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Incentives and Reputation when Names can be Replaced:
Valjean Reinvented as Monsieur Madeleine

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Incentives and reputation when names can be replaced: Valjean reinvented as Monsieur Madeleine[*]

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Abstract

This article studies the effect of the possibility that firms change their names over their incentives for choosing high quality. A firm may want to start over under a new name in order to avoid market punishment, if the reputation carried by its former name is too low. We find that that the effect of the name-changing option on incentives is ambiguous. Although the ability of avoiding punishment generally hurts incentives, it may sometimes improve them. Moreover, doing so may be the only way out a low-effort trap. The conditions under which each case obtains are explored.

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1 Introduction

Abandoning an old name for a new one is a strategy firms of widely different sizes and kinds do use. Wu (2010) reports that between 1980 and 2000, about 1 in 10 firms in the Center for Research in Security Prices database underwent what he calls a "radical" name change.[1] Likewise, McDevitt (2011) finds figures of the same order of magnitude in the plumbing industry, where non-listed firms are prevalent. Furthermore, two recent trends are rendering the understanding of this strategy increasingly relevant: (i) The rise of e-commerce, especially consumer-to-consumer sites like eBay, where users may create, use, and eventually stop using any given fictitious name, and (ii) The active concern of many countries in order to reduce the cost of starting up new firms (The Economist, 2012).

The power to change its name is very much like a real option to the firm. We look at the case where the ability of consumers to track the firms' history is completely tied to their names. All new names are thus associated to an empty history, and carry a reputation ϕ_E. As will be shown, the optimal policy is to exercise the option whenever the firm's reputation would improve by doing so. In the equilibrium that we focus on, ϕ_E becomes the "strike reputation".

The name-changing option gives the firm the ability to make consumers forget about its past performance. Precisely that may be the reason why firms use it: By exercising such option when its previous reputation has fallen too low, a firm is actually avoiding the market's punishment for bad performance, namely, low price, low sales, or both. Indeed, Wu (2010) and McDevitt (2011) report that name changes are associated to low or diminished firms reputations. In the same vein, Cabral and Hortaçsu (2010) report a strong connection between exit and negative consumer feedback.

As any option, it benefits their holders–yet, it may hurt their incentives. The reputational mechanism for the assurance of quality hinges on consumers' ability to punish misbehaving firms. In the extreme, when every punishment is avoidable, only "bad" behavior can be expected. This concern is present in the literature as well; for instance, Jin and Kato (2006) identify the option of switching identities at low cost as a major loophole in eBay's rating system.

This article looks at firms' incentives in a reputation model, in the presence of a free name-changing option. Within the model, the concern that the option hurts incentives arises naturally. Indeed, Proposition 1 shows that the value of effort is smaller the higher the option's strike value is. Intuitively, the better the reputation the firm acquires under a new name, the more frequent the firm will replace its name and the lower the value it will place on maintaining a good reputation by choosing high effort.

However, the relationship between the option and firms' incentives is revealed to be more intricate, as the forgiveness that firms may call upon themselves by exercising it may sometimes be good for incentives. In particular, if bad reputations are too difficult to improve, the value of effort becomes negligible, as there may be little to win by choosing good behavior. In this case, entering the market under a new name with a better reputation may be the only way of

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[1] According to Wu (2010) a radical name change occurs when a firm replaces its name by another that is not related to a brand nor it is semantically related to its old name; this is to say, when the firm presumably seeks to avoid any association with its old name.

restoring individual incentives for good behavior. Proposition 2 shows that this could be the case.

The situation depicted here is reminiscent of Victor Hugo's character Valjean in the novel *Les Misérables*: he was in a hopeless situation as an ex-convict with a reputation for violence and theft; by changing his name and moving to another town, leaving behind his bad reputation, he was able to turn into Monsieur Madelaine, a successful businessman and respected philanthropist. A fresh start allowed him to be rewarded soon enough for his good behavior, providing him with the proper incentives.

We are certainly not the first to consider the possibility that firms use whatever means available to avoid punishment in a reputation context. Bar-Isaac (2003) and Board and Meyer-ter Vehn (2010), for instance, consider the possibility that a monopolist exit the market when his reputation reaches a low level. In particular, they focus on a mixed-strategy equilibrium in which the high types benefit from an informational externality: as the low types leave the market with higher probabilities than the high types, staying in the market becomes informative, and the reputation of the firm that stays in the market improves just by that act. Atkeson, Hellwig, and Ordóñez (2012) look at a similar equilibrium in a competitive environment. Thus, "staying" in their models has a similar consequence than "replacing names" in ours. However, they do not delve into the incentive effects of punishment avoidance.

Another interesting difference between "staying" and "replacing names" is that these strategies have different long-term implications. When competent firms always stay while inept firms eventually leave, the name's age is asymptotically fully informative of the type; hence, in the long run there is full separation. In contrast, when all types of firm eventually change their names, the name's age is still informative if they do so with different probabilities, but it is not perfectly revealing. This allows for permanent reputations, i.e., adverse selection persists even in the steady state.

