Career Concerns in an Adversarial Setting

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September 2022

Abstract

This article studies a model with two agents opposing each other to win a case where the outcome depends on the agents' talents and effort choices. Taking legal disputes as the main application, the case outcome is binary and provides an implicit incentive because it is informative about the agents' talents. Regardless of the functional form used to model this binary contest outcome, the implicit incentive is shown to be characterized by three components, namely the ex ante uncertainty over the agents' talents, the sensitivity of the outcome to the agents' talents, and the variance of the noise in the outcome, which is endogenous. Their interplay with the agents' effort levels and the merits of the case affects the informativeness of the case outcome on the agents' talents, thereby creating strategic interactions. I find that aggregate effort is higher with asymmetrically career concerned agents. Moreover, an unbalanced field due to case merits favoring one party can further amplify the effect of career concerns. The unfavored agent would experience a more substantial reputational gain in case of winning relative to an even case, whereas the favored agent would also be affected as she would have a more substantial reputational loss in case of losing the favorable case relative to an even case. I characterize under which conditions the equilibrium effort level is relatively larger for the unfavored party.

JEL Classification: D80, K41, L14

Key words: Reputational gain, aggregate effort, informational strategic interactions, endogenous noise, unbalanced field.

*I would like to thank two anonymous referees, Andrew Daughety and Jennifer Reinganum for helpful suggestions. I am also grateful to the comments of Larbi Alaoui, Marco Celentani, Hector Chade, Jörg Franke, Robert Gibbons, Paul Milgrom, Alper Nakkas, Giacomo Ponzetto, Larry Samuelson, Friman Sánchez, Rajdeep Sengupta, and seminar participants at Universitat Pompeu Fabra, Vanderbilt University, at the American Law and Economics Association Annual Meeting, and at the Bonn Law and Economics Workshop. I also gratefully acknowledge the financial support of NSF grant SES08-14312, the Kirk Dornbush research funds, the Government of Catalonia, the Spanish Ministry of Economy and Competitiveness (ECO2008-01116, ECO2010-15052, and ECO2013-43011-P, PID2019-109377GB-I00), and the Severo Ochoa Programme for Centers of Excellence in R&D (SEV-2015-0563). Contact: rosa.ferrer@upf.edu

1 Introduction

From legal disputes, to battlefields, and sports competition, the outcome of an adversarial confrontation provides information about contenders' ability. Thus, career-concerned contenders have incentives to make strategic choices depending on such learning process. For instance, lawyers' career concerns can influence litigation decisions and, consequently, litigation costs, which have been found to distort intellectual property investments (Lerner, 1995; Gallini, 2002), health care services and costs (Currie and MacLeod, 2008; Roberts and Hoch, 2009; Dranove and Watanabe, 2009), and the prices of goods via product liability (Viscusi et al., 2005).[1].

How do career concern incentives of adversarial contenders differ from career concerns in a single-agent setting? Interestingly, adversarial settings with binary outcomes generate a novel twist to the standard one-agent career concerned model. Dewatripont and Tirole (1999) show that effort provision of a single career-concerned agent with a binary outcome leads to an ambiguous effect on effort relative to a continuous outcome. Moving from a continuous to a binary outcome will increase the effort incentives of agents close to the exogenous threshold value that determines the binary outcome. But at the same time, it will decrease the effort incentives of those agents clearly below or above such threshold. In contrast, in an adversarial setting there is an endogenous threshold that depends on the characteristics and effort of the contenders. As a consequence, richer interactions arise. Overall, this paper lies at the intersection of the career-concerns, contests and litigation literature. Effort provision in adversarial settings has been extensively studied by the contest literature but without considering reputational concerns. In addition, few papers in the career concerns literature have looked at effort choices in multi-agent settings.[2]

In the model, based on the binary adversarial outcome (i.e., win or lose), the market updates its initial belief about the agents' talents. The difference between the posteriors on the agents' talents in the event of a win and in the event of a loss measures the reputational gain from winning. The larger the reputational gain, the stronger are the agents' career-concerns incentives. Taking litigation as the main application, this article studies how career concerns influence effort levels and contenders' strategic interactions. Because the court cases' merits can influence the market's inference on contenders' talents (e.g., winning a difficult case could lead to a larger reputational gain than winning an intermediate case), I also study the interaction between career-concerns incentives and the merits of the case.

As shown in this article, the reputational gain is determined by three components, regardless of the specific functional form used to model the binary trial outcome. The first component is the initial uncertainty over the attorney's talent, which determines the scope for the potential reputational gain. If the initial uncertainty is high, then there is more to learn from the trial

[1] Career concerns appear to be particularly relevant in the legal profession because the variance of lawyers' earnings is large. For US lawyers of a same cohort with 7 years of experience in law firms, Azmat and Ferrer (2017) find a standard deviation of 50 percent of the mean

[2] In the career concerns literature, the closer papers are the ones that have studied team work (Auriol et al., 2002; Chalioti, 2016) or binary/rachet effects (Meyer and Vickers, 1997; Miklós-Thal and Ullrich, 2015)

outcome than if it is low. A second component is related to the noise in the information transmitted by the trial outcome. Intuitively, the noise arises because the trial outcome is not fully determined by effort, talent and the merits of the case. For instance, it could be affected by an unverifiable bias in the judge or jury's decisions or, simply, by luck. When the noise variance (hereafter, noisiness) is higher, then there is *ex ante* more uncertainty over the trial outcome and *ex post* a lower degree of informativeness about the agents' talents. As a consequence, the potential reputational gain is also lower. Finally, the third component measures the sensitivity of the trial outcome to the agents' talents. The reputational gain from winning in court increases with the sensitivity of the trial outcome to skills. For instance, some legal systems or legal areas can be relatively more sensitive than others to agents' talent in court. All of the subsequent results in the article emerge from the analysis of these three components and their interplay with other variables in the model.

The tournament nature of litigation and the binary outcome leads to the novel features of this model. While the noise in performance is exogenous in standard career-concerns models, in this model the role of noise in the trial outcome is necessarily endogenous, as it depends on the lawyers' effort decisions. In particular, the noisiness is maximal when the two opposing lawyers compete in symmetric conditions. Notice that under symmetric conditions, there is more room for randomness (e.g., luck) being more influential in determining the final outcome. Consequently, the trial outcome's informativeness and career-concerns incentives are lower. In contrast, as the competition becomes less symmetric in terms of effort, talent, and merits, there is less room for randomness to make a difference in performance. As a result, the trial outcome's informativeness increases inducing parties to exert more effort. Therefore, I find that asymmetries reinforce effort incentives, which is a peculiar (and to some extent contra-intuitive) feature of career concerns incentives in tournaments.

To further evaluate the distortions introduced by career concerns, I use similar linearity conditions on the performance outcome as in standard career-concerns models. I obtain a closed-form solution for the relative equilibrium effort ratio of the two opposing lawyers. Agents with career concerns attempt to influence the market's beliefs by exerting more effort. Although the market cannot be fooled in equilibrium, the attorney with stronger career-concerns incentives exerts higher effort than the opponent in equilibrium (holding other incentives equal). Stronger career-concerns incentives arise through a greater variance in the agent's *ex ante* talent, a larger weight on the reputational gain relative to other elements in the attorney's payoff function, and a higher sensitivity of the trial outcome to the attorney's talent. The attorney with an overall larger net effect exerts more effort in court.

Regarding the merits of a case, they can interact with career concerns through different possible channels. A particularly interesting one for the analysis of career concerns is the potential effect of merits in enhancing the transmission of information on attorneys' talents. Facing an unfavorable case can actually increase the sensitivity of the trial outcome to the attorney's talent, for instance when winning a less favorable case can be more informative about her talent than winning an intermediate or an easy case. Unfavorable merits would then act as a multiplier of the career-concerns incentives and increase the attorney's effort incentives. In contrast, favorable merits could weaken them: the trial outcome is likely to be less sensitive to the attorneys' talent when the case is easy. Consequently, although less favorable merits can increase the marginal cost of effort, they can also lead to a larger reputational gain from winning the case. Therefore, the cost advantage of the attorney that benefits from the merits could be fully offset by higher reputational incentives of the opponent. As a result, an attorney facing unfavorable merits might exert higher effort in equilibrium than an attorney with the merits in her favor.

I also extend the model to a framework in which effort and talent exhibit positive complementarities. Such complementarities arise when the returns from effort are increasing in the agents' talents. Complementarities between effort and talent can lead to richer learning and career-concerns incentives (Bonatti and Hörner, 2017). I find that a higher average talent induces a higher equilibrium effort because complementarity means that the trial outcome's sensitivity to the agents' talents is increasing in the effort level. In a framework with two opposing agents, this implies that the equilibrium effort ratio thus depends on the ratio of *ex ante* average talent.

In addition, the article extends the analysis to alternative compensation schemes. First, it studies the case in which the plaintiff's attorney is compensated via a contingent fee arrangement (i.e., a percentage of the settlement or the award obtained by the plaintiff in court). In a framework without implicit incentives, Polinsky and Rubinfeld (2003) find that contingent fees provide insufficient incentives for the attorney to devote the effort level desired by the plaintiff. However, since career concerns add up to the contingent fee incentive, they can increase the incentives to provide effort. Nevertheless, as shown throughout the paper, the strength of the career-concerns incentives depends on several parameters, such as the characteristics of the opponent's attorney. Second, it studies both clients' willingness to pay for an attorney with high career concerns. Hiring a lawyer with strong career concerns may be beneficial for the client, but the value of such a gain is also a function of the strength of the opposing lawyer's career concerns. In fact, both clients may have incentives to hire an attorney with strong career concerns, but they may not benefit from doing so —or even end up worse off— when both hire this type of attorney.

1.1 Related literature

This article lies in the intersection between three different literatures, the career concerns literature, the litigation literature, and the tournaments' literature. Combining elements of these three areas, the article provides new insights about effort provision in tournament environments where parties compete for endogenous reputation effects.

The contract theory literature introduced career concerns to study their effects on agency problems. As argued by Fama (1980), career concerns provide incentives for the agent to exert higher effort, to the point that it may solve a moral hazard problem. As pointed out by Holmström (1999), such career-concerns effect is increasing in the ex-ante uncertainty about the agents' ability. Dewatripont et al. (1999a) extend the results to a more general framework with multiple tasks and where effort may affect the agent's future talent. Posterior literature has built applications adapting this main standard model. Dewatripont et al. (1999b), study the role of career concerns for government agencies' officials focusing on the role of multitasking and fuzzy evaluation of performance. Career concerns tend to increase effort provision, but they can also lead to inefficiencies such as herding and mispricing (Scharfstein and Stein, 1990; Milbourn et al., 2001; Dasgupta and Prat, 2006, 2008) and anomalies consistent with prospect theory (Harbaugh, 2013).

The analysis in this article differs from the standard career concerns models by studying a model with two opposing agents that compete against each other. Lawyers' performance in court is determined not only by their talent and their effort level, but also by the talent and effort of the opponent's lawyer. Thus, this article relates to career-concerns models where the outcome of one agent is informative about the outcome of another agent. Most notably, Meyer and Vickers (1997) study career concerns under the richer information arising from comparative performance. They focus on the case where there is correlation in either the talent or the performance's noise of the two agents. Effort incentives can increase when there is positive correlation between the noise shocks of two agents' performances. The positive correlation between noise shocks implies that the performance of one agent becomes more informative about her talent when observing also the other agent's performance. Since there is lower uncertainty about the noise shock, effort incentives increase. In contrast with this model and with the model in Casas-Arce and Martínez-Jerez (2009) that have individual performance outcomes for each agent, two lawyers opposing each other in a case share a common outcome —with perfectly negatively correlated implications for the two of them. This is also the difference with Chalioti (2016), which studies an agent's incentives to collaborate with a teammate when the teammate's performance provides information about the agent's talent. Thus, unlike in these models, in this article there is a common noise shock in the lawyers' observed performance. Furthermore, the noise and, therefore, the informativeness of the trial outcome are endogenous to the lawyers' effort decisions.

