline{\eta}}$
- Wages: *A particularly simple non-linear reward-to-reputation function is the step function generated by the following rule*

  Period 1: $\mathbf{W_1 = 0}$.

  Period 2: $\mathbf{W_2}$**(no promotion) = 0** but $\mathbf{W_2}$**(if promotion) = W > 0**

Note that more than non-linear, the reward to reputation function is discontinuous.

Maximization Program of the Agent

$$e^{*} = \arg\max_{e} \Pr\left[E\left(\theta \middle| y_1, e_1^{*}\right) \geq \underline{\eta}\right] \times W - c(e)$$

Moreover,

$$E\left(\theta \middle| y_1, e_1^{*}\right) = E(\theta) + \frac{\sigma_\theta^2}{\sigma_\theta^2 + \sigma_\varepsilon^2}\left(y_1 - E\left(y_1\right)\right)$$

since θ and y_1 follow a normal law. Thus,

$$\Pr\left[E\left(\theta \middle| y_1, e_1^{*}\right) \geq \underline{\eta}\right] = 1 - \Phi\left[\frac{\left(e^{*} - e\right) + \left(\underline{\eta} - E(\theta)\right) \times \frac{\left(\sigma_\theta^2 + \sigma_\varepsilon^2\right)}{\sigma_\theta^2}}{\sqrt{\sigma_\theta^2 + \sigma_\varepsilon^2}}\right]$$

Computing FOC, *e** satisfies:

$$\frac{W}{\sqrt{\sigma_\theta^2+\sigma_\varepsilon^2}}\varphi\left[\left(\underline{\eta}-E(\theta)\right)\frac{\sqrt{\sigma_\theta^2+\sigma_\varepsilon^2}}{\sigma_\theta^2}\right]=c'(e^*)$$

Applying the implicit functions theorem, we get:

$$\frac{de^*}{d\sigma_\theta^2}=W\left(\begin{array}{l}\dfrac{-1+\left(\underline{\eta}-E(\theta)\right)^2\dfrac{\left(\sigma_\theta^2+\sigma_\varepsilon^2\right)\left(\sigma_\theta^2+2\sigma_\varepsilon^2\right)}{\sigma_\theta^6}}{2c''\left(e^*\right)\left(\sigma_\theta^2+\sigma_\varepsilon^2\right)^{3/2}}\\ \\ \times\varphi\left[\left(\underline{\eta}-E(\theta)\right)\dfrac{\sqrt{\sigma_\theta^2+\sigma_\varepsilon^2}}{\sigma_\theta^2}\right]\end{array}\right)$$

Thus,

$$\frac{de^*}{d\sigma_\theta^2}\begin{cases} <0 \ \text{ if and only if } \left|\underline{\eta}-E(\theta)\right| \text{ is small} \\ \geq 0 \ \text{ if and only if } \left|\underline{\eta}-E(\theta)\right| \text{ is high enough} \end{cases}$$

Why is this the case?

Because, there are now two effects

Å First, there is a new effect, named the **closeness effect**.
A lower precision (an increase in σ_θ^2) implies that posterior reputation is **less** likely to be close to the prior reputation, which dampens (strengthens) effort incentives if the prior reputation is close to (far from) the threshold.

Å Second, there is the traditional **Learning effect** à la Holmström.
A lower precision means that the agent's performance has more impact on the posterior belief about his ability, which strengthens effort incentives.

Two Remarks on Miklos-Thal and Ullrich's Article

1. Return-to-reputation is exogenous.

Having an endogenous non-linear return-to-reputation, would allow to characterize another effect. Namely, it would allow to examine **how belief precision impacts on the wage offered, and eventually on effort.**

Intuitively : if an increase in σ_{θ}^{2} leads to an increase (a decrease) in W(promotion), then $\frac{de^{*}}{d\sigma_{\theta}^{2}}$ would be higher than in our model with a fixed « reward » in case of promotion.

2. Return-to-reputation is discontinuous.

Actually, this is theoretically impossible with $\boldsymbol{y_1}$ being symmetrically observed on the labor market. The basic reference for discontinuous return-to-reputation is Waldman (1984) in which information about the reputation of a talent is asymmetric. Being promoted reveal (good) information about an agent, which increases his outside option, and thus implies a discontinuous return-to-reputation.