Different kinds of name change have been studied in the literature. Tadelis (1999) and Mailath and Samuelson (2001) analyze name trading among firms. Cabral (2000) analyzes umbrella branding, a practice by which a firm attempts to extend the reputation gained in one market to another. Instead, we focus on the case where firms may freely replace their names by a new, unseen one. We study how the entry-level reputation ϕ_E shapes incentives and is a determinant factor in the decision to keep or change names.

The rest of the article is organized as follows. Section 2 introduces the model. Section 3 analyzes the incentives for competent firms to choose high effort at all reputation levels, and study how the size of the entry-level reputation affects them. Section 4 explores as an application how these incentives relate to the degree of competitive pressure of the market. Section 5 concludes.

2 The model

We analyze the decision problem of a firm that produces a good of unverifiable quality. The environment can be described as in Mailath and Samuelson (2001): time is discrete ($t = 0, 1, 2, ...$); at each date a stage game is played, between the firm (a long-run player) and a continuum of consumers. The firm may be competent (C) or inept (I); the firm's *reputation*

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is the conditional probability that it is competent, denoted by ϕ. An inept firm can only exert low effort (L, at no cost), whereas a competent firm may also choose to exert high effort (H) at a cost c. When the firm chooses high effort, consumers obtain a stochastically larger utility outcome, denoted by x. This utility outcome is the same for all consumers. It is also publicly observed; upon its observation, consumers update their beliefs, so that the high-effort choice translates into a stochastically larger future reputation for the firm as well.

As is standard in this literature, we assume consumers are homogeneous expected-utility maximizers, and we focus on the high-effort Markov perfect equilibrium. In this case, the expected utility is linear in ϕ, and so is the equilibrium price. Indeed, if the firm is a monopolist (as in Mailath and Samuelson, 2001) the price level is such that the whole consumer surplus is extracted. If the firm operates in a perfectly competitive industry, consumers may enjoy some surplus but must be indifferent among providers (as in Vial, 2010). In both cases, the price function is increasing in the seller's reputation; its slope is given by the difference in expected utility outcomes between high and low effort, and its level depends on the competitiveness of the industry.

To lighten notation, we depart slightly from Mailath and Samuelson (2001) by assuming that the utility outcome is an absolutely continuous random variable with full support in $[0, 1]$. We denote by f_H and f_L the pdfs for high and low effort respectively. Moreover, we assume that the likelihood ratio $R(x) \equiv \frac{f_H(x)}{f_L(x)}$ is strictly increasing (monotone likelihood ratio, MLR), and furthermore, $R((0,1)) = (0, \infty)$. Recall that MLR implies first-order stochastic dominance (FOSD).

With an exogenous probability λ the firm is replaced; the replacing firm is competent with probability θ. We assume $\lambda \in (0, 1)$, so that the replacement occurs but doesn't render history irrelevant. Consumers, seeing the same name, do not realize that the firm has changed.

Mailath and Samuelson (2001) consider the possibility that the firm sells its name when leaving the market. Instead, we look at the possibility that the firm costlessly changes its name. This has the effect of making it impossible for consumers to match the history with the new name; indeed, they forget–and so *must* "forgive"–any past mistakes. Consumers, seeing a different name, do not realize that the firm is the same.

The sequence of events is as follows. The *prior reputation* at t is denoted by $\overline{\phi}_t$. The firm chooses a probability of changing its name η. A new name carries a reputation ϕ_E. Taking into account the firm's name choice, the prior probability is updated to the *interim reputation* ϕ_t. The market opens, the competent firm chooses an effort level τ, and the units are sold at a price $p(\phi_t)$. After trading, the consumers receive the utility outcome x_t, and update their beliefs to the posterior $\varphi(\phi_t | x_t)$ –which becomes next period's prior $\overline{\phi}_{t+1}$.

We look at a Markov perfect equilibrium as defined by Mailath and Samuelson (2001). When making the naming decision, the state variables for the firm are its type and its prior reputation $\overline{\phi}$. When making the effort decision, the state variable for the competent firm is its interim reputation ϕ.

Given that f_H and f_L have full support, the Bayesian updating of the interim ϕ is:

$$\varphi(\phi \,|\, x) \;=\; (1 - \lambda) \frac{(\tau(\phi) f_H(x) + (1 - \tau(\phi)) f_L(x)) \phi}{(\tau(\phi) f_H(x) + (1 - \tau(\phi)) f_L(x)) \phi + f_L(x)(1 - \phi)} + \lambda\theta \qquad (1)$$

The set of posteriors is given by $\overline{\Phi} \equiv [\lambda\theta, 1 - \lambda + \lambda\theta]$, which is the image of φ.