Miklós-Thal and Ullrich (2015) study the effort incentives of soccer players under heterogeneous chances to be selected by their national team for an international competition. Unlike in Meyer and Vickers (1997), Chalioti (2016) and my model, players' outcomes are not correlated. However, there is interaction between players' strategies because after their independent individual performance is observed, only the player with the highest ex-post perceived ability is selected. The authors focus on the incentives generated by this type of selection tournament when the gain from being selected is decreasing in the agents' effort exerted prior to selection (e.g., due to fatigue or risk of injury). They find non-monotone effects. Performance increases for those players with intermediate chances of being selected, but decreases for those likely to be selected. In contrast, I focus on a framework where there are no effort spillovers and agents' outcomes, contrary to being independent, are actually directly interrelated. Only one agent can win, therefore performance simply determines which is the agent that succeeds. This is crucial for the analysis as it implies that there is a common noise component in agents' performance. As shown in the article, this common noise becomes endogenous and affects the strength of the resulting career-concerns incentives.

Previous authors have applied contest models to litigation (Katz, 1988; Farmer and Pecorino, 1999, 2000; Wärneryd, 2000; Hirshleifer and Osborne, 2001; Baik and Kim, 2007). In particular, this article is related to Wärneryd (2000), and Baik and Kim (2007), which study strategic effects of delegating in lawyers the choice of effort. Nevertheless, these models do not account for career concerns since the reward from winning in court is exogenous. In contrast, this article studies lawyers' effort provision in the presence of endogenous reputational gains. As shown in the article, reputational incentives differ from standard contest incentives. In particular, while asymmetries between the contestants tend to reduce effort provision in contests with exogenous awards (e.g., Schotter and Weigelt (1992); Franke (2012a,b)), they can induce higher effort levels in the case of endogenous reputational gains. I find that a less favorable case can actually increase an attorney's effort incentives, since winning a less favorable case can be more informative about her talent than winning an intermediate case.

In addition, the career-concerns model in this article incorporates other features that are specific to litigation models. The outcome of the trial might be more or less sensitive to the performance of the attorneys depending on the type of case, court, or legal system. I study how the level of sensitivity affects the results. Finally, a section of the article studies the effect of career concerns when the plaintiff and her lawyer have misaligned interests. I study how career concerns affect the misalignment that arise when the lawyer is compensated through a contingency fee, which consists of a percentage of the settlement or the award obtained by the plaintiff in court.

Previous articles have studied the effect of reputation in the legal profession. Fingleton and Raith (2005) study bargaining outcomes when the parties hire reputation-motivated agents to do the bargaining. They find that, when talent is private information of the bargaining agent, less talented bargainers are more aggressive in open door bargaining (i.e., when their clients can observe the bargaining process). As a consequence, open door bargaining has a higher probability of inefficient disagreements. Levy (2005) adapts the Scharfstein and Stein (1990) herding model of investment to a judicial framework wherein monitoring only takes place when litigants appeal. The author shows that judges with career concerns deviate from the efficient decision by excessively contradicting previous judicial decisions in order to signal ability. Finally, Iossa and Jullien (2012) study the role of judges' career concerns on clients' demand for lawyers under distinctive quality layers.

A number of articles have analyzed the effect of compensation systems for lawyers; however, these models do not incorporate the effect of lawyers' career concerns. If implicit incentives have important effects on the decisions of lawyers, they will also affect the contracts between the lawyers and their clients. In an article that studies the contract choice of a risk averse agent with career concerns, Gibbons and Murphy (1992) show that career concerns incentives play an important role even in the presence of explicit performance-based incentives. Furthermore, since career concerns effects are stronger for younger workers, weaker explicit incentives are optimal in their case, which is consistent with their empirical evidence studying CEO compensation. Regarding the implications for the contract stage, this article contributes to this existing literature by showing that in a litigation environment contract decisions are affected by the potential career-concerns incentives of the opponent's lawyer.

2 The model

2.1 The attorneys

Two attorneys, i and j, face at Court representing opponent parties. The trial outcome, $y \in \{0,1\}$, is binary and determined by the attorneys' talents and efforts, denoted as t_i, t_j, e_i and e_j, respectively. Let $y = 1$ ($y = 0$) represent the case where i (j) wins.

Attorney $a \in \{i, j\}$'s talent is given by $t_a \in \{\theta_a^l, \theta_a^h\}$ where $0 < \theta_a^l < \theta_a^h \leq 1$. The unconditional probability of attorney a having high talent is denoted by $\rho_a > 0$, which is common knowledge and where ρ_j may be different from ρ_i. Thus, as in the standard career concerns model, there is uncertainty about talent, and the lawyers and the market share common priors on t_i and t_j. In other words, there is imperfect but symmetric information.[3] Let (μ_i, σ_i^2) and (μ_j, σ_j^2) be the *a priori* expectation and variance of attorneys' talent.[4] The unconditional probability of having high talent does not depend on the outcome of this specific dispute, but it might reflect information about the attorney's talent based on past trial outcomes. The priors on the attorneys' talents may be different due, for instance, to differences in the past performance in Court, in the quality of the law school from which they graduated or in the number of years of experience.

The attorneys simultaneously decide how much effort to exert in Court. Effort levels are not observable. Thus, the attorneys' individually optimal levels of effort are determined by the tradeoff between the cost of effort and the implicit reputational incentives to win the trial. For simplicity, I assume in most of the article that the attorneys' explicit compensation does not depend on the trial outcome.[5] The attorneys' payoffs are increasing in the corresponding expected market's inference about their talent given the trial outcome y, $E[t_i \mid y]$ and $E[t_j \mid y]$, which is their implicit incentive to perform well.[6]

[3]The standard career concerns model, based on Holmström (1999) focuses on distortions due to reputation formation that are unrelated to private information. Maintaining this focus, I extend the model to a tournament setting.

[4]That is, for $a \in \{i, j\}$ we have that $\mu_a = \rho_a \theta_a^h + (1 - \rho_a)\theta_a^l$ and $\sigma_a^2 = \rho_a(\theta_a^h)^2 + (1 - \rho_a)(\theta_a^l)^2 - \mu_a^2$.

[5] Hourly billing is a frequent form of compensating lawyers (American Bar Association, 2002). The analysis without explicit monetary incentives fits with hourly billing when effort is not observable. As argued in Garoupa and Gomez-Pomar (2007), when attorneys are compensated on an hourly fee basis and the clients cannot observe the attorneys' effort levels, then a regime of hourly fees is equivalent to a regime of flat fees. Section 5 discusses the case of contingent fees, which are common in some specific legal areas such as personal injury litigation. The results presented in Section 5 do not change qualitatively.

[6]The market's inference about an attorney's talent is a reduced form implicit incentive that captures the effect of talent information from current performance on future compensation. The attorneys payoffs depend linearly on the corresponding market's inference, $E[t|y; e_i, e_j]$. The motivation for this assumption in career-concerns models is that

Attorney $a \in \{i, j\}$ chooses the effort level, e_a^*, in order to solve the following problem:

$$\max_{e_a \in [0,1]} \beta_a \cdot E[t_a \mid y] - \frac{c_a e_a^\gamma}{\gamma}.$$

The first part of the objective function are the reputational incentives, and the second part represents the effort costs (e.g., opportunity cost of having to decline other cases or clients), where c_a is a cost parameter and $\gamma > 1$ implies increasing marginal cost of effort when finding evidence or legal arguments. The expected reputational effect of the trial outcome is weighted by $\beta_a > 0$, which measures the importance of the reputational gain on the attorney's payoff; that is, the strength of her career concerns.

In the objective functions, attorneys i and j's implicit incentives are aligned opposite from one another because, whenever one of them wins, the other necessarily loses. Therefore, their maximization problems are linked via their rivalry in the trial outcome, y, which depends on their talents and effort levels. After the trial takes place, the market updates the prior on the talent of each attorney based on the observed realization of y. For $a \in \{i, j\}$, let $\hat{t}_a(y = 1; e_i, e_j)$ and $\hat{t}_a(y = 0; e_i^*, e_j^*)$ denote the market's expectation on a's talent in case of attorney a winning or losing. Given that $y = 1$ represents the case when attorney i wins, then naturally, $\hat{t}_i(y = 1) \geq \hat{t}_i(y = 0)$, whereas $\hat{t}_j(y = 1) \leq \hat{t}_j(y = 0)$.

Anticipating how the market updates, the attorneys' expected inferred talent considering the two possible outcomes, $y = 1$ and $y = 0$, is given by:

$$E[t_i \mid y] = \Phi_{E_t} \cdot \hat{t}_i(y = 1) + (1 - \Phi_{E_t}) \cdot \hat{t}_i(y = 0),$$

$$E[t_j \mid y] = \Phi_{E_t} \cdot \hat{t}_j(y = 1) + (1 - \Phi_{E_t}) \cdot \hat{t}_j(y = 0),$$

where Φ_{E_t} is the expected probability that i wins the trial, which is discussed in detail in the next subsection.

As in Holmström (1999), even though the market does not observe the attorneys efforts, the market's inference on the attorneys' talent depends on the market's conjecture about the attorneys equilibrium effort levels. In equilibrium, the market conjecture will coincide with the actual equilibrium effort levels, e_i^* and e_j^*. Therefore, the expected inferred talents can be expressed as functions of the equilibrium effort levels:

$$E[t_i \mid y; e_i^*, e_j^*] = \hat{t}_i(y = 0; e_i^*, e_j^*) + \Phi_{E_t}(e_i, e_j)(\hat{t}_i(y = 1; e_i^*, e_j^*) - \hat{t}_i(y = 0; e_i^*, e_j^*)),$$

$$E[t_j \mid y; e_i^*, e_j^*] = \hat{t}_j(y = 1; e_i^*, e_j^*) + (1 - \Phi_{E_t}(e_i, e_j))(\hat{t}_j(y = 0; e_i^*, e_j^*) - \hat{t}_j(y = 1; e_i^*, e_j^*)),$$

The difference $\hat{t}_i(y = 1; e_i^*, e_j^*) - \hat{t}_i(y = 0; e_i^*, e_j^*)$ characterizes i's reputational gain from winning the

in a competitive market the agent's future compensation is determined by the market's posterior expectation of the agent's outcome. Linear separability between effort and talent, also commonly assumed in these models, permits the agent's future compensation to be also linearly separable with respect to the agent's talent and effort.

trial relative to losing, and, therefore, measures i's implicit incentives, whereas $\hat{t}_j(y=0;e_i^*,e_j^*)-\hat{t}_j(y=1;e_i^*,e_j^*)$ characterizes j's reputational gain from winning the trial ($y=0$) relative to losing ($y=1$).

Therefore, the first-order conditions for the interior solution can be written as:[7]

$$\beta_i \frac{\partial \Phi(y=1;e_i^*,e_j^*)}{\partial e_i} \cdot (\hat{t}_i(y=1;e_i^*,e_j^*) - \hat{t}_i(y=0;e_i^*,e_j^*)) - c_i {e_i^*}^{\gamma-1} = 0, \tag{1}$$

$$\beta_j \left. \frac{\partial(1-\Phi(y=1;e_i^*,e_j^*))}{\partial e_j} \right|_{e_i=e_i^*, e_j=e_j^*} (\hat{t}_i(y=0;e_i^*,e_j^*) - \hat{t}_i(y=1;e_i^*,e_j^*)) - c_j {e_j^*}^{\gamma-1} = 0. \tag{2}$$

where in equilibrium the effort levels chosen coincide with the market's conjecture , e_i^* and e_j^*.

2.2 The trial outcome

The trial outcome, denoted by $y \in \{0,1\}$, is a binary outcome where, as already mentioned, $y=1$ is interpreted as i wins (i.e., j loses) and vice versa for $y=0$. The outcome is determined by the attorneys' efforts, e_i, e_j and their talents, t_i, t_j:

$$y = \begin{cases} 1 & \text{with probability } \Phi(e_i,e_j,t_i,t_j) \\ 0 & \text{with probability } 1-\Phi(e_i,e_j,t_i,t_j) \end{cases} .$$

where, $\Phi \in (0,1)$, $\partial\Phi/\partial e_i > 0$, $\partial\Phi/\partial t_i > 0$, $\partial\Phi/\partial e_j < 0$, $\partial\Phi/\partial t_j < 0$. In Section 4 the trial outcome also depends on the case merits.

