

ESSAYS ON ECONOMIC INCENTIVES RELATED TO THE LAW

By

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To my parents,
for teaching me the value of responsibility and commitment,
and the beauty of searching for answers.

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CHAPTER I

INTRODUCTION

This dissertation is comprised of three essays entitled: "Breaking the law when others do: a model of law enforcement with externalities," "The effects of lawyers' career concerns on litigation," and "Overworking to win the case: Representing cases in court and young lawyers' hours of work."

The first essay studies the problem of optimal law enforcement when individuals violating the law generate positive externalities for other violators. Studying these externalities may be of great importance because they allow us to explain the correlation in individuals' decisions to break the law. As shown in Glaeser et al. (1996), crime rate variances are not fully explained by standard economic, social, and local conditions. They find that the correlation between individuals' criminal behavior may cause the rest of the crime rate variation. While previous literature has focused on behavioral assumptions to explain such correlation (e.g., imitation among peers), this paper shows that interdependence in the decision to break the law may occur among rational utility-maximizing individuals.

In the model the probability of punishing a violator depends not only on enforcement resources, but also on the number of violators. Specifically, the productivity of the enforcement resources is decreasing in the number of violators due to two neighborhood externalities. The first externality is created by congestion in enforcement resources. As the number of violators increases, the amount of resources per violator decreases and hence so does the likelihood that a violator is punished. The second externality arises due to the key role of members of the community in enforcement activities.¹ When the involvement of community members in enforcement

¹See for instance Akerlof and Yellen (1994) and Sampson (2004) for a discussion of the deterrent effect induced by neighbors' collaboration in enforcement activities.

is decreasing in the number of criminals (e.g., due to fear of retaliation), then again the productivity of the enforcement resources decreases as the number of violators increases.

The paper is also related to the game theory literature, as it discusses the application of possible equilibrium selection concepts and its limitations. Furthermore, it provides an application of the risk dominance selection criterion developed by Harsanyi and Selten (1988). In the model, multiple equilibria arise as a consequence of the externalities. Hence, given a level of enforcement resources, more than one crime rate may result as an equilibrium for the continuum of individuals in the model. Furthermore, I find that the more sensitive is the enforcement technology to the externalities, the larger is the range of enforcement resources for which there exist multiple equilibria. Therefore, differences in crime rates across neighborhoods may be explained by differences in how sensitive the enforcement technology is to the externalities.

I assume that the equilibrium selected is the risk dominant equilibrium. Risk dominance seems the most suitable selection criterion in this framework; first, because the experimental literature has shown that it has a stronger predictive power than Pareto dominance, second, because, as shown by Angeletos et al. (2006), the global games model does not lead to equilibrium selection when a previous policy choice (in my framework, the choice of enforcement resources) provides information to the individuals, and third, because the dynamic evolutionary criterion (Young, 1993) requires that individuals are boundedly rational.

At the risk dominant equilibrium, I find that the lower the neighborhood's involvement, the more enforcement resources are needed to induce compliance. Furthermore, if the neighborhood's involvement is low enough, enforcing the law in that specific neighborhood might be too costly. This effect is even stronger when the neighborhood involvement in enforcement activities is decreasing in the crime rate. Overall, differences in crime rates between otherwise identical neighborhoods may be explained

by how the neighborhood's involvement affects enforcement activities and by how it decreases with the crime rate.

In terms of policy analysis, the paper provides two types of policy implications. First, it illustrates the importance of policies that reduce the effect of the congestion externality in the enforcement technology. Examples of these policies are incentives for voluntary payment of fines, and demerit point systems for traffic violations. Second, the results show how campaigns promoting neighbors' involvement in community policing can decrease the amount of resources needed for enforcement, and may facilitate enforcement in crime-ridden neighborhoods. Third, the results are also relevant in terms of empirical implications. In particular, I argue that a structural model of crime may be required when the probability of punishing a violator is endogenously determined and when the level of enforcement resources is a strategic decision of the law enforcement agency. For instance, it may be important to have an equation for the choice of enforcement resources that controls for the harm associated with crime in a specific neighborhood.

The second essay studies how career concerns may affect lawyers' effort choices and settlement decisions in litigation. Because career concerns induce lawyers to provide more effort in court, litigation costs may increase. Understanding the sources of high litigation expenses is important because they affect health costs, the price of goods via product liability, and decisions related to intellectual property rights. For instance, Lerner (1995) provides empirical evidence of how litigation costs affects firms' patenting behavior.

In the model, two lawyers, the defendant's lawyer and the plaintiff's lawyer, oppose each other in court. Each lawyer chooses how much effort to exert in the case by maximizing her payoff function, which is increasing in the market's inference about her talent. The outcome of the trial is informative about the attorneys' talents because it depends on their choices of effort and on their talents. Thus, lawyers have incentives to

exert more effort at trial because in addition to the explicit incentives, each attempts to affect the market's inference about her talent by winning the case. As a benchmark, I solve the case in which lawyers are symmetric. Then, I let the two lawyers differ in how much they care about the market's inference (i.e., in the strength of their career concerns), in what is the initial prior over their talents, and in their cost functions.

Although there is a large economics literature on litigation, little is known about the effect of lawyers' reputational concerns. Career concerns were introduced in a one-principal one-agent model by Fama (1980) and Holmström (1999) to study how such concerns mitigate the moral hazard problem. I contribute to this literature by studying the strategic interactions of two agents opposing each other, and by considering settlement and other specific features of the litigation models, such as different possible contracts between lawyers and clients. As is standard in this literature, I assume that the agents (the two lawyers) have uncertainty about their own talents. Specifically, there is imperfect but symmetric information in the model.

The results show that career concerns create an equilibrium effort trap for the two opposing attorneys. Also, I find that starting from an equilibrium where the two of them care the same about the markets' inference, increasing the career concerns of one of the lawyers implies that her equilibrium effort level is higher than the one from the other lawyer. Furthermore, the other lawyer also increases her equilibrium effort level (although to a lesser extent) even though her career concerns remain unchanged. That is, in equilibrium a lawyer's effort choice depends not only on her career concerns but on the opposing lawyer's career concerns. I also find a similar result when I compare the symmetric equilibrium with the equilibrium effort levels when the uncertainty over the talent of one of the attorneys is larger (letting the prior average talent be the same for both lawyers).

In the settlement stage each lawyer anticipates her choice of effort in case of trial. In this model, the court costs depend on the choice of effort and thus are

endogenous. Since stronger career concerns imply higher equilibrium effort levels, the scope for settlement is increasing in the strength of the lawyers' career concerns. Starting again from an equilibrium where the two opposing attorneys care the same about their career concerns, increasing the career concerns of one of the attorneys implies that the attorney with unchanged career concerns may accept a less beneficial settlement offer than in the initial equilibrium. Notice that the lawyer with stronger career concerns has a higher expected probability of winning the trial because her equilibrium effort level is higher. Also, the lawyer with weaker career concerns exerts more effort than in the initial equilibrium, and therefore has higher court costs. Thus, the expected payoff of going to trial decreases as the career concerns of the opposing lawyer increase.

The third essay is an empirical study analyzing some of theoretical results from the second essay. In particular I provide empirical evidence of the equilibrium effort trap for trial lawyers. In the essay, I use survey data from the "After the JD study," a project funded by the American Bar Foundation and other legal associations, to test whether there is a significant difference between the hours of work of lawyers representing cases in court (treatment group) and other young practicing lawyers working in law firms (control group). I focus on young lawyers because previous research has shown that the effect of career concerns is stronger for younger workers. Also to focus on lawyers with career concerns, I exclude lawyers working part-time or for the government.

Previous empirical research has studied lawyers' earnings, particularly gender differences, but little is known about the determinants of lawyers' hours of work. An exception is Landers et al. (1996) that finds evidence of associate lawyers working too many hours, in the sense that they generally preferred a decrease in hours of work to an increase in their wage. The authors argue that law firms induce lawyers to over-work as a screening device. Their framework assumes that law firms wish to identify

which are the lawyers with a lower taste for leisure, which is private information of the lawyers, to make them partners of the firm. Since lawyers' taste for leisure may change over time (e.g., if they have children), I study whether lawyers work more hours even when there is no signaling or screening involved.

I find that lawyers that represent cases in court work nearly five more hours than the rest of lawyers working full-time in law firms. The result is highly significant and robust to a variety of specifications. For the findings I use average treatment effect estimation under the ignorability-of-treatment assumption. To relax this assumption, I introduce an alternative dependent variable (hours of work beyond expected) that allows me to control for unobservable heterogeneities among the lawyers. The results suggest that lawyers representing cases in court work more hours than the rest due to incentive effects rather than to selection effects. In addition, I construct instrumental variables for the lawyers' annual salary since it could be endogenous and affect the estimates. When using the instruments for annual salary, the difference between the treatment and the control group is even larger, slightly above five hours per week. Finally, I find no evidence of a possible sample selection bias in my analysis.

CHAPTER II

BREAKING THE LAW WHEN OTHERS DO: A MODEL OF LAW ENFORCEMENT WITH NEIGHBORHOOD EXTERNALITIES

Introduction

Socioeconomic conditions of poverty, inequality, education and unemployment do not fully explain the differences in crime rates across locations. Such differences in crime rates remain an open question in the law enforcement literature. This paper studies an alternative explanation that regards the interdependence of individuals' decisions to break the law as an important source of the variance in rates of compliance. In contrast to previous work that focuses on behavioral assumptions,² this paper demonstrates that such interdependence can also arise from conventional assumptions of rational utility maximizing behavior.³

Standard theories of the economics of law enforcement assume that the likelihood that a violator is punished depends only on the level of resources that are devoted to enforcement. However, it is often true that the productivity of enforcement resources depends upon the number of people that engage in the illegal activity.⁴ This paper considers two positive externalities among offenders that may explain neighborhood differentiation. By affecting the productivity of enforcement resources, these externalities create interdependence between individuals' decisions to violate the law.

As shown below, these externalities must be accounted for in evaluating individual payoffs from violating the law because they have a considerable effect on optimal enforcement policy. One externality is caused by congestion in enforcement. It creates

²See for instance Glaeser et al. (1996) and Sah (1991), which are discussed below.

³This interdependence results in multiple equilibria. I will use a refinement to select among them; this is discussed in Section 4.2.

⁴The outcome of the enforcement process is the likelihood that a violator is punished. Thus, the enforcement resources' productivity is measured in terms of that likelihood, or consequently, in terms of the resulting crime rate.

a positive externality among offenders because (for a fixed level of enforcement resources) an increase in the number of violators leads to a lower amount of enforcement resources per violator, yielding a lower likelihood that a violator is punished. This case arises when enforcement resources are needed for punishment and detection activities, rather than for detection alone. For example, if there is only one tow-truck in the neighborhood, an increase in the number of cars that are illegally-parked reduces the probability that a given car is towed since there are fewer enforcement resources (tow-trucks) per violator. In the model the number of violators is determined in equilibrium; hence, the magnitude of this externality is generated endogenously.

The second externality is caused by the community's degree of involvement in enforcement activities. The role of citizens in the enforcement process is important since they may alert authorities, provide evidence, and denounce offenders.⁵ Thus, the productivity of enforcement resources increases in the community's degree of involvement. First, I consider the degree of involvement as an exogenous characteristic of the neighborhood; this allows me to discuss the effect of policies that may change this degree of involvement. Second, a section of the paper extends the results to the case in which neighborhood involvement is a decreasing function of the non-compliance rate (and thus, being determined endogenously), as is the case when non-compliers may retaliate against neighbors who provide information to police.