In turn, the interim reputation ϕ of a firm that keeps its name is the Bayesian update of the prior $\overline{\phi}$:

$$\phi\left(\overline{\phi}|\text{keeps name}\right) = \frac{\left(1 - \eta\left(C, \overline{\phi}\right)\right)\overline{\phi}}{\left(1 - \eta\left(C, \overline{\phi}\right)\right)\overline{\phi} + \left(1 - \eta\left(I, \overline{\phi}\right)\right)\left(1 - \overline{\phi}\right)} \qquad (2)$$

which is well defined provided that $\eta\left(C, \overline{\phi}\right) \neq 1$ or $\eta\left(I, \overline{\phi}\right) \neq 1$. Otherwise, when both types are supposed to change their names, the interim reputation is not defined by Bayes' rule as keeping the old name is an off-equilibrium move.

We focus on the pooling high-effort equilibrium defined by the following strategies:

$$\eta\left(C, \overline{\phi}\right) = \eta\left(I, \overline{\phi}\right) = \begin{cases} 1 & \text{if } \overline{\phi} < \phi_E \\ 0 & \text{if } \overline{\phi} \geq \phi_E \end{cases} \quad \text{and} \quad \tau\left(\phi\right) = 1 \text{ for all } \phi \qquad (3)$$

where the supporting beliefs are given by:

$$\varphi\left(\phi|x\right) = (1 - \lambda)\frac{R\left(x\right)\phi}{R\left(x\right)\phi + 1 - \phi} + \lambda\theta \qquad (4)$$

and

$$\phi\left(\overline{\phi}|\text{name choice}\right) = \begin{cases} \overline{\phi} & \text{if old name} \\ \phi_E & \text{if new name} \end{cases} \qquad (5)$$

Equation 5 embeds the assumption that off-equilibrium moves are uninformative.[2]

We check below when these strategies are indeed optimal. Under these strategies, the interim reputation is given by:

$$\phi = \max\left\{\overline{\phi}, \phi_E\right\} \qquad (6)$$

Section 3 considers ϕ_E as an exogenous parameter in order to focus on its influence on individual decisions and incentives; Section 4 considers it an endogenous variable in the case of a Walrasian market.[3]

3 Analysis

Our main concern is how the incentives for a competent firm to exert high effort are affected when the name-changing option is available. Generally speaking, an incentive condition can be represented as a sign condition on some function g defined on the state space $\overline{\Phi}$. Let $\overline{\Phi}\left(\phi_E, c\right)$ be the set of prior reputations where the incentive condition is satisfied for a given ϕ_E and cost c, i.e., $\overline{\Phi}\left(\phi_E, c\right) \equiv \left\{\overline{\phi} \in \overline{\Phi} : g\left(\overline{\phi}; \phi_E, c\right) \geq 0\right\}$. There are at least two senses in which incentives can "improve" after an exogenous change in a parameter: At each given state $\overline{\phi}$,

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[2]Notice that these off-equilibrium beliefs can be obtained by taking the limit of ϕ from any sequence of completely mixed pooling strategies η that converge to 1. Notice also that this equilibrium satisfies Cho and Kreps' Intuitive Criterion.

[3]Other articles that study endogenous entrants' reputation include Atkeson, Hellwig, and Ordóñez (2012) and Tadelis (1999).

the incentive condition holds with more slack (the function g increases at $\bar{\phi}$), or the incentive condition holds at *more* states ($\overline{\Phi}(\phi_E, c)$ increases under the set-inclusion order). We call the former an **intensive-margin** improvement at the state $\bar{\phi}$, and the latter an **extensive-margin** improvement. The main result of this article is that when ϕ_E increases, incentives deteriorate in the intensive margin at each state in which the firm wants to keep its name, but may improve in the extensive margin. Moreover, this is the case when an increase in ϕ_E renders the high-effort equilibrium viable when it wouldn't be otherwise.

Given the naming and effort strategies (3), the value function for a competent firm is given by:

$$v_C(\phi) = p(\phi) - c\tau + \delta(1-\lambda) \int_0^1 v_C(\max\{\varphi(\phi, x), \phi_E\}) f_H(x) \, dx \tag{7}$$

where $\delta \in (0, 1)$ is the discount factor. Let Δ denote the "value of effort"; namely, the payoff difference between high and low effort when the firm chooses high effort from the next period onward:

$$\Delta(\phi; \phi_E) \equiv \delta(1-\lambda) \int_0^1 v_C(\max\{\varphi(\phi, x), \phi_E\})(f_H(x) - f_L(x)) \, dx \tag{8}$$

Lemma 1. *The value of effort is non-negative. Moreover, $\Delta(\phi; \phi_E) > 0$ if $\phi \in (0, 1)$ and $\phi_E < 1 - \lambda + \lambda\theta$; otherwise, $\Delta(\phi; \phi_E) = 0$.*

Proof. It is evident from (8) that the value of effort is null when $v_C(\max\{\varphi(\phi, x), \phi_E\})$ is independent of x. This happens when (i) the interim reputation is extreme ($\phi = 0$ or $\phi = 1$), because the posterior belief detaches itself from the outcome x; or (ii) $\phi_E \geq 1 - \lambda + \lambda\theta$, because the entry-level reputation is so high that the firm wants to change its name at all states.