A main contribution of the model is to extend the career concerns model to a tournament framework with opposing agents. There are two main deviations from the standard career concerns model, both related to this tournament nature of litigation. First, the attorneys' outcome is binary.[8] Second, only one of the two opposing attorneys can win the case. As a result of these two features, the noise in the outcome is endogenous to both agents' choices of effort. This is crucial difference with respect to previous related models, which take the noise as an exogenous linear shock. The endogenous noise arises even when assuming an exogenous additive shock to Φ à la Holmström (1999). As shown in Appendix A.1, how decisive is such a shock would depend on the actual values of the attorneys' efforts and talents. Intuitively, what is crucial is not the size of the exogenous

[7]Note that $\frac{\partial^2\Phi(y=1;e_i,e_j)}{\partial^2 e_i} \leq 0$ and $\frac{\partial^2(1-\Phi(y=1;e_i,e_j))}{\partial^2 e_j} \leq 0$ are sufficient (not necessary) conditions for the objective function to be strictly concave in e_i. Therefore, the first order condition characterizes the interior maximum as long as the marginal returns from effort are not strictly increasing. Section 3 provides the necessary parametric condition to rule out corner solutions

[8]Prevailing or not in Court is a binary outcome that transmits information about the attorneys' talents. In addition, the award obtained by a prevailing plaintiff could transmit further non-binary information. A natural question would be whether binary outcomes induce lower or higher effort than continuous outcomes. In a subsection of Dewatripont and Tirole (1999), the authors discuss the implication of a"pass/fail" outcome in a career concerns framework with one agent. They argue that whether the agent's effort is lower or higher with a binary outcome rather than with a continuous outcome depends on the density function of talent and observables given effort. Thus, if the market can obtain additional information from the Court award, this could potentially lead to higher or lower effort incentives for the attorney relative to the pure binary case.

shock, but its size relative to the the values of e_i, e_j, t_i, and t_j. Therefore, the tournament binary outcome necessarily generates noise that is implicit and endogenous to the attorneys' choices of effort.

The noise in the trial outcome is implicitly given by the deviations of the observed value of y away from the value determined by effort and talent (and merits in Section 4), $\Phi(e_i, e_j, t_i, t_j)$. Thus, the noise, ε, in the trial outcome is a random variable that takes values:[9]

$$\varepsilon \equiv y - \Phi = \begin{cases} 1 - \Phi & \text{with probability } \Phi \\ -\Phi & \text{with probability } (1 - \Phi) \end{cases} .$$

which implies that the noise's average is $E\{\varepsilon\} = \Phi - \Phi^2 - \Phi + \Phi^2 = 0$ with variance $Var(\varepsilon) = (1 - \Phi)^2\Phi + (-\Phi)^2(1 - \Phi) = \Phi(1 - \Phi)$. The implicit noise is larger when the outcome of the trial is determined more from randomness than from the efforts and talents of the two attorneys. For instance, suppose the plaintiff's attorney is considerably more talented and puts more effort than the defendant's attorney, then Φ would be expected to be closer to 1 than in a case with more similar attorneys. Thus, if i wins (i.e., $y = 1$), the noise in the learning process would be small since it would be the difference between Φ —fully determined by e_i, e_j, t_i, and t_j— and $y = 1$. In contrast, if i loses then the noise in the market learning process would be larger as $y = 0$ would be further away from the function of effort and talent, Φ.

I refer to the variance of the noise, $\Phi(1 - \Phi)$, as the trial outcome's noisiness. Notice that it coincides with the variance of the trial outcome, $Var(y)$, because naturally, more uncertainty about the trial outcome, y, implies noisier information from the trial outcome for the market's learning process about attorneys' talents. Consider two attorneys with very similar talent and effort levels, then, everything else equal, Φ would closer to $1/2$ than in the case with the more talented attorney exerting more effort. As the case becomes more balanced, the level of uncertainty increases (i.e., the noisiness increases). Notice that if e_i, e_j, t_i, and t_j are such that $\Phi = 1/2$, the highest level of noisiness is reached. Intuitively, when attorneys' effort levels and talents are such that they both have the same chances of winning, then it is more likely that randomness plays a substantial role determining the trial outcome; therefore, the outcome is least informative about the attorneys' talents.

In addition to the implicit noise component, there is another source of uncertainty in the trial outcome. In this model, there is common uncertainty about attorneys' talents, as it is common in the standard career-concerns models. Therefore, neither z nor Φ can be anticipated with certainty by the attorneys and the market. As a consequence, the posteriors on the attorneys' talents are not based on the actual Φ but on the expected probability that i wins, $\Phi_{Et} \equiv E_t\{\Phi(e_i, e_j, t_i, t_j)\}$, which is the expectation over Φ taken with respect to both t_i and t_j, given the common priors over

[9] For simplicity, I refer to the expression above as the error term but it is the error term of i's performance. The error term of A_j's performance is given by $(1 - y) - (1 - \Phi)$. Thus, the two error terms are perfectly and inversely correlated.

them.

The realization of the trial outcome, y, permits to update the priors on the attorneys' talents through Φ_{Et} and Bayes' rule. As discussed above, the trial outcome's informativeness depends on the endogenous noise, ε, which is conditional on the values of effort and talent. Since there is uncertainty about the attorneys' talents, the Bayesian update is based on the unconditional distribution of the noise with respect to t_i and t_j. Therefore, the noisiness level for the market is given by Φ_{Et} rather than by Φ. Let this noisiness level be denoted by $Var(\Phi_{Et}) \equiv \Phi_{Et}(1-\Phi_{Et}) \in [\underline{\Sigma}, \overline{\Sigma}] \subset [0, 1/4]$. Since Φ_{Et} is a probability, $\overline{\Sigma} = 1/4$ is the largest level of uncertainty possible. In addition, I assume that $\underline{\Sigma} > 0$, for tractability purposes.

To measure the impact of the trial outcome on the market's opinion about the attorneys' talents let $\hat{t}_a(y=0; e_i, e_j)$ denote the posterior expected talent of attorney $a \in \{i, j\}$ for each possible trial outcome. Based on Bayes' rule, in case i wins:

$$\begin{aligned}
\hat{t}_i(y=1; e_i, e_j) &= \theta_i^h \cdot \Pr\{\theta_i^h \mid y=1\} + \theta_i^l \cdot \Pr\{\theta_i^l \mid y=1\}, \text{ and} \\
\hat{t}_j(y=1; e_i, e_j) &= \theta_j^h \cdot \Pr\{\theta_j^h \mid y=1\} + \theta_j^l \cdot \Pr\{\theta_j^l \mid y=0\},
\end{aligned}$$

and in case j wins:

$$\begin{aligned}
\hat{t}_i(y=0; e_i, e_j) &= \theta_i^h \cdot \Pr\{\theta_i^h \mid y=0\} + \theta_i^l \cdot \Pr\{\theta_i^l \mid y=0\} \text{ and} \\
\hat{t}_j(y=0; e_i, e_j) &= \theta_j^h \cdot \Pr\{\theta_j^h \mid y=0\} + \theta_j^l \cdot \Pr\{\theta_j^l \mid y=0\}.
\end{aligned}$$

The reputational gain from winning the trial is given by the difference between $\hat{t}_i(y=1; e_i, e_j)$ and $\hat{t}_i(y=0; e_i, e_j)$. Naturally, $\hat{t}_i(y=1; e_i, e_j) > \hat{t}_i(y=0; e_i, e_j)$ and $\hat{t}_j(y=1; e_i, e_j) < \hat{t}_j(y=0; e_i, e_j)$.

As shown in Appendix A.2, the posterior expected talent for attorney i can be rewritten as:

$$\hat{t}_i(y=1; e_i, e_j) = \mu_i + \rho_i(1-\rho_i)(\theta_i^h - \theta_i^l) \cdot \frac{\left(\Phi_{Et} \left| t_i = \theta_i^h\right.\right) - \left(\Phi_{Et} \left| t_i = \theta_i^l\right.\right)}{\Phi_{Et}}.$$

$$\hat{t}_i(y=0; e_i, e_j) = \mu_i - \rho_i(1-\rho_i)(\theta_i^h - \theta_i^l) \cdot \frac{\left(\Phi_{Et} \left| t_i = \theta_i^h\right.\right) - \left(\Phi_{Et} \left| t_i = \theta_i^l\right.\right)}{1-\Phi_{Et}}.$$

Notice that the expression $\left(\Phi_{Et} \left| t_i = \theta_i^h\right.\right) - \left(\Phi_{Et} \left| t_i = \theta_i^l\right.\right)$ is related to how sensitive is the trial outcome to the attorney's talent. For instance, if the value of this difference is large, it means that a talented attorney can affect considerably the court decision. Letting the trial outcome sensitivity be defined as the effect on the trial outcome of having an attorney with high talent, θ_i^h, relative to having an attorney with low talent, θ_i^l, measured as a fraction of the difference between $\theta_i^h - \theta_i^h$, we have that:

$$\delta_i \equiv \frac{(\Phi_{Et} | t_i = \theta_i^h) - (\Phi_{Et} | t_i = \theta_i^l)}{\theta_i^h - \theta_i^l}$$

Rewriting the posterior expected talent in terms of the trial outcome sensitivity is intuitive and also convenient for notation. It permits to rewrite the posterior expected talents as a function of δ_i and $\sigma_i^2 \equiv \rho_i(1-\rho_i)(\theta_i^h - \theta_i^l)^2$, as follows:[10]

$$\hat{t}_i(y=1; e_i, e_j) = \mu_i + \frac{\sigma_i^2 \delta_i}{\Phi_{Et}} \tag{3}$$

$$\hat{t}_i(y=0; e_i, e_j) = \mu_i - \frac{\sigma_i^2 \delta_i}{1-\Phi_{Et}} \tag{4}$$

Therefore, the difference between the market's inference about t_i in case of i winning relative to losing can be written as follows:

$$\hat{t}_i(y=1; e_i, e_j) - \hat{t}_i(y=0; e_i, e_j) = \frac{\sigma_i^2 \delta_i}{\Phi_{Et}(1-\Phi_{Et})} \tag{5}$$

Equivalently, for j:

$$\hat{t}_j(y=0; e_i, e_j) - \hat{t}_j(y=1; e_i, e_j) = \frac{\sigma_j^2 \delta_j}{\Phi_{Et}(1-\Phi_{Et})}, \tag{6}$$

where:[11]

$$\delta_j \equiv \frac{(1-\Phi_{Et}|t_j = \theta_j^h) - (1-\Phi_{Et}|t_j = \theta_j^l)}{\theta_j^h - \theta_j^l}.$$

The reputational gain is increasing in the sensitivity of the trial outcome to the attorneys' talents, δ_i and δ_j. Although the sensitivity performance is not commonly studied in previous career concerns literature, it is natural that the reputational gain depends on it. For the particular case of litigation, some types of cases, types of courts, or types of legal systems might be more sensitive than others to attorneys' talents. [12] One possibility is that juries are more sensitive to attorneys' ability (e.g., communication skills), while judges might focus more on the merits of the case.

Another difference of the model relative to previous career concerns literature is that the reputational gain is decreasing in $\Phi_{Et}(1-\Phi_{Et})$, which is the noisiness in the informativeness of the trial outcome. As the noisiness increases, the trial outcome becomes less informative about talent. As a consequence, the gain associated to performing well decreases. The novelty of this framework is that the noise uncertainty is endogenous to the attorneys' choices of effort.