The probability of punishing a violator is determined endogenously depending on the enforcement resources and on individuals' decisions in equilibrium. A functional form for this probability permits me to evaluate the effects of the externalities. The results show that the externalities have crucial effects on optimal law enforcement policy. First, they create multiple equilibria; thus, more than one compliance level may

⁵For instance, Akerlof and Yellen (1994) argue that "the major deterrent to crime is not an active police presence but rather the presence of knowledgeable civilians, prepared to report crimes and cooperate in police investigations." In a model of gang behavior, Akerlof and Yellen (1994) study the optimal level of cooperation of a community. However, there are no externalities across criminals because their behavior is modeled by a representative gang that chooses the intensity of criminal activity.

result for a given amount of enforcement resources. To find the optimal enforcement policy, the enforcement agency must be able to identify which of the equilibria will be selected. As I argue, risk dominance seems the most suitable selection criterion in this framework. After one equilibrium has been selected, the effects of the externalities remain. In particular, they may cause enforcement to be too costly, which helps explain how some neighborhoods become “no-go” zones for police.

In such cases, an alternative is to enforce the law through community policing. The paper formally models how differences in the involvement in enforcement activities between two otherwise identical neighborhoods may create a divergence in crime rates. Other alternatives are policies that make apprehension and punishment depend less on the number of violators. Examples of these types of policies for traffic violations are demerit point systems and electronic citation programs.

The model is presented in Section 2. As a benchmark, Section 3 provides the results when there are no externalities. Section 4 solves the model with externalities. Section 5 studies other possible neighborhood externalities and discusses the case where congestion is the only externality. Section 6 extends the model to a framework with heterogeneous individuals. Finally, Section 7 concludes.

Related literature

Glaeser et al. (1996) show that the variance of crime rates clearly exceeds what one would predict considering observable socioeconomic characteristics.⁶ Furthermore, they show that, with the exception of murders and rapes, such variance can be explained by the correlation of agents’ decisions. To interpret such correlation the authors use a behavioral model where a fraction of the population simply imitates their neighbors. In an earlier behavioral model Sah (1991) also studies how individuals’ decisions to violate the law may be interdependent. In his model, individuals

⁶Unemployment rate, high school dropout rate, property taxes per capita, police per capita, regional dummy variable, persons over age of 25, etc.

respond to the "perception" of the likelihood of the punishment rather than to the true likelihood which implies that each individual chooses whether to be a criminal depending on her own and her acquaintances' past experiences.

In contrast with these behavioral models, I show how individuals' decisions may be interdependent (which generates multiple equilibria) in a framework where all individuals are utility maximizers. As discussed above, such interdependence arises when the crime rate is a "negative input" on criminal apprehension system. In an empirical study on crime, Ehrlich (1973) showed that the probability of apprehending and convicting felons is not only positively related to the level of current police resources, but also negatively related to the crime rate. He argued that the productivity of the resources "is likely to be lower at higher levels of criminal activity because more offenders must then be apprehended, charged and tried in court in order to achieve a given level of P [probability of the sanction]." However, much of the literature on the economics of law enforcement does not allow for this kind of externality among criminals.

One notable exception is Freeman, Grogger and Sonstelie (1996).⁷ In a model with two neighborhoods, they study the tradeoffs between two externalities across criminals: when the number of thieves increases, the probability of being arrested decreases while the returns of crime decrease because there is less to steal. They find multiple equilibria; in particular, one possible equilibrium is that crime may concentrate in one neighborhood instead of spreading to the other. My work differs from theirs in several ways. First, rather than taking enforcement resources as exogenous, I take these enforcement resources as strategically determined by the enforcement

⁷Another exception is Bar-Gill and Harel (2001) which discusses in detail several ways in which the crime rate might feed back into the expected sanction. They argue that the expected sanction could be a decreasing function of the crime rate, either because of resource congestion or due to learning from fellow criminals; this is also the approach taken in this paper. They also note the possibility of multiple equilibria, but they do not characterize the full set of equilibria nor select among them. In addition to characterizing and selecting among equilibria, my analysis also differs from Bar-Gill and Harel in that I use a parametrized functional form for the enforcement technology that allows me to vary the sensitivity of the technology to the externalities.

agency, which is an active agent of the model. Second, my model considers also the externality that arises through the involvement of the neighborhood in enforcement activities, and assumes that returns from illegal behavior do not decrease in the number of criminals. Third, I study further effects of the externalities by introducing criteria of equilibrium selection. After adopting a criterion of equilibrium selection, I show that it matters how sensitive the enforcement technology is to the externalities; in particular, it is crucial in determining the optimal enforcement policy. This result is particularly relevant because Glaeser et al. (1996) argue that, although crime models with multiple equilibria generate a higher variance in the crime rate than do other models, the existence of multiple equilibria is not enough to explain the high variance in crime rates.⁸ In their data, they show that differences in crime rate across communities (once they control for socioeconomic conditions) cannot be explained by crime rates clustering around a few possible equilibria.

After Ehrlich (1973), the empirical literature on crime has continued studying the relationship between the likelihood of the punishment and the crime rate. In general, these studies find a significant negative relationship between the crime rate and the arrest rate (the usual proxy for the likelihood of the punishment). As discussed in Levitt (1998) and Ehrlich (1996) there are several empirical difficulties in these studies that complicate the empirical analysis. In particular, two of the empirical problems are related to the externalities discussed in this paper. First, regressing crime rates on arrest rates may suggest a (spurious) correlation when the arrest rate is also affected by the crime rate. Second, there may be a measurement error when

⁸The literature on illegal behavior has studied other causes of multiple equilibria. In Schrag and Scotchmer (1997), when the crime rate is high, individuals' likelihood to be punished is almost the same regardless of being innocent or guilty, thus it is actually rational for an individual to commit a crime only when the crime rate is high. Because of the multiple equilibria, the authors conclude that the crime rate cannot be predicted from the enforcement policy and do not undertake an analysis of optimal law enforcement. In Rasmusen (1996) employers have incomplete information about workers' criminal activity. Multiple equilibria arise because the stigma of being convicted (reduction in the wage employers are willing to pay someone with a criminal record) decreases with the crime rate. Similarly, Silverman (2004) finds multiple equilibria in a model where committing a crime is beneficial in terms of "street reputation."

using the arrest rates to proxy the likelihood of the punishment because it might not provide enough information about the ratio of criminals that are effectively punished. More specifically, using the arrest rates leaves out the possibility of congestion during the investigation and conviction process, which may have important implications as shown in this paper. Although Glaeser et al. (1996) focus on showing the importance of the interactions across individuals and “not the form of that interaction or the mechanisms that aid that interaction,” they believe congestion is not the form of interaction because they do not find a correlation between arrest rates and crime rates in New York City precincts. However, as just mentioned, a spurious correlation problem may arise when studying the relationship between these two variables.

With this paper I intend to provide further insights on how enforcement resources, the crime rate, and other factors determine the likelihood of the punishment. Ehrlich (1996) considers this “production function” as an essential part of the simultaneous equations econometric structure needed to study illegal behavior and law enforcement. Moreover, my analysis points out two additional challenges in the empirical analysis. First, there may exist threshold levels of enforcement resources that make the individuals’ behavior vary drastically. In such cases, increases in enforcement resources below that threshold level might not result in meaningful changes in the crime rate, which might make the estimation more difficult. Second, when the level of enforcement resources is a strategic decision of the enforcement agency, a separate regression equation might be needed to model this decision. For instance, it would be interesting to study how the harm caused by the criminal activities (measured through victimization costs) affects the choice of level of enforcement resources.

In what follows I will assume that the fine is fixed exogenously, so that the level of enforcement resources is the sole decision variable of the enforcement agency.⁹ This

⁹According to Becker’s (1968) seminal study on crime and punishment (see also Stigler, 1970), optimal enforcement involves the highest possible fine and the lowest possible apprehension probability that are consistent with the desired expected sanction. Others have argued that less-than-maximal fines may be optimal when more complicated incentives are involved. Stigler (1970) and Mookher-

is reasonable because the fine is set by a legislative body (or perhaps by judicial precedent) with broad jurisdiction, while the level of enforcement resources is chosen at a more local level and through a shorter-term process. Notice that although the total amount of enforcement resources might be decided at a supralocal level (e.g., decided by the state), urban and local authorities may decide how those resources are distributed across neighborhoods or communities within their area.

The Model

The basic structure of the model is similar to Polinsky and Shavell (1979). There is an enforcement agency that aims at maximizing social welfare and a continuum of risk neutral utility-maximizing individuals.

The individuals

There is a continuum of risk-neutral individuals of measure 1, which represents the population of potential offenders.¹⁰ Individuals are assumed to be homogenous in the main model; this assumption is relaxed in Section 6. Each of the individuals may either comply with the law, denoted as {C}, which yields zero payoff, or not comply with the law, denoted as {NC}, which implies a benefit, b , but also a possible fine, $f > 0$. The fine is imposed with a probability P that is determined endogenously as explained below. The benefit is net of any cost (excluding the fine) associated with not complying (e.g., moral cost). Both b and f are exogenous to the model. I assume that $b < f$, that is, there is always a high enough probability, $P \geq b/f$, that deters individuals from violating the law.

The choice of a single individual has a negligible impact on the crime rate; therefore it has no effect on P . Thus, an individual commits an offense if $P < b/f$, but not

jee (1994) invoke the need for marginal deterrence; Polinsky and Shavell (1979) and Block and Sidak (1980) include costs associated with risk-bearing; and Malik (1990) includes avoidance and/or collection costs that increase with the magnitude of the fine.

¹⁰Although every individual could be considered as a potential criminal, some individuals are deterred by very small levels of enforcement resources due, for instance, to moral costs. Thus, I am excluding them from the analysis.

if $P > b/f$, and will be indifferent if $P = b/f$. In order to simplify the exposition, I maintain the following assumption¹¹:

ASSUMPTION 1: Individuals comply with the law in case of indifference.

Therefore, the proportion of individuals not complying is given by a function of the probability of the sanction, $\mu = R(P)$ where:

$$R(P) = \begin{cases} 1 & \text{if } P < b/f \\ 0 & \text{if } P \geq b/f \end{cases} . \quad (1)$$

The enforcement agency

The enforcement agency maximizes social welfare by choosing the amount of enforcement resources $c \geq 0$. The sanction associated with non-compliance, $f > 0$, is exogenous for reasons explained in the Introduction. Therefore the decision variable of the agency is the level of enforcement resources, c , which includes all the needed expenses in detecting, prosecuting, and fining, so that the fine is actually imposed. Hence, c describes the public resources that are used for enforcement activities.

Social welfare is measured by considering that first, non-compliance should be deterred because each individual not complying with the law generates a harm, h , to the community, and that second, (for a fixed level of aggregate harm) the lower the expenditure on enforcement the better off society is. For a given non-compliance rate, denoted above as μ , the harm generated is $h \cdot \mu$. In addition, the fines are assumed to be mere transfers of money and hence the revenue obtained from them does not affect the choice of the agency. Therefore, the enforcement policy that maximizes social welfare is given by:

$$c_{opt} = \arg \max_c SW(c) = \arg \min_c h \cdot \mu^*(c) + c, \quad (2)$$

¹¹I thank an anonymous referee for suggesting this assumption. For a model that involves mixed strategies, see Ferrer (2008).

where $\mu^*(c)$ is the equilibrium non-compliance rate among individuals who are contemplating crime.