Let $\tilde{x}(\phi, \phi_E)$ be the utility outcome after which an interim ϕ is updated to a posterior ϕ_E, namely, the solution to $\phi_E = \varphi(\phi|\tilde{x})$. Observe that if $\phi_E \in \overline{\Phi}$ and $\phi \in (0, 1)$, $\tilde{x}(\phi, \phi_E)$ is a well-defined function; in this case, by splitting the integral and integrating by parts, (8) can be written as:

$$\Delta(\phi; \phi_E) = \delta(1-\lambda) \int_{\tilde{x}(\phi, \phi_E)}^1 v_C'(\varphi(\phi, x)) \frac{\partial \varphi(\phi, x)}{\partial x}(F_L(x) - F_H(x)) \, dx \tag{9}$$

The differentiability of v_C (and $\Delta(\phi; \phi_E)$) follows from the absolute continuity of F_H and F_L. By FOSD, $(F_L(x) - F_H(x)) > 0$ for $x \in (0, 1)$; v_C is strictly increasing because a better reputation translates into a higher price today and a higher expectation of future reputations. Finally, $\frac{\partial \varphi(\phi, x)}{\partial x} > 0$ when $\phi \in (0, 1)$, a property of Bayes' rule (Equation 4). Hence, $\Delta(\phi; \phi_E) > 0$ in this case. $\square$

Choosing high effort ($\tau = 1$) is optimal when:

$$\Delta(\phi; \phi_E) \geq c \tag{10}$$

Equation 9 makes clear what is involved in the effort decision. Choosing high effort makes it more likely that better outcomes will be obtained; this changes each possible future reputation

at a rate $\frac{\partial \varphi(\phi, x)}{\partial x}$. In turn, a better reputation increases the firm's payoff by $v_C' \left(\varphi \left(\phi, x \right) \right) > 0$. This is provided that the future reputation is φ instead of ϕ_E, which is the case if x is high enough so that the firm doesn't want to change its name. When this gain outweights the cost c, the firm chooses high effort.

Using (6), the set $\overline{\Phi} \left(\phi_E, c \right)$ can be written as:

$$\overline{\Phi} \left(\phi_E, c \right) \equiv \left\{ \overline{\phi} \in \overline{\Phi} : \Delta \left(\max \left\{ \overline{\phi}, \phi_E \right\} ; \phi_E \right) - c \geq 0 \right\} \tag{11}$$

Mailath and Samuelson (2001) study the effort decision in the absence of the name-changing option. This is equivalent to the existence of an option that is never exercised, say $\phi_E = \lambda \theta$ in our setting. They establish that if $\theta \in (0, 1)$ and the cost of high effort is low enough, the strategy of choosing high effort at every state is optimal. However, if $\theta = 0$, this strategy is not optimal, and the high-effort equilibrium cannot be sustained. Thus, Proposition 1 in Mailath and Samuelson (2001) holds in our setting too, and can be written as:

Lemma 2. *Assume $\phi_E = \lambda \theta$. Then:*

(i) If $\theta \in (0, 1)$, then $\exists c^* > 0 : \forall c \in [0, c^*)$, $\overline{\Phi} \left(\phi_E, c \right) = \overline{\Phi}$, and

(ii) If $\theta = 0$, then $\forall c > 0$, $\overline{\Phi} \left(\phi_E, c \right) \subsetneq \overline{\Phi}$.

Proof. Take $c^* \left(\phi_E, \theta \right) \equiv \min_{\overline{\phi} \in \overline{\Phi}} \Delta \left(\max \left\{ \overline{\phi}, \phi_E \right\} ; \phi_E \right)$, which is well-defined as Δ is continuous in ϕ and $\overline{\Phi}$ is compact. By Lemma 1, $c^* \left(\phi_E, \theta \right) > 0$ when $\theta > 0$, hence (i) is obtained. Moreover, if $\theta = 0$ then $\Delta \left(\lambda \theta ; \phi_E \right) = 0$; hence $\forall c > 0$, $\Delta \left(\lambda \theta ; \phi_E \right) < c$ and (ii) is obtained. $\square$

Our concern is the incentive effect of market forgiveness caused by the name-changing option –and its extent, as measured by ϕ_E.