[10] The variance of attorney i's ex-ante talent is a function of the prior belief's variance, $\rho_i(1-\rho_i)$, and of the spread of the attorney's types, $(\theta_i^h - \theta_i^l)$. More in detail, $\rho_i(1-\rho_i)(\theta_i^h-\theta_i^l)^2 = \rho_i(1-\rho_i)(\theta_i^h)^2 + \rho_i(1-\rho_i)(\theta_i^l)^2 - 2\rho_i(1-\rho_i)\,\theta_i^l\,\theta_i^h$. Since $\mu_i^2 \equiv (\rho_i\theta_i^h + (1-\rho_i)\theta_i^l)^2 = \rho_i^2(\theta_i^h)^2 + (1-\rho_i)^2(\theta_i^l)^2 + 2\rho_i(1-\rho_i)(\theta_i^h)(\theta_i^l)$, then, replacing $2\rho_i(1-\rho_i)(\theta_i^h)(\theta_i^l)$ as $\mu_i^2 - \rho_i^2(\theta_i^h)^2 - (1-\rho_i)^2(\theta_i^l)^2$ into the initial expression leads to: $\rho_i(1-\rho_i)(\theta_i^h-\theta_i^l)^2 = \rho_i(\theta_i^h)^2 + (1-\rho_i)(\theta_i^l)^2 - \mu_i^2 \equiv \sigma_i^2$.

[11] Notice that $\left(1-\Phi_{Et}\left|t_j = \theta_j^h\right.\right) - \left(1-\Phi_{Et}\left|t_j = \theta_j^l\right.\right) = \left(\Phi_{Et}\left|t_j = \theta_j^l\right.\right) - \left(\Phi_{Et}\left|t_j = \theta_j^h\right.\right)$.

[12] For instance, previous research has found differences in verdicts from judges and verdicts from juries when facing similar cases. Spier (2007) provides an overview of documented differences between juries and judges decisions. In particular, Clermont and Eisenberg (1991) and Helland and Tabarrok (2000) find differences in trial awards and win rates, once accounting for the part of these differences driven by selection. Their evidence suggests that the differences are more complex than just driven by a general pro-plaintiff jury bias, as considered by conventional wisdom.

Finally, as in previous career concerns literature, the reputational gain is greater the larger is the uncertainty about the talent of the attorney. The market learns much less from the trial outcome of an attorney with vast experience than in the case of an inexperienced lawyer. Therefore, the potential reputational gain from winning is larger in the latter case.

The following proposition summarizes these findings.

Proposition 1 *The reputational gain of attorney $a \in \{i, j\}$ from winning is given by the product of the following three components:*
i.- The sensitivity of the trial outcome to the attorney's talent, δ_a
ii.- The inverse of the trial outcome's noisiness, $\Phi_{Et}(1 - \Phi_{Et})$,
iii.- The ex-ante *uncertainty on the attorney's talent, σ_a^2.*

3 Equilibrium effort in Court

3.1 Benchmark model: separable performance

This subsection provides a benchmark setting using the litigation framework but without the career concerns tournament competition. It permits to see the effects of career concerns with binary outcomes but without the tournament competition. The tournament component of the main model arises because only one of the attorneys can obtain an outcome that provides positive information about her talent (i.e., only one can win the case). As a consequence, the informational update about attorneys' talents is favorable for the prevailing attorney and unfavorable for the other. If instead, the performance of each attorney could be separately observed, the market's inferences about attorneys' talents would depend on separate performance indicators and switch off tournament competition.

In this subsection, I assume that the market is able to evaluate separately the attorneys' performance based on independent success outcomes, y_i and y_j, and their corresponding probabilities, $\phi_i(e_i, t_i)$ and $\phi_j(e_j, t_j)$. As a consequence, the informational tournament competition disappears because the market's update about an attorney's talent is not affected by the opponent's effort and talent. The trial outcome is determined by the attorneys efforts and talents but there are separate performance indicators for each attorney. Specifically, the probability of the aggregate outcome $y = 1$ is given by:

$$\Phi = 1/2 + \phi_i(e_i, t_i) - \phi_j(e_j, t_j).$$

The market observes y as well as y_i and y_j, separately. For instance, the market would be able to observe when both attorneys perform well in trial even though only one of them prevail in the end. That is, attorney i might lose the case (i.e., y=0) but have a good performance during the trial ($y_i = 1$).

Separable performance switches off the strategic interactions in attorneys effort strategies. Attorney i is expected to perform well with probability $\phi^i_{Et_i}(e_i, t_i)$ and her reputational gain from winning the case is given by:

$$\hat{t}_i(y_i = 1; e_i) - \hat{t}_i(y_i = 0; e_i) = \frac{\sigma_i^2 \delta_i}{\phi^i_{Et_i}(1 - \phi^i_{Et_i})} \tag{7}$$

It does not depend on the opponents' effort because $\phi^i_{Et_i}$ does not. Therefore, we can solve i and j's problems separately.

With separable performance, the reputational incentive crucially depends on μ_i.[13] . This is the case because noisiness depends now on how close $\phi^i_{Et}(e_i, t_i)$ is to 1/2.

3.2 Main model: Interlinked attorneys' performance

I now return to the main model, where there is non-separable performance of the two opponent attorneys. I assume that given the same amount of effort and talent, both attorneys have the same chances of winning the trial. That is, $(\Phi \mid e_i = e_j, t_i = t_j) = 1/2$. Section 4 relaxes this assumption to study the potential role of the merits of the case, which might favor one of the attorneys and, as a consequence, can affect returns from talent and the informativeness of the trial outcome. In equilibrium both attorneys choose effort levels simultaneously. The first order conditions for the equilibrium effort levels (e_i^*, e_j^*) are:

$$c_i e_i^{*\ \gamma-1} = \beta_i \frac{\partial \Phi_{Et}}{\partial e_i} \cdot \frac{\sigma_i^2 \delta_i}{Var(\Phi_{Et}(e_i^*, e_j^*))}, \tag{8}$$

$$c_j e_j^{*\ \gamma-1} = \beta_j \frac{\partial \Phi_{Et}}{\partial e_j} \cdot \frac{\sigma_j^2 \delta_j}{Var(\Phi_{Et}(e_i^*, e_j^*))}. \tag{9}$$

In this section, I focus on the case where Φ is linear with respect to effort and talent, in line with Holmström (1999). Also, a direct extension of this assumption for the case of two agents is to let e_i and e_j also be linearly separable with respect to each other. Thus, I will let Φ be linear and separable with respect to e_i, e_j, t_i *and* t_j. Section 5 discusses the implications of relaxing linear separability of effort and talent. Under these assumptions, the probability that i wins the case would be:

$$\Phi = 1/2 + (e_i - e_j) + \tau \cdot (t_i - t_j), \tag{10}$$

where τ is small enough to ensure that $\Phi \in [0, 1]$ for any combination of e_i, e_j, t_i and t_j.[14]

An advantage of assuming linear separability of e_i and e_j is that all the strategic interactions in the choice of effort arise through the reputational gain rather than through a specific functional form for the trial outcome. Notice that under this assumption, the returns from effort of attorney i

[13] In line with example 5.1 in Dewatripont et al. (1999a), p.191

[14] This functional form also belongs to the family of "difference-form" success functions that considers the probability of success as a function of the difference in the contestants' performances (Hirshleifer, 1989; Che and Gale, 2000).

do not directly depend on the effort of attorney j (i..e., $\partial\Phi/\partial e_i$ does not depend on e_j), nevertheless it will be shown that attorneys' choose their effort strategically based on how each others' effort levels indirectly affect the trial outcome's informativeness about their talents. I also assume that the returns from effort are constant, the same for both attorneys and normalized to 1, $\partial\Phi_{Et}/\partial e_i = \partial(1-\Phi_{Et})/\partial e_j = 1$. Nevertheless, heterogeneities in the production of effort between the two attorneys can still be captured by differences in the marginal effort costs (i.e., differences in c_i and c_j). To illustrate that an attorney i needs greater effort investment to provide the same amount of evidence (or legal arguments) as attorney j, then we would have that $c_i > c_j$.

Under linearity of Φ with respect to the attorneys' talents, $\delta_i \equiv \tau(\theta_i^h - \theta_i^l)/((\theta_i^h - \theta_i^l) = \tau$, and $\delta_j \equiv \tau(\theta_j^h - \theta_j^l)/((\theta_j^h - \theta_j^l) = \tau$, where $\tau \equiv \partial\Phi/\partial t_i = \partial 1 - \Phi/\partial t_j$. Thus the returns from talent are the same and constant for both attorneys.

Since the expectation of a sum is the sum of the expectations, linearity and separability ensure that Φ_{Et} can be expressed as a function of μ_i and μ_j. Under this functional form, the ex-ante expected probability that i *wins* is given by:

$$\Phi_{Et} = 1/2 + (e_i - e_j) + \tau \cdot (\mu_i - \mu_j). \tag{11}$$

Also, given that in this section $(\Phi \mid e_i = e_j, t_i = t_j) = 1/2$, then linearity implies that $(\Phi_{Et} \mid e_i = e_j, \mu_i = \mu_j) = 1/2$. Thus, if the prior expected talent is the same for both attorneys and the effort levels also coincide, then both attorneys have the same expected probability of winning, even though the actual realizations of t_i and t_j may not coincide.

Therefore the reputational gains are given by:

$$\hat{t}_i(y=1; e_i^*, e_j^*) - \hat{t}_i(y=0; e_i^*, e_j^*) = \frac{\tau\sigma_i^2}{Var(\Phi_{Et})}$$

$$\hat{t}_j(y=0; e_i^*, e_j^*) - \hat{t}_j(y=1; e_i^*, e_j^*) = \frac{\tau\sigma_j^2}{Var(\Phi_{Et})}$$

The main implication of assuming linearly separable effort and talent is that δ_i and δ_j are constant and do not depend on the effort levels. Thus, the reputational gain is determined by the inverse of the noisiness times a constant, making it possilbe to represent it graphically . Figure 1 illustrates how the informativeness of the trial outcome is affected by Φ_{Et}. In particular, both $\hat{t}_i(y=1; e_i, e_j) - \hat{t}_i(y=0; e_i, e_j)$ and $\hat{t}_j(y=0; e_i, e_j) - \hat{t}_j(y=1; e_i, e_j)$ are minimized when the noisiness is maximal (i.e., when Φ_{Et}=1/2)

The first-order conditions can be rewritten such that:

$$e_i^{*\,\gamma-1} = \frac{\beta_i\tau\sigma_i^2}{c_i Var(\Phi_{Et})} \tag{12}$$

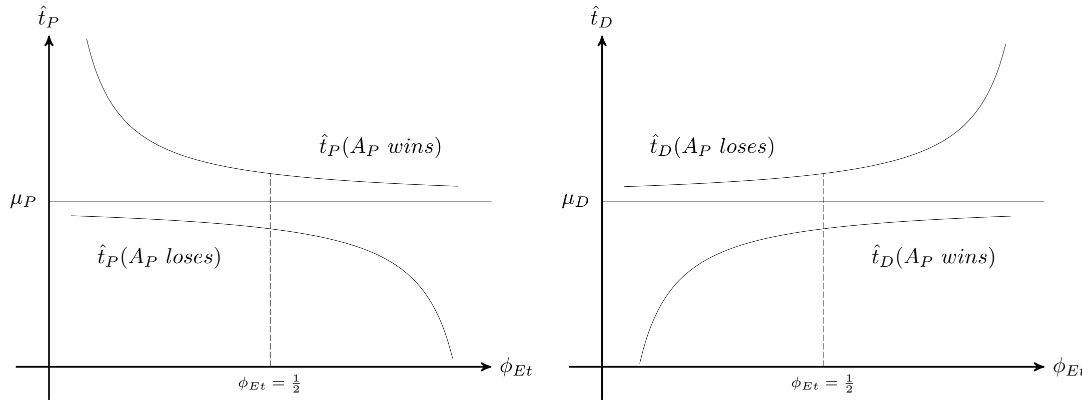

Figure 1: Posterior i and j's expected talents conditional on the the trial outcome

$$e_j^{*\ \gamma-1} = \frac{\beta_j \tau \sigma_j^2}{c_j Var(\Phi_{Et})} \tag{13}$$

In order to ensure that in equilibrium e_i^*,$e_j^* \in (0,1)$, $c_i > \beta_i \tau \sigma_i^2 / \underline{\Sigma}$, and that $c_j > \beta_j \tau \sigma_j^2 / \underline{\Sigma}$. Simplifying these two equations:

$$\frac{c_i e_i^{*\ \gamma-1}}{\beta_i \sigma i^2} = \frac{c_j e_j^{*\ \gamma-1}}{\beta_j \sigma_j^2} = \frac{\tau}{Var(\Phi_{Et}(e_i^*, e_j^*))}. \tag{14}$$

Therefore, the following result holds.