The timing of the decisions of the agency and of the individuals is:

Stage 1: The agency decides how much to spend on enforcement, c .

Stage 2: Individuals decide whether or not to comply with the law.

The agency anticipates the behavior of the individuals since it has perfect information about the individuals' payoffs.

The enforcement technology

The enforcement technology consists of the process that determines the probability of a law-violator being sanctioned, P . Therefore, it assembles all the activities related to detection, apprehension and punishment.

The probability of the sanction, P , is not a (direct) decision variable of the agency and it will be determined endogenously. Given the enforcement resources, c , a non-compliance rate, μ , and a measure of neighborhood involvement, denoted η , the probability of being sanctioned is given by $P = p(c, \mu, \eta)$. The triple $(c, \mu, \eta) \in \mathbb{R}^+ \times [0, 1] \times [0, 1)$ and the function p is increasing in c and η and decreasing in μ .

Because of the positive externality among offenders, the enforcement technology is such that the higher the non-compliance rate, the lower the probability of the sanction (i.e., $p_\mu < 0$).¹² This positive externality among offenders arises due to congestion in enforcement resources. Also, it could arise when offenders share information or techniques on how to avoid detection and punishment. Since the non-compliance rate is determined in equilibrium, the magnitude of this externality is endogenous in the

¹²In this paper, the externality among offenders is always positive. In contrast, Calvó-Armengol and Zenou (2004) consider a model of social networks in which there is a negative externality among delinquents because they compete in criminal activities. Competition in criminal activities commonly arises in environments of organized crime, however, in other illegal activities there is usually no (significant) booty to fight for. Bar-Gill and Harel (2001) also discuss the possibility of a negative externality among offenders. While this negative externality is certainly possible, it would predict a negative correlation in criminal behavior, which seems to be at odds with the available evidence.

model.

In addition, the involvement of a neighborhood in enforcement is measured by η . The information that members of the community have plays an important role in the enforcement process since they may alert authorities, provide evidence, and denounce offenders. That is, since such information has an effect on the productivity of enforcement: the higher is the involvement of neighbors in enforcement, the higher the probability of the sanction (i.e., $p_\eta > 0$).¹³ Diverse factors and policies may affect the value of this parameter. For instance, language differences between the police and the neighbors may decrease the level of neighbors' involvement. First I consider η as exogenously given for each neighborhood. Section 4.4 extends the results to the case where η is decreasing in μ ; that is, to the case where the neighbors' involvement is decreasing in the non-compliance rate.

In order to have closed-form solutions for the optimal level of enforcement resources, a particular functional form for p is employed. A second advantage of assuming a specific functional form is that it allows me to measure the results in terms of the sensitivity of the technology to the externalities. A specific functional form is a restrictive assumption; however, the form assumed represents a large family of functions and satisfies desirable properties.

The probability of the sanction is given by the following function defined over the enforcement resources and the non-compliance rate¹⁴:

$$P = p(c, \mu, \eta) = kc^\alpha / (1 + \mu - \eta)^\alpha. \tag{3}$$

The parameters of this production function are $k > 0$, which expresses additional factors that may affect the enforcement technology such as specific characteristics of

¹³Sampson (2004) finds evidence that "exposes the centrality of citizens as the engine of crime control."

¹⁴I will make the necessary parametric assumptions in order to ensure that $P \in [0, 1]$. In particular, I impose that $P = 1$ when the level of enforcement resources is $c > ((1 + \mu - \eta)^\alpha / k)^{1/\alpha}$. Footnote (18) discusses the implications when modeling the equilibrium selection.

the type of illegal behavior; and $\alpha \in (0, 1)$, which implies that there are decreasing returns with respect to the level of enforcement resources (i.e., $p_{cc} < 0$). Also, $1 + \mu - \eta$ measures the overall neighborhood effect. Finally, $\chi \in (0, 1)$ measures how sensitive the technology is to the externalities. Notice that $-\chi$ is the elasticity of p with respect to the overall neighborhood effect $1 + \mu - \eta$. In the limiting case of $\chi = 0$, then μ and η have no effect on the probability of the sanction, and P depends only on the level of enforcement resources. This case will be used as a benchmark. Furthermore, if the rate of community involvement is higher than the crime rate (i.e., $\eta > \mu$) then the net effect of the externalities is positive for enforcement since then $p_\chi > 0$. Alternatively, the externalities have a negative net effect when the rate of community involvement is lower than the crime rate (i.e., $\eta < \mu$) because then $p_\chi < 0$. In Section 5, I study the case in which congestion is the only externality; that is, the case where $\eta = 0$.

This specific functional form aggregates the two distinct neighborhood effects (μ and η) into an overall neighborhood effect; let $N \equiv \mu - \eta$ denote this overall effect. By employing this specific functional form, I impose assumptions on the signs of the second cross-partial derivatives of the enforcement technology. Thus, $p_{cN} < 0$; that is, a higher overall neighborhood effect (due to either an increase in the crime rate or a decrease in community involvement) reduces the marginal productivity of expenditures on enforcement. The effect of the externalities on the marginal productivity of enforcement expenditures is given by $p_{c\chi} > 0$ if $\mu < \eta$ and $p_{c\chi} < 0$ if $\mu > \eta$. That is, if the crime rate is lower than the rate of community involvement, then the marginal productivity of enforcement expenditures is decreased by the presence of the externalities, while if the crime rate is higher than the rate of community involvement, then the marginal productivity of enforcement expenditures is decreased by the presence of the externalities. Finally, $p_{N\chi} < 0$; that is, the overall neighborhood effect is stronger when the enforcement technology is more sensitive to the externalities. While these implications about the signs of cross-partial derivatives seem plausible, they are not

crucial for the main results of the paper.¹⁵

Equilibrium condition for the individuals' behavior

Because of the positive externality among offenders, each individual cares about the rest of the individuals' decisions with respect to compliance. Therefore an individuals' equilibrium is only reached when, given the non-compliance rate, no individual is willing to change her decision as to whether to comply or not.

Definition 1 : *Given the enforcement resources, c , the non-compliance rate $\mu^* \in [0, 1]$ is an **equilibrium for the individuals' behavior** if it satisfies the following condition: $\mu^* = R(p(c, \mu^*, \eta))$. That is, the non-compliance rate μ^* is consistent with the probability of the sanction resulting from c enforcement resources and a non-compliance rate μ^* .*

Given η , the equilibrium condition for individuals' behavior can be rewritten as a function of the enforcement resources, c , through the following function $\mu^* : [0, 1] \rightarrow [0, 1]$:

$$\mu^*(c; \eta) = \begin{cases} 0 & \text{if } p(c, 0, \eta) \geq b/f \\ 1 & \text{if } p(c, 1, \eta) < b/f \end{cases} . \quad (4)$$

¹⁵In particular, the existence of multiple equilibria, and a unique risk-dominant equilibrium, also hold when P is determined by a generic differentiable function such that for any μ and η , $p(c, \mu, \eta)$ is strictly increasing, surjective, and strictly concave in c .

The benchmark: optimal policy in the absence of externalities

The analysis excluding externalities (i.e., when imposing $\chi = 0$) provides the results obtained in the standard law enforcement literature. For this reason, the results of this section are used as a benchmark. Notice that when $\chi = 0$, p becomes a one-to-one, increasing and concave function of the enforcement resources, c , alone. For any given c , $p(c)$ is uniquely determined, independent of the rate of non-compliance:

$$P = p(c) = kc^\alpha \quad \text{for all } c \geq 0. \quad (5)$$

Whenever $\chi = 0$, each individual complies or not with the law depending only on the enforcement resources, since other individuals' choices have no effect on her payoff function. Notice that there is a level of enforcement resources that constitutes a threshold for the individuals.

Definition 2 *Let $\tilde{c} \geq 0$ be such that $p(\tilde{c}) = \frac{b}{f}$ is satisfied. I refer to \tilde{c} as the threshold level of enforcement resources in the absence of the externalities.*

Considering the functional form of p , notice that $\tilde{c} = (b/fk)^{1/\alpha}$ and $p(\tilde{c}) \leq 1$. Thus, the individuals' non-compliance rate in equilibrium can be rewritten as a function of c . In order to find the optimal enforcement policy let me first find the equilibrium of the second stage. For any $c \geq 0$, the equilibrium of the individuals' behavior is given by:

$$\mu^*(c) = \begin{cases} 1 & \text{if } c < \tilde{c} \\ 0 & \text{if } c \geq \tilde{c} \end{cases} . \quad (6)$$

Therefore, the equilibrium of the individuals' behavior is unique for any given c . The agency anticipates the behavior of the individuals and chooses the optimal policy

according to it. Therefore, the optimal policy of the enforcement agency, c_{opt} , is obtained by backwards induction:

$$c_{opt} = \arg \min_c h \cdot \mu^*(c) + c. \quad (7)$$

From the second stage, it is clear that the agency will either invest $c = 0$ so that $\mu^* = 1$ or $c = \tilde{c}$ so that $\mu^* = 0$. This decision will be based on how large is h , the harm imposed to the community. If the agency chooses $c = 0$, then the welfare is equal to $h \cdot \mu^*(c) + c = h$ while if it choose $c = \tilde{c}$, the $h \cdot \mu^*(c) + c = \tilde{c}$. Thus, we have the following result:

Proposition 3 *In the absence of the externalities, equilibrium enforcement and compliance can be characterized as follows:*

- i) If $\tilde{c} > h$ the agency will spend $c_{opt} = 0$, which yields a no-compliance equilibrium, $\mu_{opt}^* = 1$.*
- ii) If $\tilde{c} < h$ the agency will spend $c_{opt} = \tilde{c}$, which yields a full-compliance equilibrium, $\mu_{opt}^* = 0$.*
- iii) If $\tilde{c} = h$ then the agency is indifferent between spending $c_{opt} = \tilde{c}$, which induces a full-compliance equilibrium, $\mu_{opt}^* = 0$, and spending $c_{opt} = 0$, which induces a no-compliance equilibrium, $\mu_{opt}^* = 1$.*

Considering zero enforcement resources as optimal (as is the case in the model for certain parameter values) or having equilibrium rates with either full or no compliance may seem unusual in real life. However, let me emphasize that μ measures the compliance rate among potential criminals. There may be many members of the community that do not behave illegally even when enforcement resources are very low (for instance because illegal behavior has strong moral costs for them) and thus are outside of my analysis. In any case, Section 6 extends the model to a framework where the potential offenders are heterogeneous.

Law enforcement under the externalities

As already discussed in subsection 2.3, the enforcement technology depends on its sensitivity to the externalities, χ , and on their net effect, $\mu - \eta$. Recall that $p_\chi < 0$ when $\mu > \eta$ and $p_\chi > 0$ when $\mu < \eta$. That is, the presence of externalities decreases the probability of sanction if the noncompliance rate exceeds the rate of community involvement, and increases the probability of sanction if the rate of community involvement exceeds the non-compliance rate.