Coping with the two previous remarks (Loss and Renucci, 2015)

We study a model in which:

(i) Agents can be promoted.
(ii) Learning about ability is symmetric (inside and outside the firm).
(iii) Wages are endogenously derived from underlying production functions.

We show that effort can decrease when belief precision about ability diminishes, unlike the result obtained in the seminal career concerns paper of Holmström (1982/1999).

By characterizing the impact of belief precision on incentives through the endogenous equilibrium wage function, we extends Miklos-Thal and Ullrich's (2015) analysis of the case where the return to reputation is exogenous.

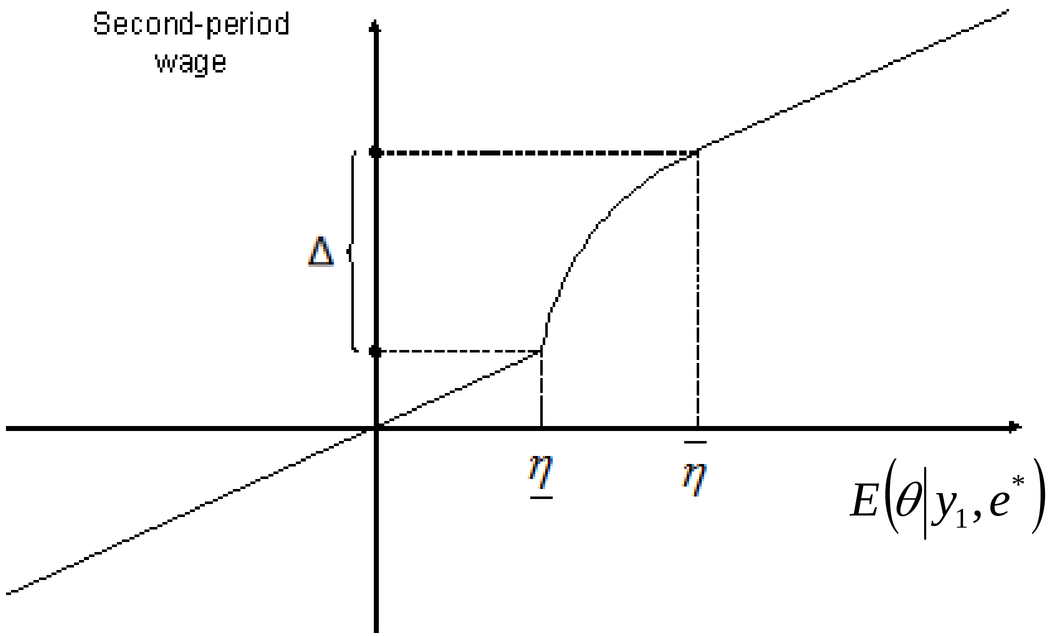
Threshold of Promotion

At the beginning of period 2, there are two different technologies.

Å The basic technology, characterized by: ***y = e + Θ + ϵ .***

Å A more elaborated technology, characterized by: $Y = \begin{cases} e+\theta+\varepsilon-\Delta & if\ \theta < \underline{\eta} \\ e+\theta+\varepsilon+\Delta & if\ \theta \geq \underline{\eta} \end{cases}$

Therefore, there is promotion if and only if $\mathbf{E(Y \mid y_1,e^*) \geq E(y \mid y_1,e^*) \Leftrightarrow E(\Theta \mid y_1, e^*) \geq \underline{\eta}}$ **.**



Making computations, we obtain:

$$e^* = \frac{\sigma_\theta^2}{\sigma_\theta^2 + \sigma_\varepsilon^2} + \Delta\left[\frac{\sqrt{2}}{\sqrt{\pi}\,(\sigma_\theta^2 + \sigma_\varepsilon^2)} \exp\left(-\frac{1}{2}\frac{(\underline{\eta} - E\theta)^2}{\sigma_\theta^2}\right) \times \left(1 - \Phi\left(\frac{(\underline{\eta} - E\theta)\sqrt{\sigma_\varepsilon^2}}{\sigma_\theta^2}\right)\right)\right].$$

Proposition:

For $\Delta > \bar{\Delta}$, *and* $\sigma_\theta^2 > \sigma_\varepsilon^2$, e^* *decreases in* σ_θ^2 *if* $\underline{\eta} - T_1 < E\theta < \underline{\eta} + T_2$, *with* $T_2 > T_1 > 0$. *Otherwise,* e^* *increases in* σ_θ^2.