Proposition 2 *In equilibrium:*
i.-A higher equilibrium $Var(\Phi_{Et})$ is associated with lower equilibrium effort levels of i and j.
ii.- i/j effort ratio can be characterized as:[15]

$$\frac{e_i^*}{e_j^*} = \left(\frac{c_j \beta_i \sigma_i^2}{c_i \beta_j \sigma_j^2} \right)^{1/(\gamma-1)}. \tag{15}$$

Intuitively, a higher equilibrium $Var(\Phi_{Et})$ means the trial outcome is noisier, which reduces the reputational incentives. Also, the equilibrium effort ratio depends on the attorneys' relative career concerns weight, relative effort costs and relative prior uncertainty over talent. In contrast, differences in prior expected talents, μ_i and μ_j, do not play any role on effort incentives. This is not the case when effort and talent are not linearly separable. Section 5 shows that μ_i and μ_j may actually affect $e_i^*\ /e_j^*$ in the presence of complementarities between effort and talent.

[15] It could be that more than one pair (e_i^*, e_j^*) satisfies the equilibrium conditions. Even if potentially there could be multiple equilibria, the model is tractable because the expression above characterizes the equilibrium effort ratio for any possible equilibrium.

Effects on aggregate effort

In addition to the effect on relative effort, career concerns can affect also aggregate effort levels, $e_i + e_j$. The analysis of aggregate effort is very common in the tournament, contest and rent-seeking literature as it permits to measure the intensity of the competition as well as the amount of resources devoted to it. To see how tournaments with career concerns differ from standard tournaments, a critical question is whether attorneys exert higher aggregate effort when they have similar or asymmetric career concerns.

Starting from the situation where both attorneys have symmetric career concerns, let the priors on the talent of the two attorneys coincide, $\mu_i = \mu_j = \mu$ and $\sigma_i = \sigma_j = \sigma$, as well as the career concerns weights, $\beta_i = \beta_j = \beta$.[16] For simplicity, I let $c_i = c_j = c$ throughout this section. Introducing these conditions in Proposition 2, we know that both lawyers have the same incentives to exert effort in Court, $e_i^* = e_j^* = e^*$.

Corollary 1 *In the symmetric career concerns case, a symmetric equilibrium is the only solution to the effort optimization problem of the attorneys, with optimal effort levels, $e^* = e_i^* = e_j^*$, and aggregate effort:*

$$e_i^* + e_j^* = 2\left(\frac{\beta\tau\sigma^2}{c\overline{\Sigma}}\right)^{1/(\gamma-1)}. \tag{16}$$

The equilibrium aggregate effort is increasing in the attorneys' career concerns, either measured by β, or by the *a priori* uncertainty on the attorneys' talent, σ^2. Interestingly, effort levels cancel each other out in Φ_{Et}. As a consequence, $Var(\Phi_{Et}(e_i, e_j))|_{e_i=e_j}$ is maximal, $Var(\Phi_{Et})|_{e_i=e_j} = \overline{\Sigma} = 1/4$.

A particularity of this framework is that the tournament component —typical of legal disputes— implies that higher equilibrium effort does not necessarily lead to a higher performance, measured by the probability of prevailing in court. Let $\Phi^* \equiv \Phi(e_i^*, e_j^*, t_i, t_j)$ be the realized probability that i succeeds at trial. Increasing the career-concerns incentives of the two opposing agents, can make both attorneys worse off, since both attorneys would increase the equilibrium effort levels without affecting Φ^*. Therefore, attorneys' expected payoffs decrease because effort costs are larger. As discussed in Section 5 this does not benefit clients either since the expected trial outcome remains unchanged despite the higher equilibrium effort.

The next question is whether asymmetric attorneys' career concerns decrease or exacerbate the effect of career concerns on aggregate effort. From Proposition 2, we know that career-concerns incentives are stronger for the attorney with higher uncertainty on her talent. We also now that a higher equilibrium variance is associated with lower equilibrium effort. Thus, we can see that starting from the symmetric attorneys case, an increase in σ_i^2 for one of the attorneys increases aggregate effort.

[16] Even though the priors on the attorneys' talents coincide, it could be that the actual realizations of the talent are different for the two attorneys. That is, even if the prior expectation of their talents coincides, $\mu_i = \mu_j$, it could be that the actual talents are different $t_i = \theta_i^h > t_j = \theta_j^l$.

Let σ_i^2 increase while σ_j^2 remains equal to σ, the initial symmetric uncertainty. Let e_i^* and e_j^* denote the new equilibrium effort levels, while e^* denotes the initial symmetric equilibrium effort for the two attorneys. In equilibrium i exerts more effort than j, and since μ_i=μ_j, her expected chances of prevailing in Court are also higher (i.e., $\Phi_{Et} > 1/2$). Since $\Phi_{Et} > 1/2$, then $Var(\Phi_{Et}) < \overline{\Sigma} = 1/4$. As a consequence:

$$e_j^{*\gamma-1} = \frac{\beta\tau\sigma^2}{cVar(\Phi_{Et})} > e^{*\gamma-1} = \frac{\beta\tau\sigma^2}{c\overline{\Sigma}} \tag{17}$$

Therefore, an increase in i's career concerns induces j to increase her equilibrium effort level. As a consequence, aggregate effort, $e_i^* + e_j^*$, increases as well. Despite increasing her effort level, j's prospects of winning the case are worse than when facing an attorney with the same career-concerns incentives. The analogous result can be shown for an increase in σ_j^2 starting from the symmetric case. Figure 2 illustrates these results.

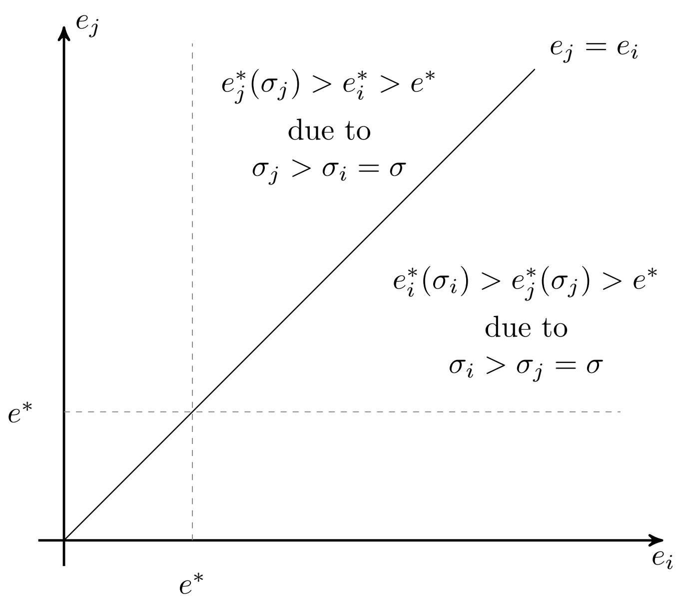

Figure 2: Changes in the equilibrium effort levels when increasing σ_i (or σ_j) while holding σ_j (σ_i) fixed with respect to the baseline

There are two main driving forces in these results. First, winning a case has a larger positive effect for the attorney with a higher prior variance because the market has greater uncertainty over her talent. Similarly, losing a case has a larger negative effect. Thus, her incentives to exert more effort in Court are stronger. In addition, starting from the symmetric equilibrium, if the priors on the attorneys' talents change such that $\sigma = \sigma_j < \sigma_i$, then both attorneys increase their effort because due to $e_j^* < e_i^*$, $Var\{\Phi_{Et}^*\}$ decreases with respect to the symmetric equilibrium. In other words, i's effort level is larger because his incentives are twofold ($\sigma_j < \sigma_i$ and $Var\{\Phi_{Et}^*\} <$

$\overline{\Sigma}$). In contrast, j exerts higher effort only because the trial outcome becomes less noisy due to $Var\{\Phi^*_{Et}\} < \overline{\Sigma}$.

The following corollary summarizes these findings.[17]

Corollary 2 *Starting from the situation with symmetric priors, an increase in σ_i (holding σ_j fixed and equal to σ) implies that aggregate effort increases.*

Overall, it has been shown that career concerns can lead to an increase in aggregate effort and litigation costs without necessarily improving the litigants' payoffs. As discussed in Section 6, career concerns might still be beneficial in terms of social welfare. In particular, higher equilibrium effort levels might be welfare improving if they lead to more accurate Court decisions or reduce the probability of mistakes.

4 Career concerns and the merits of the case

The merits of the case also play a role in the trial outcome, frequently favoring one of the litigants (e.g., before the trial begins, it could be common knowledge that the precedents favor one of the litigants). Let $M \in (0,1)$ denote the merits of the case in favor of the plaintiff, such that Φ is increasing in M (i.e., $1-\Phi$ is decreasing in M). Then, Φ is now a function of M, e_i, e_j, t_i, and t_j, where $(\Phi \mid e_i = e_j, t_i = t_j, M)$ is not necessarily 1/2, unlike in Section 3. However, by letting $M = 1/2$ represent the case where the merits do not favor any of the litigants, then $(\Phi \mid e_i = e_j, t_i = t_j, M = 1/2) = 1/2$.

The merits of the case can interact with career concerns through three possible channels. First, the merits of the case may affect the attorneys' returns from effort. It is possible to study this channel by making c_i and c_j depend on M. [18] Second, when the trial outcome depends on M, also does the trial outcome's noisiness, $\Phi_{Et}(1-\Phi_{Et})$ and, as a consequence, the incentives to provide effort in Court. Intuitively, as the merits increasingly favor one party, random effects are less likely to be decisive in the trial outcome, which reduces the trial outcome noiseness. Thus, a change in the value of M can affect career-concerns incentives by determining how close is the noisiness, $\Phi_{Et}(1-\Phi_{Et})$, to the maximal trial outcome's noisiness, which is still reached when $\Phi_{Et} = 1/2$. Third, and particularly interesting for the analysis of career-concerns incentives, the merits may directly affect the trial outcome's informativeness about the attorneys' talents. In particular, winning a difficult case (i.e., a case with merits against the attorney) is likely to be more informative than winning an intermediate or an easy case (i.e., a case with even merits or merits that favor the attorney). As a consequence, a difficult case could lead to larger reputational gain and, therefore, to larger career-concerns incentives.

[17]Equivalent results arise when introducing asymmetries in the career concerns weights,$\beta_i \neq \beta_j$, or in the sensitivity of the trial outcome to the attorneys' talents, $\tau_i \neq \tau_j$. This is not surprising as these are alternative ways to modify attorneys' career concerns.

[18]Suppose the case merits only affect the cost parameters, then c_i decreasing and c_j increasing in M, (i.e., as the merits become more favorable to attorney i, her cost of effort decreases) , implies that e^*_i/e^*_j is increasing in M.

To model the effect of the merits on the trial outcome's informativeness, let the sensitivity of the trial outcome to attorney i and j's talents, $\delta_i(M)$ and $\delta_j(M)$, depend on M. This means that the cross partial derivatives of Φ with respect to talent and merits of the case are non-zero, $\partial\Phi/\partial M\partial t_i \neq 0$,$\partial\Phi/\partial M\partial t_j \neq 0$.