The individuals' behavior: multiple equilibria

In contrast with the benchmark, whenever $\chi > 0$ the probability of the sanction depends also on the non-compliance rate. Then the decision of an individual with respect to compliance depends on other individuals' choices. When the individual decides not to comply, her utility is given by $b - p(c, \mu, \eta) \cdot f$. Hence, an individual may decide to comply with the law when the non-compliance rate is low (which yields a larger value of $p(c, \mu, \eta)$) and not to comply when the non-compliance rate is high (because it yields a smaller value of $p(c, \mu, \eta)$).

Definition 4 *Let $\underline{c} \geq 0$ be such that $p(\underline{c}, 0, \eta) = \frac{b}{f}$. I refer to \underline{c} as the minimal enforcement resources needed to reach $P = b/f$.*

That is, \underline{c} is the level of enforcement resources needed to make individuals indifferent between compliance and non-compliance when the rate of non-compliance is zero. For the functional form specified for p , $\underline{c} = (b(1 - \eta)^\chi / fk)^{1/\alpha}$.

Definition 5 *Let $\bar{c} \geq 0$ be such that $p(\bar{c}, 1, \eta) = \frac{b}{f}$. I refer to \bar{c} as the maximal enforcement resources needed to reach $P = b/f$.*

That is, \bar{c} is the level of enforcement resources needed to make individuals indifferent between compliance and non-compliance when the rate of non-compliance is 1.

For the functional form specified for p , $\bar{c} = (b(2 - \eta)^\alpha / fk)^{1/\alpha}$. Thus, for $\eta \in [0, 1)$:

$$\underline{c} \leq \tilde{c} < \bar{c}. \quad (8)$$

Notice that if the agency is not able to benefit from the information of the neighbors (i.e., $\eta = 0$) then \underline{c} coincides with \tilde{c} . The equilibria for the individuals' behavior can be characterized in terms of \underline{c} and \bar{c} as shown in Figure 1. Notice that for $c < \underline{c}$ and for $c \geq \bar{c}$ the individuals' equilibria coincides with those of the benchmark case. First, for $c < \underline{c}$, no compliance ($\mu^* = 1$) is the unique equilibrium possible, since by definition of \underline{c} , if $c < \underline{c}$ then $p(c, \mu, \eta) < \frac{b}{f}$ for all μ ; hence it is optimal for the individuals to violate the law. Second, for $c > \bar{c}$, full compliance ($\mu^* = 0$) is the unique equilibrium possible since by definition of \bar{c} , if $c > \bar{c}$ then $p(c, \mu, \eta) > \frac{b}{f}$ for all μ ; hence it is optimal for all individuals to comply. Finally, full compliance is also the unique equilibria for $c = \bar{c}$ since I have assumed that individuals comply with the law in case of indifference.

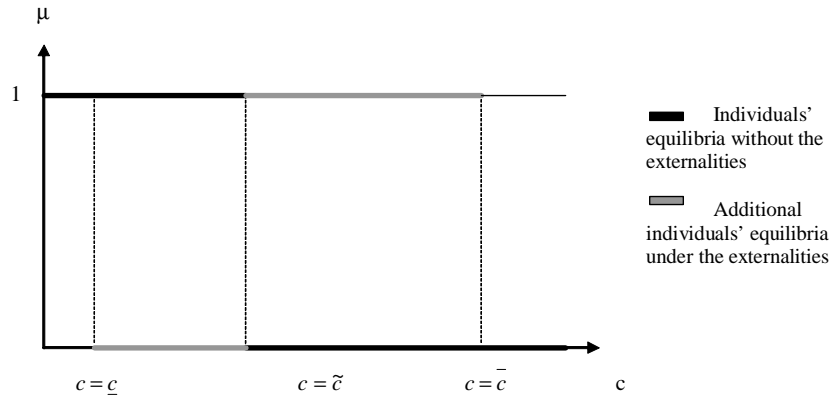


Figure 1: Equilibria of the individuals

However, because of the externalities there is an interval $[\underline{c}, \bar{c})$ of enforcement resources for which individuals' equilibria differ from the benchmark. In particular, as shown in Figure 1, for this interval of resources there are multiple equilibria.

Proposition 6 For any level of enforcement resources $c \in [\underline{c}, \bar{c})$:

i) There exists a no-compliance equilibrium, $\mu^* = 1$.

ii) There exists a full-compliance equilibrium, $\mu^* = 0$.

Furthermore, the length of the interval $[\underline{c}, \bar{c})$ is increasing in χ .

Proof. See the Appendix ■

Due to the presence of externalities, more than one equilibrium arises for a given amount of enforcement resources $c \in [\underline{c}, \bar{c})$. Intuitively, because the net effect of the externalities on enforcement may be positive, some of the new equilibria that arise are good equilibria from the perspective of the enforcement agency. In particular, full-compliance equilibria can now be sustained for levels of enforcement resources below the threshold \tilde{c} .

Furthermore, since a larger χ results in a smaller \underline{c} and a larger \bar{c} , there is more scope for multiple equilibria the more sensitive the technology is to the externalities. In other words, a higher elasticity of the enforcement technology with respect to the overall neighborhood effect implies a larger range of enforcement resources for which there are multiple equilibria.

Equilibrium selection

As just shown, multiple equilibria arise for any given c in the range $[\underline{c}, \bar{c})$. The full-compliance equilibrium is the socially desirable one; however, it may be that it is not the equilibrium selected by the individuals. In this subsection I discuss possible selection criteria and characterize the risk-dominant equilibrium, as it seems to be the most compelling criterion. The concept of risk dominance (Harsanyi and Selten, 1988) consists of individuals choosing the less risky equilibrium action, incorporating each individual's uncertainty about the strategy that the rest will end up choosing in equilibrium.¹⁶ Given $c \in [\underline{c}, \bar{c})$, notice that choosing not to comply is a risky strategy

¹⁶For a recent application of risk dominance in a law and economics setting, see Spier (2002).

for the individuals since the rest of individuals might choose to comply. In particular, the higher is c , the higher is this strategic risk.

Alternative equilibrium selection methods are the global games' approach (introduced by Carlsson and van Damme, 1993), Young (1993)'s dynamic evolutionary process, or assuming payoff dominance as a focal point. As shown in Angeletos, Hellwig, and Pavan (2006), policy analysis in global games is quite complex. In a global game, a unique equilibrium is selected when agents have heterogeneous information about the payoff structure. However, Angeletos et al. (2006) show that there is no equilibrium selection when the policy choice affects that uncertainty by signaling some information.¹⁷ Alternatively, the dynamic evolutionary model assumes that agents are boundedly rational in the sense that they have "an incomplete knowledge of recent precedents" (Young, 1993, page 75). Thus, I find that risk dominance is a more compelling equilibrium selection criterion. Also, it is important to note that both the global games approach and Young (1993)'s dynamic evolutionary model select the risk-dominant equilibrium in 2 x 2 coordination games.

Finally, in comparison with payoff dominance, risk dominance seems to be a more adequate criterion for this framework. Recent experimental findings (van Huyck et al, 1990; Straub, 1995; and Schmidt et al., 2003) have shown the difficulty players have in coordinating to reach the payoff-dominant equilibrium, and also the important role of risk dominance in explaining individuals' behavior in coordination games. Moreover, there is not a clear payoff-dominant equilibrium in the model when the incidence of harm is taken into consideration. At the no-compliance equilibrium, each individual attains a payoff:

$$b - p(c, \mu, \eta = 1) \cdot f > 0 \text{ for } c < \bar{c}. \quad (9)$$

¹⁷In my framework, if agents had uncertainty about k , then asymmetric uncertainty among the individuals would lead to the selection of a unique equilibrium. However, multiple equilibria would arise again when the choice of enforcement resources conveys information about k (i.e., when the choice of c signals the type of k to the individuals).

Thus, it appears that the no-compliance equilibrium payoff dominates the full-compliance equilibrium since the latter yields a payoff of zero. However, such a comparison does not consider that the harm caused by non-compliance, $\mu \cdot h$, may affect the payoffs of the individuals even though it does not affect their decision-making processes.¹⁸ Each individual takes the risk of harm as given and including it does not alter the optimal responses of the individuals; however, it may affect their payoffs. For instance, living in a neighborhood where illegal behavior is the rule might make individuals worse off, but it will not keep them from breaking the law when it is optimal for them individually.

This problem is not new in game theory. Harsanyi and Selten (1988) argue that, for rational individuals, transformations of the game that do not affect their best-response correspondences should not affect which equilibrium is considered as focal. Payoff dominance does not satisfy this requirement. In contrast, as explained by Harsanyi and Selten (1988) and by Myerson (1991), risk dominance is a solution concept that is invariant to changes in the agents' payoffs that do not affect their best-response correspondences.

The risk-dominance selection concept is typically applied in the context of two player games, while in this context there is (formally) a continuum of players. However, the setup of the model allows us to easily interpret individuals' behavior as a game with two players and two strategies per player. Consider the decision process of an individual i by interpreting the model as a 2×2 game where all other players are represented by a "representative agent." Thus, individual i decides whether to comply or not, and his payoff depends on the strategy chosen by a representative agent that reflects the choice of the rest of the potential offenders. Because there is a continuum of individuals the contribution of individual i 's choice to the payoff of the representative agent is negligible. As a consequence, the non-compliance rate is

¹⁸Section 5 studies the case where the individuals' decisions are affected by the harm from criminal activities because it affects non-criminals more than criminals.

0 whenever the representative individual decides to comply and 1 when she decides not to comply.

TABLE 1: Payoffs for individual i when η is exogenous

PAYOFFS FOR INDIVIDUAL i		Representative individual	
		COMPLY	NOT COMPLY
Individual i	COMPLY	0	0
	NOT COMPLY	$b - \frac{kfc^\alpha}{(1-\eta)^\chi}$	$b - \frac{kfc^\alpha}{(2-\eta)^\chi}$

Payoffs for individual i are shown in Table 1. Under risk dominance each individual's strategy consists of the best response when assigning a positive probability to the possibility of other individuals choosing the non-equilibrium strategy (i.e., there is a risk that the rest of the individuals will choose to comply when the individual has chosen not to comply or vice versa). Given the enforcement resources, individuals choose the risk-dominant strategy. As a consequence, the following equilibrium selection takes place.

Proposition 7 *There exists a level of enforcement resources $c^* \in (\underline{c}, \bar{c})$, such that:*

- i) For any enforcement policy $c < c^*$ the no-compliance equilibrium is risk dominant.*
- ii) For any enforcement policy $c > c^*$ the full-compliance equilibrium is risk dominant.*
- iii) For an enforcement policy $c = c^*$, there is not a risk dominant equilibrium.*

Furthermore, c^ is decreasing in η and is invariant to including the harm caused by non-compliance in the individuals' payoffs.*

Proof. See the Appendix ■

For each level of enforcement resources, risk dominance makes one of the equilibria focal, but which one depends on resources being above or below a level of enforcement resources c^* .¹⁹ In particular, c^* is increasing in χ , b and α , and decreasing in k and f .

Thus, whenever $\tilde{c} < c^*$ the externalities imply that more resources are needed to enforce the law. In contrast, whenever $\tilde{c} > c^*$ the externalities allow enforcement of the law with fewer resources.

Policy implications

The problem of the enforcement agency can be solved by maximizing social welfare.