Proposition 1 (Forgiveness and the value of effort). *If $\phi_E \in \overline{\Phi}$, at each interim reputation level ϕ an increase in ϕ_E decreases the value of effort. Moreover, $\frac{\partial \Delta(\phi; \phi_E)}{\partial \phi_E} < 0$ if $\phi \in (0, 1)$ and $\phi_E \in (\lambda \theta, 1 - \lambda + \lambda \theta)$; otherwise $\frac{\partial \Delta(\phi; \phi_E)}{\partial \phi_E} = 0$.*

Proof. Differentiating (8) we get:

$$\frac{\partial \Delta \left(\phi ; \phi_E \right)}{\partial \phi_E} = \delta \left(1 - \lambda \right) v_C' \left(\phi_E \right) \left(F_H \left(\tilde{x} \left(\phi, \phi_E \right) \right) - F_L \left(\tilde{x} \left(\phi, \phi_E \right) \right) \right)$$

which is strictly negative if $\phi_E \in (\lambda \theta, 1 - \lambda + \lambda \theta)$, and null if $\phi_E \in \{ \lambda \theta, 1 - \lambda + \lambda \theta \}$. $\square$

An increase in ϕ_E (i.e., more leniency) reduces the value of effort for a fixed interim reputation, because it softens eventual future punishments. However, when $\overline{\phi} < \phi_E$, the interim reputation becomes ϕ_E, so that $\frac{\partial \phi}{\partial \phi_E} = 1$; this produces a second effect. Totally differentiating Δ, we get for $\overline{\phi} < \phi_E$:

$$\frac{d\Delta \left(\max \left\{ \overline{\phi}, \phi_E \right\} ; \phi_E \right)}{d\phi_E} = \frac{\partial \Delta \left(\phi ; \phi_E \right)}{\partial \phi_E} + \frac{\partial \Delta \left(\phi ; \phi_E \right)}{\partial \phi} \frac{\partial \phi}{\partial \phi_E} \tag{12}$$

Equation 12 shows that besides the effect discussed in Proposition 1, the interim reputation improves at states at which the firm wants to exercise the name-changing option ($\overline{\phi} < \phi_E$):

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Figure 1: Forgiveness and incentives in the intensive/extensive margins with $\theta = 0.1$
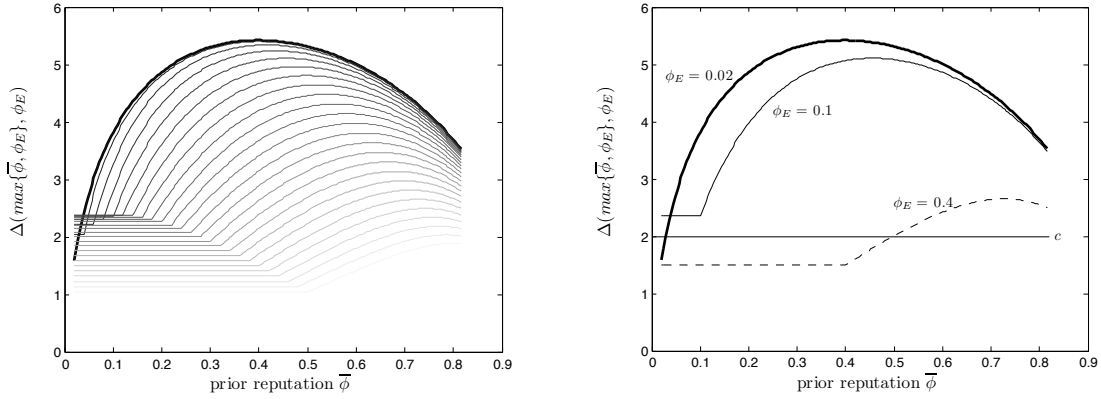
(a) Incentives in the intensive margin

(b) Incentives in the extensive margin

Note: This numerical example assumes F_H and F_L are beta distributions with parameters $(3, 2)$ and $(2, 3)$, respectively, and $\lambda = 0.2$. Hence, $\overline{\overline{\Phi}} = [0.02, 0.78]$.

If the firm changes its name, it does so to a better one. If locally improving the reputation improves incentives ($\frac{\partial \Delta(\phi; \phi_E)}{\partial \phi} > 0$), this second effect countervenes the first one, and may even dominate it. This is why incentives may improve in the extensive margin for low reputations.

Proposition 2 (Forgiveness may be good for incentives). *There exist parameter values of c and θ such that for sufficiently low values of ϕ_E, locally increasing ϕ_E improves incentives in the extensive margin, rendering the strategy of choosing high effort at all states optimal when it wouldn't be otherwise.*

Proof. See the Appendix. $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ $\square$

The proof rests on the observation that by Lemma 2, when a replaced firm cannot be replaced by a competent firm (i.e., $\theta = 0$), and the name-changing option is worthless (i.e., $\phi_E = \lambda\theta$), the strategy of choosing high effort at all states is never optimal, no matter how low c might be. However, increasing ϕ_E renders the value of effort strictly positive; hence, there are values of c for which the strategy is optimal. By continuity, this result extends to nearby values of θ and ϕ_E.

Figures 1 and 2 illustrate the incentive effects described in Propositions 1 and 2. The thick curves depict the value of effort when $\phi_E = \lambda\theta$, i.e., when the option is worthless. The thinner curves are obtained whith increasingly higher values of ϕ_E: as long as $\overline{\phi} < \phi_E$ the value of effort is constant; otherwise, it is inverse U-shaped. In Panels (a) in Figures 1 and 2 it is apparent that as ϕ_E increases, the value of effort decreases pointwisely for all values of $\overline{\phi} > \phi_E$, deteriorating incentives in the intensive margin as Proposition 1 establishes.