In particular, for i:

$$\hat{t}_i(y=1; e_i, e_j, M) - \hat{t}_i(y=0; e_i, e_j, M) = \frac{\sigma_i^2 \delta_i(M)}{\Phi_{Et}(1-\Phi_{Et})}.$$

Similarly, for j:

$$\hat{t}_j(y=0; e_i, e_j, M) - \hat{t}_j(y=1; e_i, e_j, M) = \frac{\sigma_j^2 \delta_j(M)}{\Phi_{Et}(1-\Phi_{Et})}.$$

Maintaining the linearity and separability assumptions as in Section 3, then, we could introduce merits into expressions (10) and (11) by letting the probability that i wins the case be:

$$\Phi = M + \cdot(e_i - e_j) + \tau_i(M)t_i - \tau_j(M)t_j, \tag{18}$$

where $\tau_i'(M) < 0$ and $\tau_j'(M) > 0$ to allow the sensitivity to be decreasing (increasing) in M for i (j). Then, the ex-ante expected probability that i wins is given by

$$\Phi_{Et} = M + \cdot(e_i - e_j) + \tau_i(M)\mu_i - \tau_j(M)\mu_j. \tag{19}$$

Therefore,

$$\hat{t}_i(y=1; e_i^*, e_j^*, M) - \hat{t}_i(y=0; e_i^*, e_j^*, M) = \frac{\tau_i(M)\sigma_i^2}{Var(\Phi_{Et})}$$

$$\hat{t}_j(y=0; e_i^*, e_j^*, M) - \hat{t}_j(y=1; e_i^*, e_j^*, M) = \frac{\tau_j(M)\sigma_j^2}{Var(\Phi_{Et})}$$

Replacing the expression of the reputational gain in the necessary first order conditions permits to aggregate the three potential channels in which the merits of the case can affect the attorneys' effort decisions, and obtain the equilibrium effort ration:

$$\frac{e_i^*}{e_j^*} = \left(\frac{\beta_i\sigma_i \; c_j(M)\tau_i(M)}{\beta_j\sigma_j \; c_i(M)\tau_j(M)}\right)^{1/(\gamma-1)}.$$

Paradoxically, as stated in the following proposition, less favorable merits for i (i.e., a lower M) can induce i to exert more effort than j, despite j's effort-cost advantage.

Proposition 3

1. The equilibrium effort ratio, e_i^*/e_j^*, positively depends on the corresponding trial outcome's talent sensitivity ratio, $\tau_i(M)/\tau_j(M)$.

2. The equilibrium effort ratio, e_i^*/e_j^*, decreases in M if $\tau_i(M)/c_i(M)$ is decreasing in M and

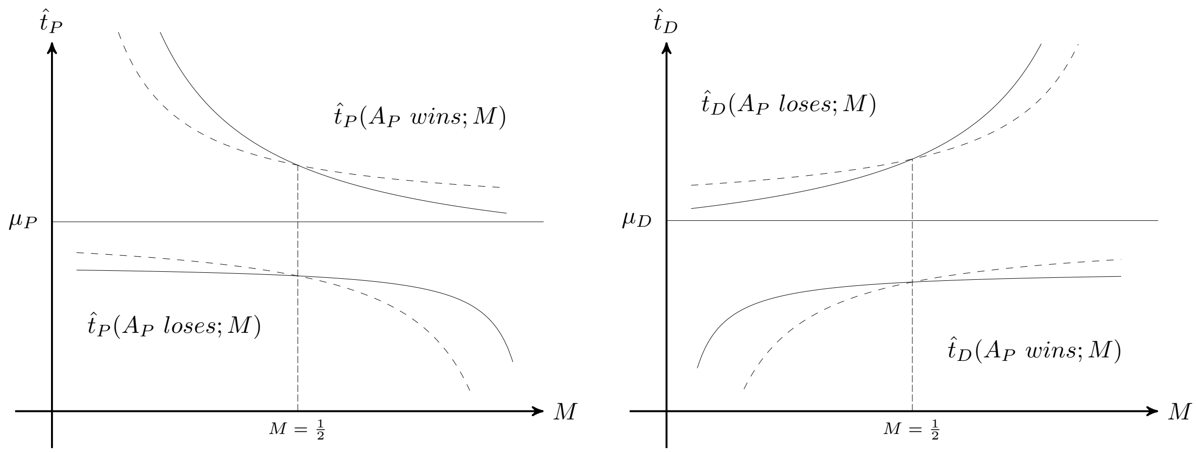

Figure 3: Posterior i and j's expected talents conditional on the the trial outcome and as a function of the case merits, M

$\tau_j(M)/c_j(M)$ is increasing in M. That is, if as the case becomes harder, the effect of the merits on the trial outcome's sensitivity is stronger relative to the effect on the marginal cost of effort, for both attorneys.

While more favorable merits decrease the marginal cost of effort, they also increase the attorneys' career-concerns incentives whenever easier cases make the trial outcome less sensitive to the attorney's talent. To the point that unbalanced merits can lead to higher equilibrium effort for the agent with unfavourable merits. This is the case when the less favorable merits make the trial outcome sufficiently more informative to generate a positive net effect on the relative equilibrium effort level. Without loss of generality let $M > 1/2$, then it must be that $c_i(M) < c_j(M)$ and $\tau_i(M) < \tau_j(M)$. Then, keeping balanced the other parameters, $\beta_i = \beta_j$ and $\sigma_i = \sigma_j$, then

The solid lines in Figure 3 illustrate the asymmetry that arises in the posteriors for i and j when the sensitivity depends on the merits of the case as discussed above. The trial outcome's level of informativeness is no longer minimized at $\Phi = 1/2$. For comparison purposes, the dashed lines illustrate a symmetric reputational gain around $M = 1/2$ that would arise if $\Phi = M/2 + \cdot(e_i - e_j) + \tau \cdot (t_i - t_j)$. That is, if M affected Φ, and therefore, $Var(\Phi_{Et})$, through the second channel mentioned above but not through the third channel. The effect through $Var(\Phi_{Et})$ would be symmetric around $M = 1/2$ since the effect on $Var(\Phi_{Et})$ of an increase from $M = 1/2$ to $M = 1/2 + \Delta$ would be equivalent to the effect of a decrease from $M = 1/2$ to $M = 1/2 - \Delta$, for any $\Delta < 1/2$. In contrast, when $\tau_i(M)$ is decreasing in M, the reputational gain from winning relative to losing is larger when $\tau_i(M = 1/2 - \Delta)$ than when $\tau_i(M = 1/2 + \Delta)$. Therefore, career-concerns incentives are larger in the first case. Equivalently for $\tau_j(M)$, the reputational gain from winning relative to losing is smaller when $\tau_i(M = 1/2 - \Delta)$ than when $\tau_i(M = 1/2 + \Delta)$. Therefore, career-concern incentives are smaller in the first case.

5 Extensions

5.1 Complementarities between effort and talent

Most career-concerns models assume additive separability between effort and talent.[19] However, in certain frameworks effort and talent can exhibit complementarities (e.g., a more talented attorney may have larger returns from effort than a less talented attorney). This subsection focuses on the role of such complementarities on the informativeness of the trial outcome and, therefore, on the career-concerns incentives of the two attorneys.

Letting:

$$\Phi(e_i, e_j, t_i, t_j) = \frac{1}{2} + \frac{e_i t_i - e_j t_j}{N}, \tag{20}$$

where N is a parameter large enough to ensure that $\Phi \in [0, 1]$ for any combination of e_i, e_j, t_i and t_j. Attorney's performance is determined by talent and effort which exhibit complementarities. Given this functional form assumed for Φ:

$$\Phi_{Et}(e_i, e_j, t_i, t_j) = \frac{1}{2} + \frac{\mu_i e_i - \mu_j e_j}{N}; \tag{21}$$

the expectation over Φ is taken with respect to both t_i and t_j, since there is common imperfect information about both attorneys' talents. The cross partial derivative of Φ (respectively, $1 - \Phi$) with respect to e_i and t_i (respectively, e_j and t_j) is positive. Thus, the attorney with higher prior average talent would have larger returns from effort than the attorney with lower prior average talent.

The main implication of this extension is that a higher effort level increases the informativeness of the trial outcome on the attorneys' talents. This is the case because the sensitivity of the trial outcome to the attorneys' talents now also depends on the attorneys' effort levels. In particular, $\left(\Phi_{Et} \left| t_i = \theta_i^h\right.\right) - \left(\Phi_{Et} \left| t_i = \theta_i^l\right.\right) = e_i(\theta_i^h - \theta_i^l)/N$ and $\left(1 - \Phi_{Et} \left| t_j = \theta_j^h\right.\right) - \left(1 - \Phi_{Et} \left| t_j = \theta_j^l\right.\right) = e_j(\theta_j^h - \theta_j^l)/N$. Thus, from expressions (3) and (4) we know that the posterior in case of winning (losing) the trial is now increasing (decreasing) in e_i. As a consequence, the attorneys' reputational gain from winning the trial is increasing in their own effort level. For i:

$$\hat{t}_i(y = 1; e_i, e_j) - \hat{t}_i(y = 0; e_i, e_j) = \frac{e_i \sigma_i^2 / N}{Var(\Phi_{Et})},$$

Similarly for j:

$$\hat{t}_j(y = 0; e_i, e_j) - \hat{t}_j(y = 1; e_i, e_j) = \frac{e_j \sigma_j^2 / N}{Var(\Phi_{Et})}.$$

[19] An exception is Bonatti and Hörner (2017), which studies a one agent model with continuous time and coarse information. They find that complementarities between effort and talent lead to strategic substitution effects between effort levels at different career stages of the agent. In contrast, such substitutability does not arise in the model with additively separable effort and talent. Also, Dewatripont et al. (1999a,b) notice that, in a one-agent model with multiple tasks, complementarities between effort ant talent may induce multiple equilibria.

Intuitively, attorneys with higher prior average talent have stronger career-concerns incentives because of the complementarities between effort and talent. From the first order conditions in expressions (1) and (2)

$$-c_i {e_i^*}^{\gamma-1} + \beta_i \mu_i / N \cdot (\hat{t}_i(y=1; e_i^*, e_j^*) - \hat{t}_i(y=0; e_i^*, e_j^*)) = 0,$$

$$-c_j {e_j^*}^{\gamma-1} - \beta_j \mu_j / N (\hat{t}_j(y=0; e_i^*, e_j^*) - \hat{t}_j(y=1; e_i^*, e_j^*)) = 0.$$

Complementarities imply that $\partial \Phi_{Et}/\partial e_i = \mu_i/N$ and $\partial \Phi_{Et}/\partial e_j = -\mu_j/N$. Replacing the expressions for the reputational gain in the first order conditions:

$$c_i {e_i^*}^{\gamma-1} = \frac{\beta_i \mu_i e_i^* \sigma_i^2}{N^2 Var(\Phi_{Et})}, \tag{22}$$

$$c_j {e_j^*}^{\gamma-1} = \frac{\beta_j \mu_j e_j^* \sigma_j^2}{N^2 Var(\Phi_{Et})}. \tag{23}$$

Since attorneys' reputational gain is now increasing on their effort levels, the equilibrium effort, e_i appears also on the right hand side of the first order condition of attorney i. The following equilibrium result holds.

Proposition 4 *In the presence of complementarities between effort and talent, a higher prior average talent, μ_i, induces a higher effort in equilibrium. In particular:*
i.- i/j equilibrium effort ratio can be characterized as:[20]

$$\frac{e_i^*}{e_j^*} = \left(\frac{c_j \mu_i \beta_i \sigma_i^2}{c_i \mu_j \beta_j \sigma_j^2} \right)^{1/(\gamma-2)}. \tag{24}$$

ii.- As in the case without complementarities, a higher equilibrium $Var(\Phi_{Et})$ is associated with lower equilibrium effort levels of i and A_j.

5.2 Alternative contracts between clients and attorneys

Attorneys' compensation in case of trial is likely to be affected by their binding participation constraint. This assumption is reasonable if attorneys compete for clients. Alternatively, it could be that attorneys have higher bargaining power during the contract stage; for instance, if the supply of lawyers is scarce or if the number of certified lawyers is given, as in Iossa and Jullien (2012). In these cases, clients' willingness to pay would affect attorneys' compensation. This subsection studies the effect of career-concerns incentives on clients willingness to pay for an attorney.