Proposition 8 *In the presence of the externalities, equilibrium enforcement and compliance can be characterized as follows:*

- i) If $c^* > h$ the optimal enforcement resources are $c_{opt} = 0$, which yields a no-compliance equilibrium, $\mu_{opt}^* = 1$.*
- ii) If $c^* < h$ the optimal enforcement resources are $c_{opt} = c^*$, which yields a full-compliance equilibrium, $\mu_{opt}^* = 0$.*
- iii) If $c^* = h$ then the agency is indifferent between spending $c_{opt} = c^*$, which induces a full-compliance equilibrium, $\mu_{opt}^* = 0$, and spending $c_{opt} = 0$, which induces a no-compliance equilibrium, $\mu_{opt}^* = 1$.*

Proof. The proof is straightforward once the results from the previous proposition are inserted into the social welfare function. Note that full compliance must follow an expenditure of c^* in order in order for there to be an equilibrium at c^* . ■

Therefore, there are values of h for which the externalities have relevant policy implications. Comparing this result with Proposition 1 illustrates the impact of the

¹⁹In order to ensure that $p(c^*, \mu, \eta) \leq 1$ for all μ , then I impose $b/f \leq \frac{1}{2} + \frac{(1-\eta)^x}{(2-\eta)^x}$. This condition guarantees that $c^* \leq ((1 + \mu - \eta)^x/k)$ which, as discussed in footnote (13), is the level of resources such that $p(c, \mu, \eta) = 1$.

externalities on the optimal enforcement policy. First, for the case where $\tilde{c} < c^*$ and whenever $\tilde{c} < h < c^*$, it is optimal to enforce the law only when there are no externalities. The externalities increase the amount of resources needed to enforce the law to a level at which it is no longer socially optimal. This result illustrates situations that may happen in high crime neighborhoods; when the situation is considered to be "hopeless," some laws are no longer enforced. The model explains how the positive externality among criminals may be such that the law is too costly to be enforced.

Second, if $\tilde{c} < c^* < h$, the law is enforced both in the benchmark and when there are externalities, although more enforcement resources are needed in the latter case. Third, for the case where $\tilde{c} > c^*$ and whenever $c^* < h < \tilde{c}$, it is optimal to enforce the law only under the externalities. Finally, if $\tilde{c} > c^*$ and $c^* < \tilde{c} < h$, the law is enforced in both the benchmark and in the presence of the externalities, but now more enforcement resources are needed in the former case.²⁰

Corollary 9 *The net effect of the externalities on enforcement is determined in equilibrium:*

- i) When $\mu_{opt}^* = 1$, in equilibrium the net effect is negative ($p_\chi < 0$).*
- ii) When $\mu_{opt}^* = 0$, in equilibrium the net effect is positive ($p_\chi > 0$).*

Intuitively, whether the net effect of the externalities is positive or negative in equilibrium depends on the compliance rate resulting from the optimal enforcement resources. If $\mu_{opt}^* < \eta$, then the equilibrium compliance is such that the net effect of the externality on the enforcement technology is positive. Alternatively, if $\mu_{opt}^* > \eta$ then in equilibrium the net effect of the externality on enforcement is negative. Hence,

²⁰This result is in contrast to the claim by Bar-Gill and Harel (2001) that when a higher crime rate reduces the likelihood of the sanction, then the optimal investment in enforcement is always lower in the benchmark than in the model that incorporates the crime rate as a determinant of the expected sanction. They come to this conclusion because they fail to account for the fact that the probability of sanction function is different when there is an externality than when no externality exists. Essentially, the function has another argument that reflects the intensity of the externality, and they do not take account of this argument's independent influence on the probability of sanction function.

in equilibrium, two communities that differ only in their values of η may end up with different non-compliance rates. However, also note that there are ranges of η which would generate the same effect, so that empirical analysis will not find a simple monotonicity between a measurement of η and one of μ .

This result is particularly relevant since there exist policies that may affect the value of η . Considering a technology with sensitivity to the externalities χ , the following proposition summarizes what happens when the enforcement agency may influence the involvement of the community, η .

Proposition 10 *For any $h > 0$ there exists a large enough $\tilde{\eta} < 1$, above which enforcing the law becomes optimal for the agency. As a consequence, laws that were unenforced in the benchmark (because $h < \tilde{c}$), may be enforced in the presence of the externalities. The critical value $\tilde{\eta}$ might be decreasing or increasing in the sensitivity of the enforcement technology to the externalities, χ .*

Proof. See the Appendix ■

Given the value of harm generated by non-compliance, h , and a technology with sensitivity to the externalities χ , it may not be optimal for the agency to enforce the law. However, the agency may reduce the necessary level of resources to enforce the law, c^* , by increasing η to $\tilde{\eta}$. In particular, the value of $\tilde{\eta}$ provides an index to measure the objective that community policing must accomplish.

The Neighborhood Watch Program created in 1972 is an example of the type of policies that promote communication between neighbors and the police in the United States. The purpose of this program is to reduce residential crime by involving citizens and private organizations in law enforcement activities. As the Neighborhood Watch Manual (elaborated by the United States' National Sheriffs' Association²¹) argues, "the impact of law enforcement alone is minimal when compared with the power

²¹"Neighborhood Watch: A manual for citizens and for law enforcement" Available at <http://www.usaonwatch.org>.

of private citizens working with law enforcement." Efforts on community policing were encouraged through the US Violent Crime Control and Law Enforcement Act of 1994 (the Crime Act). The results obtained in this section provide a rationale for how these programs may have substantial effects if they succeed in increasing the communication between the police and the public.

In Europe, several countries have established community policing programs, for instance the *police de proximité* in France or the *Komunale Kriminalprävention* in Germany. However, as observed in Brogden and Nijhar (2005), "practice and understanding of the problem seem a long way" from the Anglo-American experience. Nevertheless, rising recorded crime rates and riots by ethnic minorities in France have prompted calls for a determined implementation of community policing.²²

Endogenous neighborhood involvement in enforcement

If a larger number of offenders in a community leads to a lower neighbors' involvement in enforcement, then the involvement will depend on μ . For instance, this is the case if violators can retaliate against those who provide information to the enforcement authority or if witnesses are intimidated. In some urban (generally high crime) communities of the United States, campaigns known as "Stop Snitchin'" attempt to deter collaboration between neighbors and the police. To model this kind of situation, the involvement of a neighborhood must be endogenously determined.

Until now I have assumed that the involvement of a neighborhood in enforcement is exogenous, and measured by the parameter η . Consider now that the degree of involvement is a monotonically decreasing function n of μ such that $n(\mu) \in [0, 1)$ for

²²"Life still grim in French suburbs despite pledges," *Reuters*, November 27th, 2007 and "La police de proximité à nouveau au coeur des débats," *Le Monde*, November 27th, 2007.

all μ .²³ Then the probability of the sanction is given by:

$$P = p(c, \mu) = kc^\alpha / (1 + \mu - n(\mu))^\alpha, \quad (10)$$

where $p_\mu < 0$ since $n'(\cdot) \leq 0$.

Notice that introducing the function n does not alter any of the definitions. The equilibrium condition for the individuals' behavior still implies that:

$$\mu^*(c) = \begin{cases} 0 & \text{if } p(c, 0) \geq b/f \\ 1 & \text{if } p(c, 1) < b/f \end{cases}, \quad (11)$$

where now μ^* is determined solely by c .

Using the definitions for minimal and maximal resources needed to reach $P = b/f$ then, under an endogenous involvement of the neighborhood, they are $\underline{c} = (b(1 - n(0))^\alpha / fk)^{1/\alpha}$ and $\bar{c} = (b(2 - n(1))^\alpha / fk)^{1/\alpha}$, respectively. Notice that $\underline{c} \leq \tilde{c} < \bar{c}$ still holds. Therefore, as with the exogenous neighborhood involvement, multiple equilibria arise for enforcement resources in the interval $c \in [\underline{c}, \bar{c})$, as shown in the following proposition.²⁴

Proposition 11 *When the neighborhood involvement is endogenous, Proposition 2 still holds. Furthermore, the interval $[\underline{c}, \bar{c})$ is increasing in the spread between $n(0)$*

²³In contrast, Huck and Kosfeld (2007) consider a model where new members' recruitment for a neighborhood watch program is easier when there is a "crime crisis." In such a framework, a higher number of burglaries makes it more likely for neighbors to be enrolled in the neighborhood watch program, which leads to a higher probability of catching a burglar. Their model differs from mine in several aspects; in particular, it evaluates the optimal magnitude of the sanction rather than the optimal level of enforcement resources, and it does not allow for congestion. Nevertheless, I can adjust my model to study a framework analogous to theirs. Assuming that neighbors' involvement is increasing in the crime rate (and excluding the congestion effect) I would have that:

$$p(c, \mu) = kc^\alpha / (1 + n(\mu))^\alpha$$

where $n(\mu)$ would be increasing in μ rather than decreasing; hence, there would be a negative externality among offenders. While this negative externality is certainly possible, it would predict a negative correlation in criminal behavior (as in footnote (11)'s case), which seems to be at odds with the available evidence.

²⁴Notice that $\underline{c} < \bar{c}$ since $1 - n(0) < 2 - n(1)$. Also, notice that $\underline{c} \leq \tilde{c} < \bar{c}$ still holds.

and $n(1)$, for $n(0)$ or $n(1)$ held fixed.

Proof. See the Appendix. ■

Notice that $n(0) - n(1)$ measures the change in the neighbors' involvement when the compliance rate switches from no compliance to full compliance. Thus, a larger change in the neighborhood involvement leads to a larger range of enforcement resources for which there are multiple equilibria.

The payoffs for individual i are shown in Table 2. Following the same steps as in Section 4.2, I find the risk-dominant equilibrium for each level of enforcement resources in the interval $[\underline{c}, \bar{c}]$.

TABLE 2: Payoffs for individual i when the involvement is endogenous, $\eta = n(\mu)$

PAYOFFS FOR INDIVIDUAL i		Representative individual	
		COMPLY	NOT COMPLY
Individual i	COMPLY	0	0
	NOT COMPLY	$b - \frac{kfc^\alpha}{(1-n(0))^\chi}$	$b - \frac{kfc^\alpha}{(2-n(1))^\chi}$

Proposition 12 *For an endogenous neighborhood involvement described by the function n , there exists a level of enforcement, c_{endog}^* , such that:*

- i) For any enforcement policy $c < c_{endog}^*$ the no-compliance equilibrium is risk dominant.*
 - ii) For any enforcement policy $c > c_{endog}^*$ the full-compliance equilibrium is risk dominant.*
 - iii) For an enforcement policy $c = c_{endog}^*$, there is not a risk dominant equilibrium.*
- Furthermore, c_{endog}^* is decreasing in $n(1)$ and in $n(0)$.*

Proof. As shown in the Appendix, the proof is almost identical to the proof in Proposition 3. ■

As in Proposition 3, for each level of enforcement resources, risk dominance makes one of the equilibria focal. However, the threshold level of resources c_{endog}^* depends now on $n(1)$ and $n(0)$.²⁵ In particular, a lower level of neighborhood's involvement under no compliance, $n(1)$, results in a higher c_{endog}^* needed to enforce the law. Likewise, a lower level of neighborhood's involvement under full-compliance, $n(0)$, results in a higher c_{endog}^* .