Panel (b) in Figure 1 illustrates a case where locally increasing ϕ_E may improve incentives even in the extensive margin: increasing the entry-level reputation from 0.02 to 0.1 renders the strategy of choosing high effort at all states optimal when it wouldn't be otherwise, a

Figure 2: Forgiveness and incentives in the intensive/extensive margins with $\theta = 0.5$
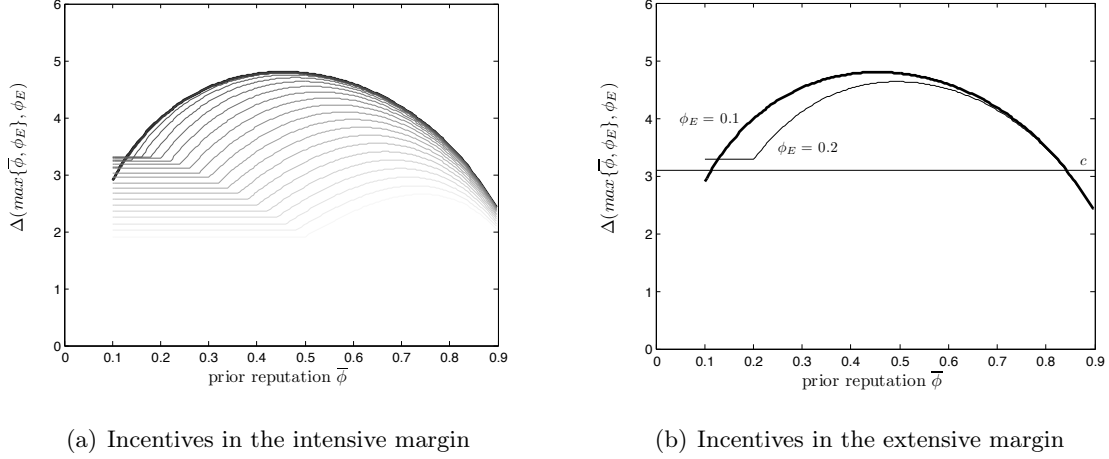
(a) Incentives in the intensive margin (b) Incentives in the extensive margin

Note: This numerical example assumes F_H and F_L are beta distributions with parameters $(3, 2)$ and $(2, 3)$, respectively, and $\lambda = 0.2$. Hence, $\overline{\Phi} = [0.1, 0.7]$.

possiblity that Proposition 2 presents. The pointwise reduction of the value of effort at all higher levels of $\overline{\phi}$ is not enough to change the optimal strategy for such states; hence, the fact that locally improving the reputation improves incentives at states where the firm exercises the name-changing option dominates.

This Panel also illustrates the fact that there is a limit to market forgiveness if incentives are to be sustained. For instance, if ϕ_E increases to 0.4 (the dashed curve), the drop in the value of effort would be too large, rendering high effort suboptimal at all reputation levels below 0.5. In this case, incentives deteriorate in both margins.

In contrast, Figure 2 illustrates a case where locally increasing ϕ_E cannot improve incentives in the extensive margin. As the lowest value of effort obtains at the highest reputation–as opposed to the lowest, as it was in Figure 1–, the deterioration of incentives in the intensive margin as ϕ_E increases in fact dominates. Even though increasing ϕ_E may solve the lack of incentives at low reputation levels–as shown in Panel (b) when the entry-level reputation increases from 0.1 to 0.2–, it only makes things worse at high reputation levels, which turn out to be the critical ones in this example.

This example sheds light on the conditions under which an increase in the entry-level reputation can improve incentives. On the one hand, it must be the case that the weakest incentives occur at low–as opposed to high–reputation levels. This requires that the probability θ that a firm changes to competent is small, as this implies that the inept type is almost absorbent and hence it is too difficult to change a very low reputation, and not so difficult to change a high reputation. On the other hand, the point-wise drop in the value of effort must be small in order for the incentive improvement that comes about with the name change to predominate; this happens when the entrants' reputation ϕ_E is small. Finally, the cost of high effort must be intermediate: if it is too high, always high effort is not an optimal strategy, while if it is too low, incentives are in place before and after the change in ϕ_E as well. These conditions

actually go beyond this example, as they show up in the proof of Proposition 2.

4   Application: Competitive pressure and incentives

In this section we analyze how the level of the strike reputation ϕ_E interacts with the degree of competitive pressure from outsiders in affecting incentives. We examine a Walrasian market whith a continuum of long-lived, price-taker firms. Each firm can produce at most one unit of the good at each stage; the mass of consumers is one, while the mass of existing competent firms is strictly smaller than one. We mantain focus on the pooling high-effort equilibrium defined by the naming and effort strategies described in Equation 3, and the sustaining beliefs described in Equation 4. Instead of treating ϕ_E as exogenous, however, we analyze how changes in the competitive pressure from outsiders affect the level of the entrants' reputation. To this end, we will consider three different regimes, which vary in the level of competitive pressure: Blockaded entry, free entry of inept firms, and free entry of inept and competent firms.