This proposition reveals that there are now three effects which are at work:

1. The traditional Learning Effect, à la Holmström.

2. The Closeness Effect, à la Miklos-Thal and Ullrich.

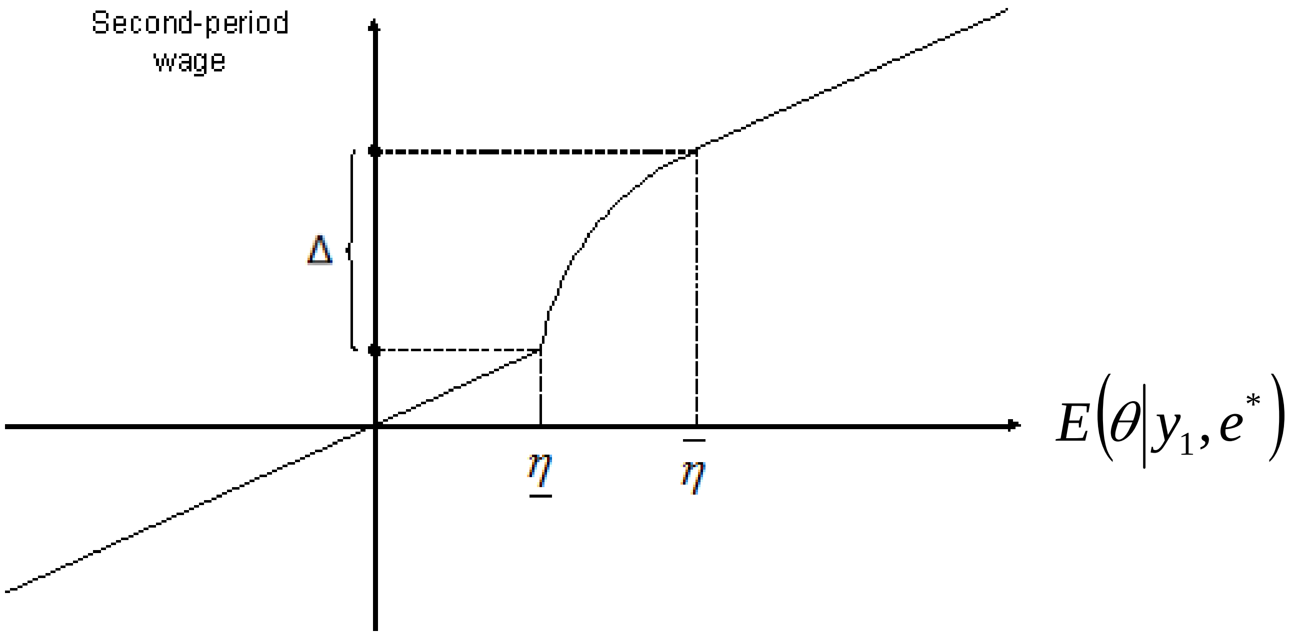
3. The Shape-of-the-Wage-Function effect. This effect makes the effect of σ_θ^2 not symmetric around $\underline{\eta}$ ($T_2 > T_1$).
   For $E(\Theta) \geq \underline{\eta}$ but close to, the agent knows that he has more to loose in average if his reputation decreases, than to gain in average if his reputation increases. This gives him incentives to exert effort in order to avoid that his reputation decreases.

Coming back to the second clear cut result : e* is strictly decreasing in σ_ε^2

Loss and Renucci, 2016, Overwhelming Hazards

Same model as in the previous model : 2 different technologies during the second period. Endogenous promotions at the beginning of period 2, when $E(\Theta \mid y_1, e^*) \geq \underline{\eta}$.