[20] As in the case without complementarities, it could be that more than one pair (e_i^*, e_j^*) satisfies the equilibrium conditions. The model is still tractable because the expression above characterizes the equilibrium effort ratio for any possible equilibrium.

In models with one agent, stronger career-concerns incentives are potentially beneficial for the principal because they may reduce the moral hazard problem. Also, in a model with one agent, Kőszegi and Li (2008) find the conditions under which wages are increasing in an employee's responsiveness to implicit incentives ("drive"). However, when the agents' outcome is determined by a tournament, career concerns might not be beneficial and could potentially have negative implications for clients. Hiring a lawyer with strong career concerns may be beneficial for the client, but the value of such gain is also a function of the strength of the opposing lawyer's career concerns.

As shown in Section 3, a litigant's equilibrium probability of winning the case does not necessarily increase when her attorney's equilibrium effort increases. It depends also on the effect on the equilibrium effort of the opponent. As a consequence, the litigant could be worse off, because her chances of prevailing in Court would not necessarily be higher and the litigation costs would increase. Thus, the results in previous sections indicate that with two opposing agents, clients' willingness to pay is going to be affected by the career concerns of both her attorney and the opponent's attorney.

Suppose both clients choose their attorneys simultaneously. They can both choose among an attorney with high career concerns, $\overline{\sigma}^2$, or an attorney with low career concerns, $\underline{\sigma}^2$. For simplicity, let the ex ante expected talent, μ_i, and other attorneys' characteristics be the same for both attorney types. The equilibrium probability that i wins would then be given by $\Phi^{\sigma_i \sigma_j^*}$, such that σ_i^2 and σ_j represent the *ex-ante* talent's variance of the attorneys chosen by the plaintiff and the defendant, respectively. Based on the results in Corollaries 1 and 2 and given $\mu_i = \mu_j$, then:

$$\Phi^{\overline{\sigma}\underline{\sigma}^*} > \Phi^{\overline{\sigma}\overline{\sigma}^*} = \Phi^{\underline{\sigma}\underline{\sigma}^*} > \Phi^{\underline{\sigma}\overline{\sigma}^*}$$

Therefore, if the attorneys' compensation is the same for both types of attorneys, that is $w \equiv w(\overline{\sigma}) = w(\underline{\sigma})$ then clients have incentives to hire the attorney with high career concerns give that for the plaintiff:

$$W \cdot \Phi^{\overline{\sigma}\underline{\sigma}^*} - w > W\Phi^{\cdot\underline{\sigma}\underline{\sigma}^*} - w$$

$$W \cdot \Phi^{\overline{\sigma}\overline{\sigma}^*} - w > W\Phi^{\cdot\underline{\sigma}\overline{\sigma}^*} - w$$

And for the defendant:

$$-W \cdot \Phi^{\underline{\sigma}\overline{\sigma}^*} - w > -W\Phi^{\cdot\underline{\sigma}\underline{\sigma}^*} - w$$

$$-W \cdot \Phi^{\overline{\sigma}\overline{\sigma}^*} - w > -W\Phi^{\cdot\overline{\sigma}\underline{\sigma}^*} - w$$

Therefore, for both it is a dominant strategy to hire the attorney with high career concerns. This particular case illustrates how litigants might end up in an equilibrium where both hire attorneys with high career concerns even though in equilibrium it does not increase their probability of winning the case relative to the case in which both hire low career concerns attorneys.

6 Social welfare implications of lawyers' career concerns

There is a wide range of possible social welfare effects in the analysis of legal disputes. The most prominent welfare effects in the literature are related to litigation costs, the probability of making judicial mistakes (i.e., judicial inaccuracy) and the optimality of the incentives generated by court decisions (e.g., potential injurer's care incentives, deterrence of illegal behavior, etc.).[21] Career concerns distortions can potentially affect several of these social welfare effects as well as the potential agency costs between attorneys and clients. As in other frameworks, the net effect of career concerns is ambiguous because their distortions have both positive and negative social welfare implications.

Regarding agency problems between attorneys and clients, reputational incentives induce attorneys to exert higher effort levels in court and, thus, can reduce moral hazard problems. However, due to the tournament type of competition between the two opponent attorneys, higher effort levels do not necessarily increase the client's payoff function. This is a substantial difference relative to previous career concerns literature. Could additional agency problems arise due to attorneys' career concerns? In particular, would career concerns make attorneys choose cases strategically in order to maximize their reputational gain? As shown in previous sections, some cases might have a wider reputational-gain range than others; however, there is no room for strategic case choice in the absence of additional asymmetric information elements. Even though career concerns induce attorneys to exert more effort, attorneys' reputational gains are zero ex-ante. Similarly to previous related literature, the market anticipates how much effort to expect from the attorneys; hence, the attorney's effort decisions cannot mislead the market's inference; that is, $\Phi^*_{Et} \cdot \hat{t}_i(y = 1; e^*_i, e^*_j) + (1 - \Phi^*_{Et}) \cdot \hat{t}_i(y = 0; e^*_i, e^*_j) = \mu$. However, the attorneys are trapped into providing higher effort the larger their career concerns and the larger the uncertainty about their talent.

The incentives generated by court decisions are closely linked to the possibility of judicial mistakes. More accurate judicial decisions help create better incentives (Spier, 2007). Two extreme cases help illustrate how career concerns can have both, negative and positive, effects in this direction. First, let the legal merits parameter, M, measure how much i deserves to win from a social welfare point of view. Then, $M - \Phi^*_{E_t}$ captures the chances of judicial mistakes, where $\Phi^*_{E_t}$ is the anticipated equilibrium probability that i prevails in court. Letting $M = 1$, then it is socially desirable that in equilibrium j exerts the minimal effort possible, $e^*_j = \underline{e}$. Given that $\partial\Phi/\partial e_j$, any effort from the attorney who deserves to lose, increases the chances of judicial mistakes and is a social waste of resources. Attorney j's career concerns can be an obstacle in this direction as they increase his incentives to exert effort. From Section 4, we know that having unfavorable merits increase attorneys effort incentives under certain conditions.

In contrast, consider a second extreme example where M measures how difficult is for j to win but for reasons unrelated to legal merits. For instance, Lerner (2003) "the proliferation of such suits

[21] See, for instance, the overview of general topics on the legal process in Shavell (2009).

may be leading to transfers of financial resources from some of the youngest and most innovative firms to more established, better capitalized concerns"

Letting $M = 1$ now means that j is defending a disadvantaged party. Measure of judicial mistakes? Now $e_j = \underline{e}$ means that the chances of mistakes (e.g., "type 2 error") increase as j's client position is weakly defended. i could take advantage and $c_i(M)$ From Proposition (3), we know that career concerns incentives offset cost disadvantages under certain conditions.

On the negative side, career concerns can lead to high litigation expenses and perverse distortions in other markets. Previous literature points out to the influential role of litigation costs in medical malpractice (Dranove and Watanabe, 2009; Roberts and Hoch, 2009; Currie and MacLeod, 2008), and intellectual property investments (Lerner, 1995; Gallini, 2002).

As shown in the previous section, clients might end up in an equilibrium in which both hire an attorney with high career concerns even though doing so does not improve their probability of winning the case. Given that higher career-concerns incentives tend to increase effort provision, this could imply that litigants end up in a prisoners' dilemma situation. Notice that the joint payoff of a client and her attorney decreases if the attorney's equilibrium effort increases but the probability of winning the case does not change. The baseline case clearly illustrates this situation. Therefore, the model extends the result in Ashenfelter and Dahl (2012) to a framework with attorneys' career concerns. Their article finds that litigants are more successful when they hire expert agents (typically lawyers) to represent them in labor disputes than when they do not. However, they also find that this advantage is fully offset when both litigants hire expert agents. As shown in this article, career concerns can exacerbate this effect.

Overall, depending on whether negative or positive effects dominate, procedural rules can be adjusted to decrease or increase attorneys' career-concerns incentives, respectively. For instance, in countries or areas of law where high litigation expenses are a concern, the model shows ways to reduce reputational incentives.

In particular, litigation procedure rules may affect the sensitivity of the trial outcome to the attorneys' talents, δ_i and δ_j in the model. For instance, the outcome of the trial is likely to depend more on attorneys' talents in some legal systems than in others. If, as argued by Carozza et al. (1999), in inquisitorial systems the impact of attorneys' talents on the trial outcome is more constrained than in adversarial systems, then the reputational gain from winning the case would be lower in such systems due to the lower sensitivity of the trial outcome to the talent of the attorneys. Similarly, previous research has found differences in verdicts from judges and verdicts from juries when facing similar cases.[22] One possibility is that juries are more sensitive to attorneys' ability (e.g., communication skills), while judges might focus more on the merits of the case. As a consequence, jury trials could lead to higher effort levels and litigation expenses. If high litigation

[22]Spier (2007) provides an overview of documented differences between juries' and judges' decisions. In particular, Clermont and Eisenberg (1991) and Helland and Tabarrok (2000) find differences in trial awards and win rates after accounting for the share of these differences driven by selection. Their evidence suggests that the differences are more complex than being driven solely by a general pro-plaintiff jury bias, as conventional wisdom would hold.

expenses are a concern, policy makers could introduce rules intended to reduce such sensitivity. For instance, caps on jury awards could achieve this target by introducing a constraint on jury decisions. Nevertheless, a lower sensitivity could also imply that equilibrium effort levels are not sufficiently high due to the lower career-concerns incentives. Therefore, in some legal frameworks, it may enhance social welfare to increase the trial outcome's sensitivity.

7 Applications to other adversarial settings

7.1 Civil conflicts with reputational concerns

In addition to litigation, the model can be applied to a battlefield or civil conflict setting with two contenders of uncertain fighting capabilities. The uncertainty over t_i and t_j could be on size, actual fighting skills, or on the ability to obtain military resources or support from other countries. Letting rivals spend on military expenses instead of legal expenses leads to a model of civil conflicts with strong similarities to a litigation contest setting (Corchón, 2007). Naturally, there is a large economics literature studying civil conflicts as a contest, which started with Hirshleifer (1988, 1989), Garfinkel (1990), and Skaperdas (1992). The contest literature focuses on explicit incentives abstracting from the role of reputational implicit incentives. This is also the case for the conflict literature more in general, with some exceptions related to reputation-based enforcement of peace agreements. However, some research does study the role of reputational incentives as a determinant of military expenses. Most prominently, Walter (2009) argues that separatist conflicts are fueled by "a desired to deter additional challenges" and "the need to build a reputation of toughness in the face of'many future challengers." In line with this interpretation of conflict, my model can be used to study conflict investment/effort choices as an informative device about contenders' capabilities that impacts future challenges.

Theoretical and empirical analysis of conflicts, which study the determinants of conflicts, its duration and intensity (see Garfinkel and Skaperdas (2012) for a survey). In particular, some of the literature discusses the role of uncertainty on the opponents resources, mostly as an asymmetric informational friction that might induce or prolong a conflict (e.g., Slantchev, 2003, Slantchev, 2006, Ramsay, 2017). Interestingly, Montalvo and Reynal-Querol (2010), discuss the role of uncertainty on the size of the rivals on the conflict intensity using a contest success function with explicit incentives but uncertainty. In a contest with explicit incentives "given the size of the groups the higher the initial variance of the measurement error (of this size) the higher will be the duration conditional on the conflict having started." In contrast, this might not be the case in conflicts with implicit reputational incentives, as shown in Proposition 2.

8 Conclusion

As shown in this article, career concerns affect agents' equilibrium effort levels and generate strategic interactions in their decisions. These strategic interactions depend on how informative is the trial outcome about their talent, which is determined endogenously. A lawyer is then not only affected by her own career concerns, but also by the career concerns of her opponent. In addition, career concerns incentives depend on the sensitivity of the trial outcome to the attorneys' talents. When such sensitivity depends on the merits of the case, then the merits may act as a multiplier of career-concerns incentives on lawyers' effort decisions.