Vial and Zurita (2013) show in this setting that the (unique) consistent entrants' reputation must equal the mean reputation of the names that disappear, increased by the fact that a mass η of inept firms that exit are replaced by the newly born competent firms that in equilibrium enter; as disappearing names are those with $\overline{\phi} < \phi_E$, then ϕ_E must satisfy:

$$\phi_E = E\left[\overline{\phi}|\overline{\phi} < \phi_E\right] + \frac{\eta}{\overline{G}(\phi_E)}. \tag{13}$$

where $\overline{G}$ denotes the (steady-state) cumulative distribution of prior reputations, and hence $\overline{G}(\phi_E)$ is the mass of disappearing names. From Equation 13 it follows that:

(i) As $\phi_E < E\left[\overline{\phi}|\overline{\phi} < \phi_E\right]$ for any $\phi_E > \lambda\theta$, then $\phi_E = \lambda\theta$ if $\eta = 0$; i.e., the mere act of changing their names cannot improve the reputation of the group of firms that exercise the name-changing option;

(ii) The existence of a mass $\eta > 0$ of newly born competent firms allows the name-changing firms to improve their reputation as they pool themselves with those competent outsiders that enter; and

(iii) Changes in η provide the exogenous variation for ϕ_E that justifies our comparative statics analysis on the extent of market forgiveness on individual decisions and incentives in Section 3.

4.1   Benchmark: Blockaded entry

In the first situation we analyze, the mass of firms is slightly smaller than that of consumers. For instance, think of regulatory barriers to entry, e.g., a medallion is needed to operate and the authority has fixed the number of available medallions slightly below what would be necessary to cover the whole demand. The equilibrium price function is the consumers' willingness to pay as the demand side is the long side of the market.

Assume that there are no newly born competents outside the market: $\eta = 0$. As there are no competents to pool with upon entrance, firms actually prefer to keep their names. Indeed,

as only the firms with reputation below ϕ_E would want to change their name, consumers associate a probability smaller than ϕ_E to the event that a firm operating under a new name is in fact competent. Thus, ϕ_E becomes the lowest reputation in the market: $\phi_E = \lambda\theta$.

4.2 Free entry of bad types

In the second situation, entry is free. As before, we assume that there are no competents being born outside the market: $\eta = 0$. Hence, $\phi_E = \lambda\theta$, and there are no actual entry or exit flows.

Potential entrants, however, exert a pressure over the price level, which must now be the smallest among those compatible with market clearing. Indeed, the free-entry condition is that the (inept) marginal entrant is indifferent between entering or staying out. If v_I is the value function for an inept firm, defined as:

$$v_I(\phi) = p(\phi) + \delta(1 - \lambda) \int_0^1 v_I(\max\{\varphi(\phi, x), \phi_E\}) f_L(x) \, dx,$$

the free-entry condition becomes:

$$v_I(\phi_E) = 0 \tag{14}$$

This implies that inept firms must produce at a loss at the date whenever they enter or change their names. On the other hand, consumers must be indifferent among providers, so that the slope of the price function remains unchanged–only the intercept changes. As the value of effort depends on the slope of the price function and not its level, the value of effort is the same as before. Therefore, incentives don't change in either margin. Moreover, if there were an income effect–which is ruled out by our implicit assumption of a quasi-linear utility–, the drop in the price function could actually occur with an increase in its slope, as richer consumers could be willing to pay more for quality in the margin. In such case, incentives would actually improve after the price level drop caused by the increased competitive pressure.

Some authors (e.g., Bar-Isaac and Tadelis, 2008) have suggested that a high price level is necessary for the reputation mechanism to work, and that competition by eroding rents would lessen incentives. In those models the price level matters because after a bad outcome the firm is forced either to leave the market or start from scratch; in contrast, in our model the consequence is only to be able to charge a (perhaps slightly) lower price.

4.3 Free entry of bad and good types

In the third situation there is a constant flow $\eta > 0$ of new competents been born outside the market. The existence of competent firms coming into the market alleviates the adverse selection that entrants face. Now the lowest reputation firms will wish to hide themselves behind the new competents. The option to change the name, replacing a prior reputation $\overline{\phi}$ by ϕ_E becomes valuable, and there is a constant flow of new names in the market. Notice that "a few" η may explain a potentially "large" entry flow $\overline{G}(\phi_E)$.

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The increase in the entry-level reputation means that the free-entry condition now requires prices to be even lower. In effect, as the value function is increasing, at the same price function all outsiders would want to enter. Moreover, the increase in the strike reputation also increases the value of the name-changing option, further improving the gains from entering. Overall, the consequence of the entry of competent firms is a further drop in the price function and, as such, there is increased competitive pressure.