Same second-period wage shape as before:



Proposition:

When $E\theta \geq \underline{\eta}$, $\left|\underline{\eta} - E\theta\right|$ *takes intermediate values and* $\Delta \geq \Delta(\underline{\eta} - E\theta)$, e^* *increases in* σ_ε^2.
When otherwise, Holmström's (1982/1999) result holds: e^* *decreases in* σ_ε^2.

The accuracy of output about the agent's ability has two effects on incentives to exert effort.

1. The traditional learning effect à la Holmström: a lower accuracy leads the market to use output to a lower extent to revise initial reputation, which naturally dampens incentives to exert effort.

2. The Shape-of-the-Wage-Function effect. This effect depends on the agent's initial reputation compare to the threshold of promotion.
   A lower accuracy of y_1 implies that the posterior reputation of an agent is more likely to be similar to the agent's initial reputation.

   Suppose that (i) $E(\Theta) \geq \underline{\eta}$ (if the agent's reputation does not change, he is going to be promoted), (ii) there remains some "uncertainty" (i.e., $|\underline{\eta} - E(\Theta)|$ takes intermediate values). Then, the agent's second-period wage function is locally concave.

   When σ_ε^2 increases the expected marginal loss if reputation decreases , increases. This increases the expected marginal gain of effort, and explains the first part of the proposition for Δ high enough.

When otherwise, Holmström's (1982/1999) result holds: e^* decreases in σ_ε^2.

Å suppose that the agent's initial reputation is around θ. Then, the wage function exhibits convexity properties with respect to posterior reputation: what the agent gains if posterior reputation increases with respect to initial reputation is (in expectation) greater than what the agent looses if reputation decreases over time.

When σ_ε^2 increases, the updating of reputation process reduces. This reduces the impact of the convexity property of the wage function, which dampens incentives. Thus, the traditional effect and the new effect highlighted here go in the same direction.

Å Finally, when the agent's initial reputation is sufficiently far below (respectively, above) ***η***, the probability that posterior reputation exceeds the promotion threshold is close to 0 (respectively, 1). The wage function is linear in posterior reputation, just as in Holmström's (1982/1999) model (with the difference that the wage is raised by Δ in the latter case when the agent is promoted). Thus, Holmström's (1982/1999) result holds.

PART II: Incentives for Risk Taking

Holmström (1982/1999): “Providing work incentives is only part of the managerial incentive problem. To secure proper behavior in the choice of investments is equally important. Firms frequently express a concern over the way their management takes risks. Some think their managers take too much risk; but perhaps more commonly managers, particularly the younger ones, are seen as overly risk-averse.”

The model is now quite different, since the agent no longer exerts an effort, and his talent (*incomplete but symmetric information*) is just related to the selection of projects, which are going to succeed.

Holmström shows that “career concerns induce a genuine incongruity in risk preferences between the firm and the **risk-averse manager**. Indeed, the risk facing the manager is quite different from the risk that is of concern to the firm. A key variable for the manager is the likelihood of success. The manager dislikes investments, which will reveal accurately whether he is a talented manager or not, since these investments make his income most risky. He prefers investments which leave him protected by exogenous reasons for investment failure. The firm, however, has no interest in it. Instead, it is mainly concerned with the actual payoffs of the project and these again are irrelevant for the manager.”

Hermalin, 1993: Managerial Preferences concerning Risky Projects

Hermalin finds a key aspect of a manager's risk project choice. Namely, that the manager's choice of risk is observable or not. The Holmström's result is true if the choice of risk is not observable by the labor market. What is important is not the risk of the project *per se*, but the risk for his reputation.