Having a unique equilibrium per level of enforcement resources, I can solve the problem of the enforcement agency as in Proposition 4. Specifically, a small enough $n(1)$ may result in $c_{endog}^* > h$, which implies that the optimal resources are zero. Therefore, as the model illustrates, campaigns like "Stop Snitchin'" can clearly cause an increase in the resources needed for enforcement. Furthermore, enforcement may become non-optimal because of a decrease in $n(1)$. The Baltimore police have launched the counter-campaign "Keep Talking" to prevent the negative consequences of a deterioration in the communication between police and neighbors.²⁶

Further discussion

Other possible neighborhood externalities

Until now I have assumed that becoming a criminal does not affect the harm perceived from others' criminal activities. That is, becoming a criminal does not make individuals less likely to be victims of crime. However, perhaps individuals can avoid being victims of a crime by becoming criminals themselves.²⁷ In this case, a third externality arises because this additional benefit from becoming a criminal is increasing in the crime rate (since a higher crime rate is associated with a higher degree of the harm). In this subsection I study the consequences of adding this additional externality into the model.

²⁵As with c^* , in order to ensure that $p(c_{endog}^*, \mu) \leq 1$ for all μ , then I impose $b/f \leq \frac{1}{2} + \frac{(1-n(0))^x}{(2-n(1))^x}$.

²⁶"Police Counter Dealers DVD With One Of Their Own," *New York Times*, May 11th 2005.

²⁷I thank an anonymous referee for suggesting the analysis of this case.

Let $d(\mu)$ be the difference between the degree of harm faced by compliers and the degree of harm faced by violators given a non-compliance rate μ . Then, normalizing to zero the payoff of complying with the law, the payoff from not complying is $b + d(\mu) - Pf$, where $d(\mu) > 0$ represents the gain from avoiding part of the harm by becoming a violator.²⁸ In addition, I assume that $d(0) = 0$, that is, when the rest of individuals are complying with the law, then becoming a criminal does not imply any gain in terms of avoiding harm. Therefore the equilibria of the individuals is given by:

$$\mu^*(c) = \begin{cases} 0 & \text{if } p(c, 0, \eta) \geq (b + d(0))/f \\ 1 & \text{if } p(c, 1, \eta) < (b + d(1))/f \end{cases} . \quad (12)$$

Using the definition for minimal enforcement resources, then $\underline{c} = ((b(1 - \eta) + d(0))/kf)^{1/\alpha} = (b(1 - \eta)^x/fk)^{1/\alpha}$. That is, this additional externality does not affect \underline{c} . In contrast, the maximal level of enforcement resources is now $\bar{c} = ((2 - \eta)^x(b + d(1))/kf)^{1/\alpha}$ which is greater than the initial $(b(2 - \eta)^x)/kf)^{1/\alpha}$. Then, again multiple equilibria arise for any level of enforcement resources $c \in [\underline{c}, \bar{c})$. Furthermore, this additional externality implies a larger range of enforcement resources for which there are multiple equilibria.

The payoffs for individual i are shown in Table 3. As in the previous sections an equilibrium is reached when all of the individuals choose the same strategy. The following proposition summarizes these results and studies the implications for the risk-dominant equilibrium.

²⁸Recall that when the harm from criminal activities affects criminals and non-criminals the same, as assumed in previous sections, such harm is irrelevant for the decision of whether to comply with the law or not.

TABLE 3: Payoffs for individual i when compliers perceive a higher degree of the harm

PAYOFFS FOR INDIVIDUAL i		Representative individual	
		COMPLY	NOT COMPLY
Individual i	COMPLY	0	0
	NOT COMPLY	$b - \frac{kfc^\alpha}{(1-\eta)^\chi}$	$b - \frac{kfc^\alpha}{(2-\eta)^\chi} + d(1)$

Proposition 13 *When compliers perceive a higher degree of the harm than violators, Propositions 2 and 3 hold. Furthermore, \bar{c} and c^* are larger than when there are no differences in how individuals perceive the harm.*

Therefore, this additional externality increases the cost of enforcement further. Moreover, following Proposition 4, such an increase in c^* may imply that enforcing the law in that neighborhood is no longer socially optimal. Finally, notice that this same analysis serves to describe reputational benefits from becoming a criminal that are increasing in μ , such as the ones modeled in Silverman (2004). The results here complement those in Silverman (2004) since I am able to select among the multiple equilibria.

Isolating the effect of congestion

In this subsection I impose $\eta = 0$ to focus on the externality caused by congestion. Notice that congestion at the neighborhood level is not the only form of congestion that may arise in enforcement activities (e.g., there may be congestion in the administrative or court procedures that ensure punishment that depend on the “technology” determined at the city or state level).

Since $\eta = 0$, P is given by:

$$P = p(c, \mu) = kc^\alpha / (1 + \mu)^\chi; \quad (13)$$

hence, $p_\chi < 0$ for all μ . The benchmark's results in Section 3 still hold for the case with no externality, $\chi = 0$. Figure 2 compares the equilibria for both the benchmark and the case of congestion. Since congestion has a negative effect on enforcement, all the new equilibria under the externality for $c \in [\underline{c}, \bar{c})$ are no-compliance equilibria.

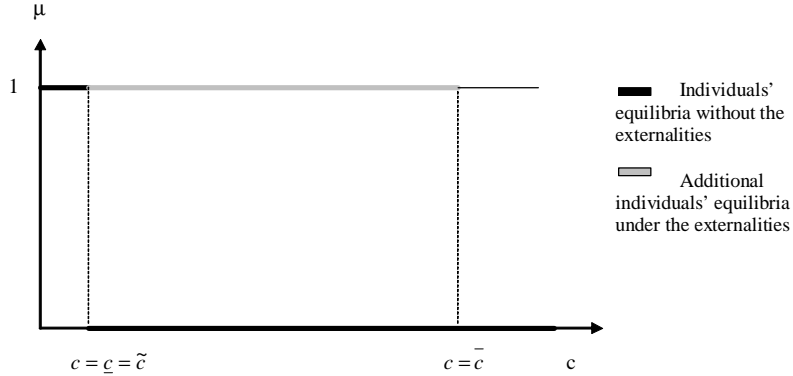


Figure 2: Equilibria of the individuals under congestion

Using the equilibrium selection results, there is a $c^* \in (\underline{c}, \bar{c})$ such that for any $c > c^*$, the full compliance equilibrium is selected. The main difference of this specific case with respect to the general model is that now $\partial c^*/\partial \chi > 0$ (recall that for $\eta > 0$ the sign of this partial derivative was ambiguous). As a consequence, the more sensitive is the enforcement technology to congestion, the higher the amount of resources that are needed to induce the full-compliance equilibrium. Thus, identical locations differing only in how sensitive their technology is to the externality, require different amounts of resources to induce compliance since c^* is increasing in χ .

Moreover, a high enough χ implies that the enforcement agency optimally chooses not to enforce the law because $c^* > h$. Thus, if congestion exists and it is not accounted for, the optimal policy will not be correctly specified. Also, and more importantly, if it is possible to decrease the sensitivity of the technology to this externality, then the amount of resources needed for enforcement will be lower. Decreasing the sensitivity of the technology to congestion is possible by decreasing the amount of en-

enforcement resources that are specifically needed for activities related to punishment.²⁹ For example, if punishment could take place instantaneously at the moment of detection, then resources would only be needed for detecting violators (e.g., there would be no need for tow trucks), which reduces considerably the possibility of congestion.

Examples of policies aimed at reducing the resources needed specifically for punishing activities are: incentives for voluntary payment of fines; demerit point systems for traffic violations;³⁰ or allowing for plea bargaining in criminal cases. More recently, the use of information and computer technology may become an effective way of reducing the need of resources for punishing activities. Electronic citation programs and other forms of electronic processing technology programs are being adopted throughout the United States (Department of Transportation (2003)). The International Association of Chiefs of Police (2003) recommends the use of electronic citations because “the physical process of writing and issuing traffic citations demands a significant amount of time and effort” from the patrol officer, the offices’ personnel and the court office staff. In Europe, the European Commission launched in 2005 the project Fully Automatic Integrated Road Control to promote the use of this type of technology. However, the adoption of these techniques into traffic management is proceeding slowly in most European countries.

Heterogeneous individuals

In this section, I assume that the benefit from violating the law follows a uniform distribution on the interval $[0,1]$. This extension allows me to examine how the effects of the externalities remain when the individuals are not homogenous. Since b follows

²⁹Recall that, as explained in Section 2.3, in the enforcement process resources are used for activities related to detection, apprehension and punishment.

³⁰Demerit point systems associated with traffic regulation are becoming a popular policy. Punishment is more immediate than with traditional fines. Since the agency administers the number of points of each driver, the punishment becomes effective by simply reducing the number of points of the violator.

a uniform distribution, the non-compliance rate is given by:

$$\mu(c) = \int_{p(c,\mu,\eta)}^1 db = 1 - f \cdot p(c, \mu, \eta) = 1 - \frac{fk c^\alpha}{(1 + \mu - \eta)^\alpha}. \quad (14)$$

Let $c(\mu; \chi, \eta)$ be the level of enforcement resources that induce a non-compliance rate of μ given a technology with a sensitivity to the externalities, χ , and a neighborhood with involvement, η . Then:

$$c(\mu; \chi, \eta) = \left(\frac{(1 - \mu)(1 + \mu - \eta)^\alpha}{fk} \right)^{1/\alpha}. \quad (15)$$

If the technology is not sensitive to the externalities (i.e., $\chi = 0$) then $c(\mu; 0, \eta) = ((1 - \mu)/fk)^{1/\alpha}$ which is a one-to-one function of μ . The externalities introduce distortions in the level of enforcement resources needed to reach a specific non-compliance rate. Also, multiple equilibria arise when $c(\mu; \chi, \eta)$ is not a one-to-one function of μ . This is because if $c(\mu; \chi, \eta)$ is not monotone in μ , the same level of enforcement resources may induce more than one non-compliance rate.

Proposition 14 *For $\mu > \eta$ ($\mu < \eta$) enforcement is more (less) costly with the externalities (i.e., $\chi > 0$) than without them (i.e., $\chi = 0$). Furthermore, for $\chi > 1 - \eta$ the externalities lead to multiple equilibria.*

Proof. See the Appendix ■

Figure 3 shows the equilibria of the individuals for the case where multiple equilibria arise (i.e., for $\chi > 1 - \eta$). I denote as $[\underline{C}, \bar{C}]$ the interval of enforcement resources for which multiple equilibria arise. Since individuals differ now in their benefit from violating the law, b , definitions 3 and 4 do not apply here. Instead, \underline{C} is the minimal enforcement resources needed to reach $\mu^* = 0$ as an equilibrium. That is, $\underline{C} = c(0; \chi, \eta)$ which implies $\underline{C} = ((1 - \eta)^\alpha / fk)^{1/\alpha}$. Then, for any level of enforcement resources $c > \underline{C}$, $\mu^* = 0$, is a possible equilibrium, although there may be others.

Finally, \bar{C} is the maximal level of enforcement resources for which a compliance rate $\mu^* > 0$ is an equilibrium, in other words \bar{C} is the maximum of $c(\mu; \chi, \eta)$. Thus, for $c > \bar{C}$, $\mu^* = 0$ is the unique equilibrium.