The article contributes to the career concerns literature by studying a model with two opposing agents where performance is determined by a tournament. It shows that when the two opposing agent's performance is determined by a win-or-lose outcome, then there is endogenous noise in the information on talent transmitted by the outcome. As a consequence, the reputational gain from winning depends on the equilibrium effort level of the two agents. At the same time, the article contributes to the contest literature. It shows that the uncertainty on the endogenous noise is maximal when agents compete in symmetric conditions. Therefore, career-concerns incentives weaken relative to situations where the conditions are asymmetric. This result contrasts with usual contest models with exogenous rewards, where asymmetries tend to reduce effort incentives.

As in the standard career-concerns literature, throughout the article attorneys do not have private information about their own talents. Incorporating asymmetric information on talent could imply additional distortions. In line with Spence (1978), attorneys could potentially use the trial as a signaling device. Lawyers observing a positive private signal about their own talent would have a higher expected reputational gain than those with a negative signal, leading to potential separating equilibria.

Appendix

A.1 Microfoundation of the endogenous noise in a tournament framework

Let the trial outcome y be partially determined by a deterministic production function of legal arguments $f(e_i, t_i, e_j, t_j)$, where the inputs are the lawyers' talents, effort levels. That is, let the function $f(e_i, e_j, t_i, t_j)$ represent the fraction of attorney i's chances of winning the case that are not related to randomness. In addition, let the trial outcome be determined by an additive random exogenous component, $u \in [\underline{u}, \bar{u}]$, and $u \sim G(0, \sigma_u)$, in line with Holmström (1999). Therefore, the trial outcome would be determined as follows:

$$y = \begin{cases} 1 & \text{with probability } f(e_i, e_j, t_i, t_j) + u \\ 0 & \text{with probability } 1 - f(e_i, e_j, t_i, t_j) - u \end{cases}$$

where $\partial f/\partial e_i > 0$, $\partial f/\partial t_i > 0$, $\partial f/\partial e_j < 0$, $\partial f/\partial t_j < 0$, and $f(0, 0, t_i = t_j) = 1/2$.

It can be easily seen that, even though u has an exogenous distribution, its role in determining

Φ actually depends on the levels of effort and talent (e_i, t_i, e_j, t_j), and therefore is endogenous. Take any possible value of $f(e_i, e_j, t_i, t_j)$. The probability that the random component u flips the odds of which attorney wins the case relative to the deterministic component depends on the attorneys effort levels, e_i, e_j. Without loss of generality let $f(e_i, e_j, t_i, t_j) > 1/2$. Then, the probability that randomness flips the odds such that j becomes more likely to win than i is given by:

$$Prob(u < 1/2 - f(e_i, e_j, t_i, t_j)) \equiv G(1/2 - f(e_i, e_j, t_i, t_j))$$

Therefore, despite u being initially exogenous, its likelihood of making a decisive contribution to the binary outcome, y, depends on the agents' choices. In particular, the probability of u being pivotal is decreasing in e_i and increasing in e_j. Moreover, u's likelihood of making a decisive contribution to the binary outcome, y, increases as $f(e_i, e_j, t_i, t_j)$ gets closer to 1/2.

A.2 Derivation of the reputational gain from winning the trial:

This part of the Appendix contains the derivation of the market's inference process. First, to obtain the market's inference about t_i, from Bayes' rule the probability of being a high type conditional on winning:

$$\begin{aligned}
\Pr\{\theta_i^h \quad | \quad y = 1\} &= \frac{\Pr(y = 1 \cup \theta_i^h)}{\Phi_{Et}} = \frac{\rho_P \left(\Phi_{Et} \left| t_i = \theta_i^h\right.\right)}{\Phi_{Et}} \\
&= \frac{\rho_P \left(\Phi_{Et} \mid t_i = \theta_i^h\right) + \rho_P \ \Phi_{Et} \ - \rho_P \ \Phi_{Et}}{\Phi_{Et}} = \\
&= \rho_P + \frac{\rho_P \left(\Phi_{Et} \left| t_i = \theta_P^h\right.\right) - \rho_P \cdot \rho_P \left(\Phi_{Et} \left| t_i = \theta_i^h\right.\right) - \rho_P(1-\rho_P)\left(\Phi_{Et} \left| t_i = \theta_i^l\right.\right)}{\Phi_{Et}} \\
&= \rho_P + \frac{\rho_P(1-\rho_P)\left(\Phi_{Et} \left| t_i = \theta_i^h\right.\right) - \rho_P(1-\rho_P)\left(\Phi_{Et} \left| t_i = \theta_i^l\right.\right)}{\Phi_{Et}} \\
&= \rho_P + \rho_P(1-\rho_P)\frac{\left(\Phi_{Et} \left| t_i = \theta_i^h\right.\right) - \left(\Phi_{Et} \left| t_i = \theta_i^l\right.\right)}{\Phi_{Et}},
\end{aligned}$$

and the probability of being a low type conditional on winning:

$$\begin{aligned}
\Pr\{\theta_i^l \quad | \quad A_P \ wins\} &= \frac{\Pr(A_P \ wins \cup \theta_i^l)}{\Phi_{Et}} = \frac{(1-\rho_P)\left(\Phi_{Et} \mid t_i = \theta_i^l\right)}{\Phi_{Et}} \\
&= \frac{(1-\rho_P)\left(\Phi_{Et} \left| t_i = \theta_P^l\right.\right) + (1-\rho_P) \ \Phi_{Et} \ - (1-\rho_P) \ \Phi_{Et}}{\Phi_{Et}} = \\
&= (1-\rho_P) + \frac{(1-1+\rho_P)(1-\rho_P)\left(\Phi_{Et} \left| t_i = \theta_i^l\right.\right) - \rho_P(1-\rho_P)\left(\Phi_{Et} \mid t_i = \theta_i^h\right)}{\Phi_{Et}} = \\
&= (1-\rho_P) + \frac{\rho_P(1-\rho_P)\left(\Phi_{Et} \mid t_i = \theta_i^l\right) - \rho_P(1-\rho_P)\left(\Phi_{Et} \mid t_i = \theta_i^h\right)}{\Phi_{Et}} \\
&= (1-\rho_P) - \rho_P(1-\rho_P)\frac{\left(\Phi_{Et} \mid t_i = \theta_i^h\right) - \left(\Phi_{Et} \mid t_i = \theta_i^l\right)}{\Phi_{Et}}.
\end{aligned}$$

Therefore, the market's inference about t_i when i wins can be rewritten as:

$$\hat{t}_i(A_P\ wins; e_i, e_j) = \theta_i^h \cdot \Pr\{\theta_P^h \mid A_P\ wins\} + \theta_i^l \cdot \Pr\{\theta_P^l \mid A_P\ wins\} =$$

$$= \mu_i + \rho_P(1-\rho_P)(\theta_i^h - \theta_i^l) \cdot \frac{\left(\Phi \left| t_i = \theta_i^h\right.\right) - \left(\Phi \left| t_i = \theta_i^l\right.\right)}{\Phi_{Et}}.$$

Conversely, when $y = 0$, the probability of being a high type conditional on losing is given by:

$$\begin{aligned}
\Pr\{\theta_i^h \quad | \quad y = 0\} &= \frac{\Pr(A_P\ loses \cup \theta_i^h)}{1-\Phi_{Et}} = \frac{\rho_P\left(1-\Phi_{Et}\left|t_i = \theta_i^h\right.\right)}{1-\Phi_{Et}} \\
&= \frac{\rho_P\left(1-\Phi_{Et}\left|t_i = \theta_i^h\right.\right) + \rho_P(1-\Phi_{Et})\ - \rho_P(1-\Phi_{Et})}{1-\Phi_{Et}} = \\
&= \rho_P + \frac{\rho_P\left(1-\Phi_{Et}\left|t_i = \theta_P^h\right.\right) - \rho_P \cdot \rho_P\left(1-\Phi_{Et}\left|t_i = \theta_i^h\right.\right) - \rho_P(1-\rho_P)\left(1-\Phi_{Et}\left|t_i = \theta_i^l\right.\right)}{1-\Phi_{Et}} \\
&= \rho_P + \frac{\rho_P(1-\rho_P)\left(1-\Phi_{Et}\left|t_i = \theta_i^h\right.\right) - \rho_P(1-\rho_P)\left(1-\Phi_{Et}\left|t_i = \theta_i^l\right.\right)}{1-\Phi_{Et}} = \\
&= \rho_P + \rho_P(1-\rho_P)\frac{\left(1-\Phi_{Et}\left|t_i = \theta_i^h\right.\right) - \left(1-\Phi_{Et}\left|t_i = \theta_i^l\right.\right)}{1-\Phi_{Et}} = \\
&= \rho_P - \rho_P(1-\rho_P)\frac{\left(\Phi_{Et}\left|t_i = \theta_i^h\right.\right) - \left(\Phi_{Et}\left|t_i = \theta_i^l\right.\right)}{1-\Phi_{Et}},
\end{aligned}$$

and the the probability of being a low type conditional on losing is given by:

$$\begin{aligned}
\Pr\{\theta_i^l \quad | \quad y = 0\} &= \frac{\Pr(A_P\ loses \cup \theta_i^l)}{1-\Phi_{Et}} = \frac{(1-\rho_P)\left(1-\Phi_{Et}\left|t_i = \theta_i^l\right.\right)}{1-\Phi_{Et}} = \\
&= \frac{(1-\rho_P)\left(1-\Phi_{Et}\left|t_i = \theta_P^h\right.\right) + (1-\rho_P)(1-\Phi_{Et})\ - (1-\rho_P)(1-\Phi_{Et})}{1-\Phi_{Et}} = \\
&= (1-\rho_P) + \frac{(1-1+\rho_P)(1-\rho_P)\left(1-\Phi_{Et}\left|t_i = \theta_i^h\right.\right) - \rho_P(1-\rho_P)\left(1-\Phi_{Et}\left|t_i = \theta_i^l\right.\right)}{1-\Phi_{Et}} = \\
&= (1-\rho_P) + \rho_P(1-\rho_P)\frac{\left(1-\Phi_{Et}\left|t_i = \theta_i^h\right.\right) - \left(1-\Phi_{Et}\left|t_i = \theta_i^l\right.\right)}{1-\Phi_{Et}}.
\end{aligned}$$

Therefore, the inference in case of winning can be rewritten as:

$$\hat{t}_i(y = 0; e_i, e_j) = \theta_i^h \cdot \Pr\{\theta_P^h \mid y = 0\} + \theta_i^l \cdot \Pr\{\theta_P^l \mid y = 0\} =$$

$$= \mu_i - \rho i(1-\rho i)(\theta_i^h - \theta_i^l) \cdot \frac{\left(\Phi_{Et}\left|t_i = \theta_i^h\right.\right) - \left(\Phi_{Et}\left|t_i = \theta_i^l\right.\right)}{1-\Phi_{Et}}.$$

Regarding the defendant's attorney, the market's inference about t_j when i loses is equivalent to the market's inference about t_i when i wins. Similarly, the market's inference about t_j when

i

wins is equivalent to the market's inference about t_i when i loses. Therefore:

$$\hat{t}_j(y=0;e_i,e_j) = \theta_j^h \cdot \Pr\{\theta_j^h \mid y=0\} + \theta_j^l \cdot \Pr\{\theta_j^l \mid y=0\} =$$

$$= \mu_j + \rho_j(1-\rho_j)(\theta_j^h - \theta_j^l) \cdot \frac{\left(\Phi_{Et} \middle| t_j = \theta_j^h\right) - \left(\Phi_{Et} \middle| t_j = \theta_j^l\right)}{\Phi_{Et}}.$$

$$\hat{t}_j(y=1;e_i,e_j) = \theta_j^h \cdot \Pr\{\theta_j^h \mid y=1\} + \theta_j^l \cdot \Pr\{\theta_j^l \mid y=1\} =$$

$$= \mu_j - \rho_j(1-\rho_j)(\theta_j^h - \theta_j^l) \cdot \frac{\left(\Phi_{Et} \middle| t_j = \theta_j^h\right) - \left(\Phi_{Et} \middle| t_j = \theta_j^l\right)}{\Phi_{Et}}.$$

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