Intuition: Undertaking no project is statistically equivalent to undertaking an infinitely risky project. Indeed, if a project is infinitely risky, no one will use the project's return to update the manager's ability; and his future compensation will be a function only of the prior estimate of his ability. Similarly, if one project is known to be riskier than a second, then the returns from the first project receive less weight when updating the prior estimate than do the returns from the second project.
This "reduction-in-weight-effect" could induce a risk-averse manager to choose the riskier project even if it has a lower expected return.

$$\pi = \theta + \mu_p + \varepsilon_P$$

Projects differ in the sense that the constant $\mu_{pi} \neq \mu_{pj}$ and the variance of the noise terms are different

Proposition: Assume that labor market observes the manager's choice of risk. Then the manager's equilibrium choice of project, is the riskiest project; that is, the project that minimizes the updating of belief process. If this choice is not the best in terms of returns for the firm, then managerial career concerns lead to inefficient first-period production.

Loss and Renucci, 2016, Overwhelming Hazards

First paper to study simultaneously a choice of effort and a choice of risk by a manager, in a career concerns setting.

First period: the agent is a "basic manager"

$$y = e + \theta + \epsilon$$

ϵ is the realization of a noise term, whose variance depends on the manager's choice of project. There are 2 choices. One project is more risky than the other.

Å The choice of risk is observable, but not contractible.
Å The return (***y***) is observable by the labor market.
Å The manager is risk neutral.

Second period: the agent can either stay as an employee or be promoted
In case of promotion, the return function changes:

$$Y = \begin{cases} e + \theta + \varepsilon - \Delta & \text{if } \theta < \underline{\eta} \\ e + \theta + \varepsilon + \Delta & \text{if } \theta \geq \underline{\eta} \end{cases}$$

Timing of the game

First Period

1. At the beginning of the first period, a firm hires a manager. The wage W is fixed.
2. The agent chooses the risk of the project.
3. The agent exerts an effort.
4. First-period output is realized and the agent is paid.
5. Priors about the agent are updated by using y, the choice of risk and $e*$.

Second Period

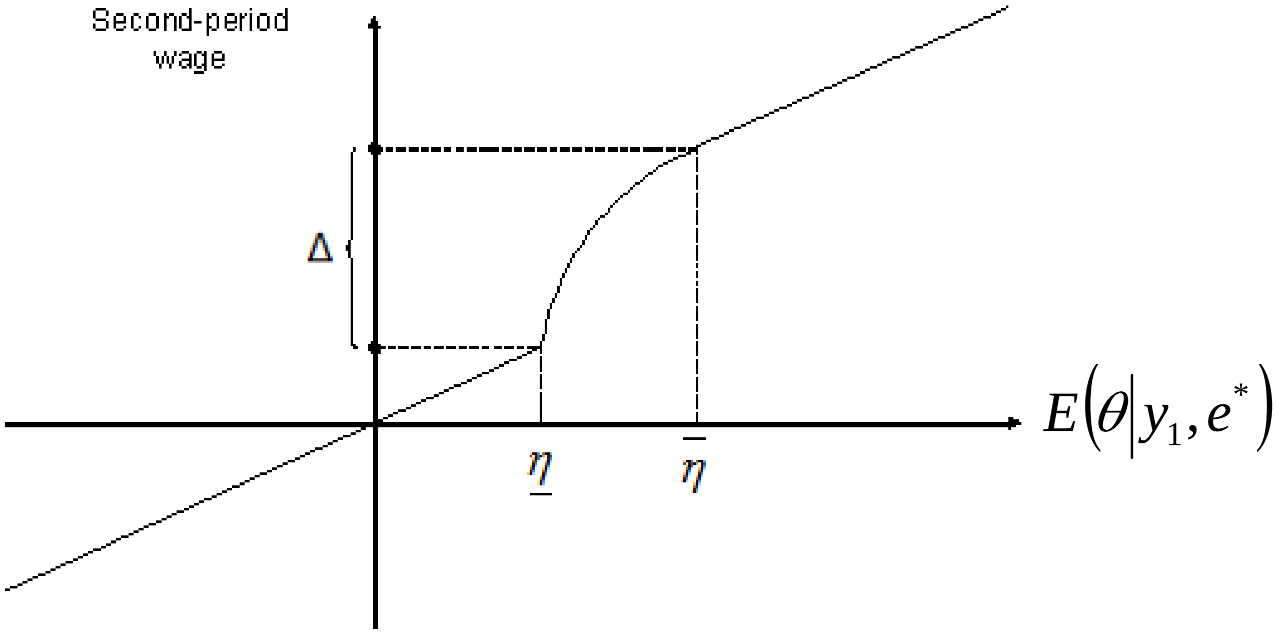
1. The Firm decides or not to promote the agent
2. Then, the timing of events is identical to the first-period one.