Nevetheless, as before the price level drop doesn't affect incentives because the slope remains constant. This means that the effect of this increase in competitive pressure over incentives is fully described by propositions 1 and 2.

5   Concluding remarks

Cripps, Mailath, and Samuelson (2004) point out that under imperfect monitoring, maintaining incentives in the long run entails the need for information loss: If consumers become almost certain of the firm's type, the consequence of good behavior may be a negligible effect on consumers' beliefs, thereby destroying incentives. Even assuming that the firm's owner may always change, the reputational mechanism may fail to provide permanent incentives. To see this, consider the case where $\theta = 0$ and $\lambda > 0$: As low reputations are too difficult to improve, the value of effort is too low and the strategy of choosing high effort at low reputations is not optimal. Mailath and Samuelson, 2001 describe an equilibrium in this case characterized by a "low-effort trap": For low reputations consumers are pessimistic because if the owner changed, he did so for the worse; it is not worthwhile for the firm to make the investment needed to overcome such pessimism. This pessimism is self-fulfilling, and it is only a matter of time before the firm falls into this trap.

A range of mechanisms for permanent type-uncertainty replenishment have been studied: limited memory (Liu and Skrzypacz, forthcoming), coarse observability (Ekmekci, 2011), costly observation of records (Liu, 2011), etc. Another interesting source is that analyzed in Hörner (2002) in which it is the combination of private monitoring with the consumers' strategy of leaving a firm after the first bad outcome what provides the necessary information loss. This article shows that there is also a simple market mechanism. When there is the possibility that new firms, of unknown names, enter the market with some non-null reputation, the incumbent firms may choose to change their names and pool themselves with the unknown entrants. By doing so, they make it hard for consumers to keep track of their performance.

We have shown that the option to change names always decreases the value of effort, yet it may improve the viability of a high-effort equilibrium. Forgiveness, or letting the firm re-enter the market under a new name, giving it the opportunity to start all over again, may in fact be a way out of the low-effort trap. This argument works under monopoly (Mailath and Samuelson, 2001) and under competition (Vial, 2010) as well. Moreover, we saw that the competitive pressure may affect the entry-level reputation and through it, the incentives for exerting high effort.

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A   Appendix: Proof of Proposition 2

Differentiating (8) we get:

$$\frac{\partial \Delta (\phi; \phi_E)}{\partial \phi} = \delta (1 - \lambda) \int_{\tilde{x}(\phi, \phi_E)}^{1} v'_C (\varphi(\phi, x)) \frac{\partial \varphi(\phi, x)}{\partial \phi} (f_H(x) - f_L(x)) \, \mathrm{d}x,$$

where $\left. \frac{\partial \Delta(\phi;\phi_E)}{\partial \phi} \right|_{\phi=0} > 0$ as $\varphi(0, x) = \lambda\theta$ and $\left. \frac{\partial \varphi(\phi,x)}{\partial \phi} \right|_{\phi=0} = (1 - \lambda) R(x)$.

Assume that $\theta = 0$ and $\phi_E = \lambda\theta$; as $\frac{\partial \Delta(\phi;\phi_E)}{\partial \phi_E} = 0$ (from Proposition 1), then the direct effect of an increase in ϕ_E is negligible, and the indirect effect dominates: $\frac{d\Delta\left(\max\{\overline{\phi},\phi_E\};\phi_E\right)}{d\phi_E} = \frac{\partial \Delta(\phi;\phi_E)}{\partial \phi} \frac{\partial \phi}{\partial \phi_E}$, where $\frac{\partial \phi}{\partial \phi_E} = 1$ stands for the right-derivative of ϕ when $\overline{\phi} = \lambda\theta$. As $\left. \frac{\partial \Delta(\phi;\phi_E)}{\partial \phi} \right|_{\phi=\lambda\theta} > 0$, this implies that $\Delta\left(\max\{\overline{\phi}, \phi_E\}; \phi_E\right)$ is increasing in ϕ_E; as Δ is minimized at $\lambda\theta$, then $c^*(\phi_E, \theta) \equiv \min_{\overline{\phi}\in\overline{\Phi}} \Delta\left(\max\{\overline{\phi}, \phi_E\}; \phi_E\right)$ is also increasing in ϕ_E. Take some $\phi'_E > \lambda\theta$ such that $c^*(\phi'_E, \theta) > c^*(\lambda\theta, \theta)$; then $\overline{\Phi}(\lambda\theta, c) \subsetneq \overline{\Phi}$ and $\overline{\Phi}(\phi'_E, c) = \overline{\Phi}$ for all $c \in (c^*(\lambda\theta, \theta), c^*(\phi'_E, \theta))$. As both Δ and $\frac{\partial \Delta}{\partial \phi}$ are continuous in θ, this result can be extended to values of θ sufficiently close to 0; also, continuity in ϕ_E implies that this result can be extended to initial values of ϕ_E sufficiently close to $\lambda\theta$ for a given value of θ.