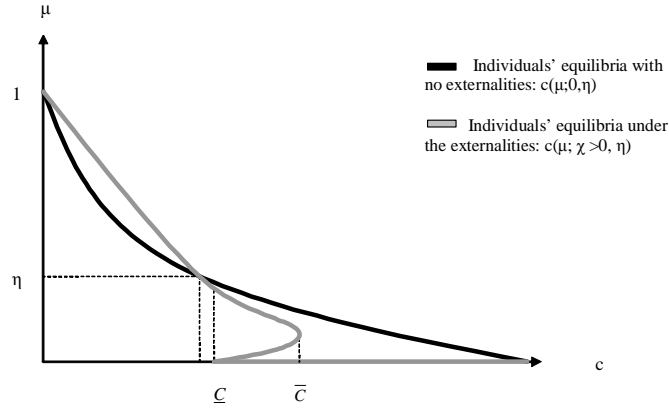


Figure 3: Equilibria of the heterogeneous individuals

Conclusion

This paper studies externalities that affect the productivity of enforcement resources. The first externality is due to congestion of enforcement resources, which creates a positive externality among offenders by decreasing the probability of the punishment. The second externality is determined by the community's involvement in enforcement activities. Neighborhoods with a higher degree of involvement lead to a higher productivity of enforcement resources. When the involvement of the neighborhood is decreasing in the number of offenders, an additional positive externality among offenders arises.

These externalities explain the interdependence of individuals' decisions to break the law, and generate neighborhood effects. Multiple equilibria arise for a given level of enforcement resources. Using risk dominance to select among the equilibria, I show how the externalities affect the optimal compliance rate and the optimal level

of enforcement resources. When the net neighborhood effect is negative and strong enough, it may be too costly to enforce the law in that neighborhood.

While a significant number of empirical studies have established the importance of neighborhood effects on crime, the issue has been largely neglected in theoretical models on enforcement.³¹ This paper provides a theoretical framework that explains how neighborhood effects may be related to the productivity of the enforcement technology. In relation to particular residential policies, the model allows for a better understanding of community policing and its consequences.

The results are extended to a framework where individuals are heterogeneous in the benefit from breaking the law which follows a uniform distribution. Alternative distribution functions are left for further research; however, multiple equilibria and similar conclusions are expected. Future progress in game theory is needed to find an equilibrium selection concept that can be applied to the framework with heterogeneous individuals.

Further research could also measure the impact of the externalities. However, important methodological problems arise when trying to study neighborhood effects (such as selection bias or how to determine the boundaries of local communities).³² More importantly, differences in the technology's sensitivity to congestion and in the community's involvement in enforcement activities are hard to observe and measure. Nevertheless, this paper provides a rational explanation for the interdependence of individuals' decisions to break the law, which is a stylized fact that has already been documented.

³¹For a survey, see Sampson et al. (2002).

³²Again, see Sampson et al. (2002).

Appendix

Proof of Proposition 2:

i) For $c < \bar{c}$ and $\chi > 0$, then $b - p(c, 1) \cdot f > 0$ by definition of \bar{c} . Thus, it is optimal for each individual to break the law if all others do, and $\mu^* = 1$ is an equilibrium.

ii) For $c \geq \underline{c}$ and $\chi > 0$, then $p(c, 0, \eta) = b/(f(1 - \eta)^x) \geq b/f$ by definition of \underline{c} . Thus, it is optimal for each individual to comply if all others do, and $\mu^* = 0$ is an equilibrium.

Finally, $\bar{c} - \underline{c} = (b/fk)^{1/\alpha}((2 - \eta)^{x/\alpha} - (1 - \eta)^{x/\alpha})$, which is increasing in χ .

Proof of Proposition 3:

As shown in Table 1, individual i and the representative individual play a 2 x 2 coordination game. Therefore, an equilibrium is reached when both players choose the same strategy.

When being at the no-compliance equilibrium, let λ be the probability that the representative individual chooses the compliance equilibrium; then, individual i faces a deviation loss of $\lambda(b - fkc^\alpha/(1 - \eta)^x)$. Since individual i obtains a payoff of zero in case of deviating to comply, then she chooses not to comply as long as:

$$\lambda \left(b - \frac{fkc^\alpha}{(1 - \eta)^x} \right) + (1 - \lambda) \left(b - \frac{fkc^\alpha}{(2 - \eta)^x} \right) \geq 0.$$

That is, as long as:

$$\lambda \leq \frac{(b(2 - \eta)^x - fkc^\alpha)(1 - \eta)^x}{fkc^\alpha((2 - \eta)^x - (1 - \eta)^x)}.$$

I denote as $\bar{\lambda}$ the highest probability for which this condition holds (i.e., the highest for which i chooses to not comply).

Similarly, when being at the full compliance equilibrium, I denote as γ to the probability that the representative individual deviates to not comply. Then individual i chooses to comply only as long as the payoff from deviating is lower than the zero

payoff from maintaining non-compliance. That is, as long as:

$$(1 - \gamma) \left(b - \frac{fk c^\alpha}{(1 - \eta)^x} \right) + \gamma \left(b - \frac{fk c^\alpha}{(2 - \eta)^x} \right) \leq 0.$$

Then:

$$\gamma \leq \frac{(fk c^\alpha - b(1 - \eta)^x)(2 - \eta)^x}{fk c^\alpha((2 - \eta)^x - (1 - \eta)^x)}.$$

I denote as $\bar{\gamma}$ the highest probability for which this condition holds. Then, for individual i to comply risk dominates not to comply whenever $\bar{\gamma} > \bar{\lambda}$. Meanwhile, not to comply risk dominates to comply whenever $\bar{\lambda} > \bar{\gamma}$. Meanwhile, none of the equilibria risk dominates the other when $\bar{\lambda} = \bar{\gamma}$. Let c^* be the threshold amount of enforcement resources that satisfies this equality, then:

$$c^* = \left(\frac{2b(1 - \eta)^x(2 - \eta)^x}{((2 - \eta)^x + (1 - \eta)^x)fk} \right)^{1/\alpha}.$$

Thus, for any $c < c^*$ the risk-dominant strategy for player i is not to comply. Since every player faces the same setup and the same payoff function, for any $c < c^*$ the equilibrium selected is the no-compliance equilibrium. Similarly, for $c > c^*$ the equilibrium selected is the full-compliance equilibrium.

Notice that for all $\chi \in (0, 1]$ it is the case that $c^* \in (\underline{c}, \bar{c})$. More precisely:

$$c^* = \underline{c} \cdot \left(\frac{2(2 - \eta)^x}{(2 - \eta)^x + (1 - \eta)^x} \right)^{1/\alpha},$$

where $\frac{2(2 - \eta)^x}{(2 - \eta)^x + (1 - \eta)^x} > 1$ for all $\chi > 0$. Also:

$$c^* = \bar{c} \cdot \left(\frac{2(1 - \eta)^x}{(2 - \eta)^x + (1 - \eta)^x} \right)^{1/\alpha},$$

where $\frac{2(1 - \eta)^x}{(2 - \eta)^x + (1 - \eta)^x} < 1$ for all $\chi > 0$. Also, notice that $\frac{\partial c^*}{\partial \eta} < 0$.

Finally, c^* is invariant to including the harm caused by non-compliance into the individuals' payoffs. Notice that if non-compliance causes a harm $v_i(h\mu)$ to individual i , then the condition for i not to deviate from the non-compliance strategy is given by:

$$\lambda \left(b - \frac{fk c^\alpha}{(1-\eta)^x} \right) + (1-\lambda) \left(b - \frac{fk c^\alpha}{(2-\eta)^x} - v_i(h\mu) \right) \geq -(1-\lambda)v_i(h\mu),$$

which is equivalent to the condition imposed previously. It can be shown analogously for γ .

Proof of Proposition 5:

From proposition 4 we know that it is optimal to enforce a law for any $h > 0$ if and only if $h > c^*$. Let $\tilde{\eta}$ be the value such that $h = c^*$. The existence of $\tilde{\eta}$ in the interval $[0, 1)$ is ensured because as shown in the proof of Proposition 4, $c^* = \underline{c}(2(2-\eta)^x / ((2-\eta)^x + (1-\eta)^x))^{1/\alpha}$; and thus:

$$\lim_{\eta \rightarrow 1} c^* = 0 \quad \text{since} \quad \lim_{\eta \rightarrow 1} \underline{c} = 0.$$

Moreover, $\tilde{\eta}$ is unique since $\partial c^* / \partial \eta < 0$. Therefore, for any $\eta \in (\tilde{\eta}, 1)$ it holds that $h > c^*$ (i.e., it is optimal to enforce the law).

Finally, the sign of $\frac{\partial \tilde{\eta}}{\partial \chi}$ can be obtained locally to $\eta = \tilde{\eta}(\chi)$ by applying the implicit function theorem:

$$\frac{\partial \tilde{\eta}}{\partial \chi} = - \frac{\partial c^* / \partial \chi}{\partial c^* / \partial \tilde{\eta}},$$

where $\frac{\partial c^*}{\partial \eta} > 0$ as shown in the proof of proposition 4. Therefore, $\frac{\partial \tilde{\eta}}{\partial \chi} < 0$ if and only if $\partial c^* / \partial \chi > 0$ which is only true for an interval of values of η .

Proof of Proposition 6:

In the proof of Proposition 2, the results are shown for $\eta \in [0, 1)$. Thus, introducing

$n(\mu) \in [0, 1)$ instead of η does not affect the results. In particular, for part i) notice that for $c < \bar{c}$ (using the new value obtained for \bar{c}) and $\chi > 0$, then $b - p(c, 1) \cdot f > 0$. Therefore, it is optimal for each individual to break the law if all others do; hence, $\mu^* = 1$. Similarly in part ii), for $c > \underline{c}$ (using the new value obtained for \underline{c}), then $b - p(c, 0) \cdot f < 0$. Therefore, it is optimal for each individual to comply if all others do; hence, $\mu^* = 0$ is an equilibrium.

Finally, $\bar{c} - \underline{c} = (b/fk)^{1/\alpha}((2 - n(1))^{x/\alpha} - (1 - n(0))^{x/\alpha})$, which is increasing in χ as in the exogenous case. In addition, denoting the difference $n(0) - n(1) > 0$ as D , I can rewrite $\bar{c} - \underline{c} = (b/fk)^{1/\alpha}((2 + D - n(0))^{x/\alpha} - (1 - n(0))^{x/\alpha})$. Then, $\bar{c} - \underline{c}$ is increasing in D when holding $n(0)$ fixed. Similarly, if instead I substitute $n(0)$ with $D + n(1)$, I find that $\bar{c} - \underline{c}$ is increasing in D when holding $n(1)$ fixed.