Threshold of Promotion

Same as before: Promotion if and only if **E(Θ | y, e*) ≥ $\underline{\eta}$.**

Second Period Wage Function

Same as before.



Same proposition on the effect of σ_ε^2 on the equilibrium level of effort:

e* *is increasing in* σ_ε^2 *for* ***Δ*** *high enough, when* ***EΘ > $\underline{\eta}$*** *and* **|$\underline{\eta}$ - *EΘ* |** *takes intermediate values.*

The Manager’s Choice of Risk

Three effects are at work.

1- The “***precision-of-the-revision***" effect: Once promoted, the agent prefers the posterior reputation to be as accurate as possible. Indeed, this increases the probability for the agent who obtains the promotion to be the right man at the right place. This increase his second period wage.
*This effect goes for the choice of the **less risky project**.*

2- The "***extent-of-the-revision***" effect: The choice of project influences the distribution of $\boldsymbol{E(\Theta \mid y, p, e^*)}$.

Å If $\boldsymbol{E(\Theta)} < \underline{\boldsymbol{\eta}}$ the manager has more to gain in expectation, if his reputation becomes better than to lose if his reputation deteriorates.

=> *choice of the **less risky project.***

Å An agent who clearly benefits from the status quo in terms of reputation ($\boldsymbol{E(\Theta)} >> \underline{\boldsymbol{\eta}}$) wants to prevent additional learning about ability. Indeed, he has more to lose in expectation, if his reputation deteriorates than to gain if his reputation becomes better.

=> *choice of the **more risky project.***

Å Finally, when the agent's initial reputation *“just”* allows the agent to be promoted if the status quo persists, the agent is better off facilitating the revision of reputation process because of the local convexity property of the wage function.

=> *choice of the **less risky project.***

3- The "***cost-of-effort***", which corresponds to the proposition on the effect of σ_{ε}^{2} on ***e****.

Therefore, even if the manger is risk neutral, he is not going to be indifferent in terms of choice of risk, since this choice impacts on the second-period wage, the probability of promotion and on the equilibrium level of effort.

Proposition *The agent chooses the less risky project when.*

- $E\theta < \underline{\eta}$ *and* $|\underline{\eta} - E\theta|$ *is small or intermediate, if* $\Delta \in \,]\Delta_I(\underline{\eta} - E\theta), \Delta_{II}(\underline{\eta} - E\theta)[$,
- $E\theta > \underline{\eta}$ *and* $|\underline{\eta} - E\theta|$ *is small, if* $\Delta \in \,]\Delta_I(\underline{\eta} - E\theta), \Delta_{II}(\underline{\eta} - E\theta)[$,
- $E\theta > \underline{\eta}$ *and* $|\underline{\eta} - E\theta|$ *is intermediate, if* $\Delta \geq \overline{\Delta}(\underline{\eta} - E\theta)$.

Otherwise, the agent chooses the more risky project.

Next step: *Making a Manager More or Less Visible*

Using the proposition on the effect of σ_ε^2 on the equilibrium level of effort ***e****, to study whether a firm is going to make a manager more or less visible (Acemoglu et al, 2008, Casas-Arce, 2010).

When ***e**** increases with σ_ε^2 a firm should make a manager **less visible** in order to make him work harder.

Next step: Effort inefficiencies

When $\boldsymbol{E\Theta > \underline{\eta}}$ and | $\boldsymbol{\underline{\eta} - E\Theta}$ | takes intermediate values, we have $\boldsymbol{e^* > e^{FB}}$ for **Δ** high enough.

Å The manager chooses the les risky project, which decreases the effort he exerts. This, in turns, reduces effort inefficiencies.

Å Contrarily, the firm chooses to make the manager less visible, which increases the effort he exerts. This, in turns, increases effort inefficiencies.

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