Proof of Proposition 7:

Using the payoffs in Table 2, and using the same procedure as in Proposition 3, let λ_{endog} be the probability that the representative individual deviates from the non-compliance equilibrium by choosing to comply. Then individual i chooses not to comply only as long as:

$$\lambda_{endog} \leq \frac{(b(2 - n(1))^x - fkc^\alpha)(1 - n(0))^x}{fkc^\alpha((2 - n(1))^x - (1 - n(0))^x)}.$$

Similarly, when being at the full compliance equilibrium, I denote as γ_{endog} to the probability that the representative individual deviates to not comply. Then individual i chooses to comply only as long as:

$$\gamma_{endog} \leq \frac{(fkc^\alpha - b(1 - n(0))^x)(2 - n(1))^x}{fkc^\alpha((2 - n(1))^x - (1 - n(0))^x)}.$$

Therefore, following the same steps as in the proof of Proposition 3, I find a threshold level of enforcement resources c_{endog}^* such that for $c < c_{endog}^*$ the full-compliance equilibrium is risk dominant, and for $c > c_{endog}^*$ the no-compliance equilibrium is risk

dominant, where c_{endog}^* is given by:

$$c_{endog}^* = \left(\frac{2b(1-n(0))^x(2-n(1))^x}{((2-n(1))^x + (1-n(0))^x)fk} \right)^{1/\alpha}.$$

Notice that $\frac{\partial c_{endog}^*}{\partial n(1)} < 0$ and $\frac{\partial c_{endog}^*}{\partial n(0)} < 0$. Also, as in Proposition 3, $c_{endog}^* \in (\underline{c}, \bar{c})$ and c_{endog}^* is invariant to including the harm caused by non-compliance into the individuals' payoffs.

Proof of Proposition 8:

This proof is as the proof of Proposition 3 except that now if both individual i and the representative individual choose to not comply then the payoff of individual i is $\left(b - \frac{fkc^\alpha}{(2-\eta)^x} + d(1)\right)$ rather than $\left(b - \frac{fkc^\alpha}{(2-\eta)^x}\right)$. Then individual i chooses not to comply as long as:

$$\lambda \left(b - \frac{fkc^\alpha}{(1-\eta)^x} \right) + (1-\lambda) \left(b - \frac{fkc^\alpha}{(2-\eta)^x} + d(1) \right) \geq 0.$$

That is, as long as:

$$\lambda \leq \frac{(b(2-\eta)^x - fkc^\alpha + d(1) \cdot (2-\eta)^x)(1-\eta)^x}{fkc^\alpha((2-\eta)^x - (1-\eta)^x) + d(1) \cdot (2-\eta)^x(1-\eta)^x}.$$

I denote as $\bar{\lambda}$ the highest probability for which this condition holds.

Similarly, when being at the full compliance equilibrium, individual i chooses to comply only as long as:

$$(1-\gamma) \left(b - \frac{fkc^\alpha}{(1-\eta)^x} \right) + \gamma \left(b - \frac{fkc^\alpha}{(2-\eta)^x} + d(1) \right) \leq 0.$$

Then:

$$\gamma \leq \frac{(fkc^\alpha - b(1-\eta)^x)(2-\eta)^x}{fkc^\alpha((2-\eta)^x - (1-\eta)^x) + d(1) \cdot (2-\eta)^x(1-\eta)^x}.$$

I denote as $\bar{\gamma}$ the highest probability for which this condition holds (i.e., the highest

for which i chooses to comply). Then for individual i to comply risk dominates not to comply whenever $\bar{\gamma} > \bar{\lambda}$. Meanwhile, not to comply risk dominates to comply whenever $\bar{\lambda} > \bar{\gamma}$. Let c^* be the threshold amount of enforcement resources such that $\bar{\gamma} = \bar{\lambda}$, then:

$$c^* = \left(\frac{(2b + d(1))(1 - \eta)^x(2 - \eta)^x}{((2 - \eta)^x + (1 - \eta)^x)fk} \right)^{1/\alpha} > \left(\frac{b(1 - \eta)^x(2 - \eta)^x}{((2 - \eta)^x + (1 - \eta)^x)fk} \right)^{1/\alpha}.$$

Thus, under this third possible externality, the law enforcement agency has to choose a higher level of enforcement resources than in Proposition 3 to induce compliance.

Proof of Proposition 9:

Comparing $c(\mu; \chi > 0, \eta)$ and $c(\mu; 0, \eta)$, we see that if $\mu > \eta$ a larger amount of resources are needed because of the externalities since $c(\mu; \chi > 0, \eta) > c(\mu; 0, \eta)$. Meanwhile, if $\mu < \eta$ less resources because $c(\mu; \chi > 0, \eta) < c(\mu; 0, \eta)$.

Also, whenever $\chi > 1 - \eta$ then $c(\mu; \chi > 0, \eta)$ is not a one-to-one function. Notice that $c(\mu; \chi, \eta)$ is a one-to-one function only if $\partial c(\mu; \chi, \eta)/\partial \mu < 0$ for all μ . However, there are values of χ and η for which this condition does not hold since:

$$\frac{\partial c(\mu; \chi, \eta)}{\partial \mu} = \frac{1}{\alpha} \left(\frac{1}{fk} \right)^{1/\alpha} (1 - \mu)^{1/\alpha} (1 + \mu - \eta)^{x/\alpha} \left(\frac{\chi}{1 + \mu - \eta} - \frac{1}{1 - \mu} \right),$$

where all the elements are non-negative, except the last term in parenthesis that might be positive or negative. In particular,

$$\partial c(\mu; \chi, \eta)/\partial \mu \begin{cases} > 0 \text{ if } \mu < (\eta + \chi - 1)/(1 + \chi) \\ < 0 \text{ if } \mu > (\eta + \chi - 1)/(1 + \chi) \end{cases}.$$

Thus, $\partial c(\mu; \chi, \eta)/\partial \mu < 0$ for all μ only if $\chi < 1 - \eta$. Whenever this condition holds, each level of enforcement resources c induces a unique non-compliance rate, μ . However, for $\eta > 1 - \chi$ then $c(\mu; \chi, \eta)$ is not a one to one function.

CHAPTER III

THE EFFECT OF LAWYERS' CAREER CONCERNS ON LITIGATION

Introduction

Legal disputes are frequent in a wide variety of economic activities.³³ In particular, litigation expenses may increase the costs of healthcare, the costs of intellectual property protection, and the prices of goods via products liability. Therefore, it is worth examining the incentives behind lawyers' decisions, particularly if those incentives may increase the costs of litigation. Since a lawyer's performance in court provides information about her skills, lawyers with career concerns might try to influence this learning process. Specifically, although winning a case might not imply a large amount of direct earnings at the beginning of a lawyer's career, it could have a substantial impact on her future salary. Thus, the prospect of earnings growth upon winning is an important incentive that might motivate lawyers to exert more effort in court.

Career concerns appear to be particularly relevant in the legal profession because the variance of lawyers' earnings is large (according to Rosen, 1992, the standard deviation is more than 40 percent of the mean). Such large variance is not fully explained by experience, gender, and working hours (again, see Rosen, 1992). In fact, since differences in (perceived) talents seem to explain part of the remaining variance, the information about lawyers' skills conveyed in trial outcomes might play an important role in future earnings. Even though there is a large economics literature on litigation, little is known about how lawyers' reputational concerns may affect litigation effort and the decision to settle.³⁴

³³More than 250,000 civil cases are filed every year in Federal Courts in the United States. For instance, in 2007 there were about 36,000 cases filed related to personal injury product liability, and more than 10,000 related to the protection of copyrights, patents and trademarks (Administrative Office of the U.S. Courts, Statistical Tables for the Federal Judiciary, 2007).

³⁴A short section in Dewatripont and Tirole (1999) discusses the robustness of their moral hazard

In this paper I study how career concerns influence effort levels, settlement decisions and the client-lawyer misalignment of interests. More importantly, because there are substantial interactions in the decisions of the two parties in a legal dispute, this paper pays special attention to how lawyers' decisions are affected by the career motives of their opponents. Also, I consider that the talent of the attorneys is uncertain not only for the market but also for themselves and for other attorneys (i.e., there is imperfect but symmetric information in the model), as usual in career concerns models. Inexperienced attorneys, who are those who may have stronger career concerns, are likely to have greater uncertainty about how they will perform in court. Moreover, although they probably know the rank of the law school from which they graduated, and the level of their performance there, this information is also available to the market. Thus, there is little room for private information and individual decisions will not involve any signaling behavior.

The model in this paper studies the effect of career concerns on the effort and settlement decisions of two attorneys opposing each other in a case. To model the career concerns of the attorneys, in addition to the explicit incentives (i.e., the award in case of winning minus effort costs), there will be a term in each attorney's payoff function that is increasing in the market's inference about her talent. The weight that this term has in the attorney's payoff function will determine the strength of her career concerns. The market does not observe the attorney's talent directly; thus, the market's initial belief about the attorney's talent is given by the "prior" distribution about attorneys' capabilities. However, if the case is taken to court, the outcome of the trial provides additional information and will lead to an update of the market's initial beliefs (this creates the "posterior" distribution).

The results show that attorneys with career concerns attempt to influence the model to the incorporation of career concerns. They argue that career concerns would not alter significantly their results. In contrast with their analysis, I consider a model where effort decisions are not binary, there may be asymmetries between the attorneys, and a settlement stage is studied.

market's beliefs by exerting more effort. Even though the market cannot be fooled in equilibrium, attorneys with career concerns are trapped into providing higher effort levels than they would in the absence of reputational concerns.³⁵ That is, two attorneys with career concerns facing each other would be better off by coordinating on the no-career-concerns equilibrium effort levels; however, they would have individual incentives to deviate. Also, when two attorneys have different degrees of career concerns, then the attorney with stronger career concerns exerts more effort in equilibrium than her opponent. Consequently, she has a higher expected probability of prevailing in court. Moreover, the attorney with weaker career concerns exerts more effort than in an equilibrium where both had the same career concerns. Therefore, she is worse off than if both had the same career concerns because she is trapped into exerting more effort, but has a lower probability of prevailing in court. Similar results arise due to career concerns when the lawyers have different cost functions, or when the uncertainty over their respective talents is different.

These results affect the settlement stage because higher equilibrium effort levels imply larger trial costs and changes in the probability of prevailing in court. For instance, I show that an increase in the plaintiff's attorney's career concerns (holding the defendant's attorney's career concerns fixed) leads to a larger concession limit for the defendant; that is, the defendant's attorney is willing to settle at a larger settlement amount. Similarly, an increase in the defendant's attorney's career concerns (holding the plaintiff's attorney's career concerns fixed) leads to a smaller concession limit for the plaintiff's attorney; that is, the plaintiff's attorney is willing to settle at a lower settlement amount. In both cases, the overall effect on the settlement range is ambiguous because an increase in the career concerns of an attorney may increase or decrease her own concession limit.

Within the settlement range, the amount resulting from the bargaining stage de-

³⁵Section 1.2. discusses evidence of this equilibrium effort trap.

depends on the bargaining power of the parties. I study the effect of career concerns for different possible bargaining solutions. The results show that having stronger career concerns is beneficial for the party with more bargaining power. For instance, when one of the attorneys has all the bargaining power, then she benefits from an increase in her career concerns. Intuitively, such an increase leads to higher equilibrium effort levels, and thus to a larger surplus from settlement, which is fully captured by the party with all the bargaining power. When using Nash (1950)'s bargaining solution, I find that an increase in the career concerns of the attorneys affects the settlement amount only when the attorneys have different career concerns. When increasing the career concerns of only one of the attorneys, she obtains a better outcome from the bargaining; in contrast, the attorney whose career concerns remain fixed is worse off. Similar results arise when modeling the settlement outcome using a random-proposer bargaining game.

In addition, the paper analyzes the extent to which the equilibrium effort levels are affected by the sensitivity of the trial outcome to the performance of the attorneys. I find that the effect of career concerns is increasing in the level of sensitivity. The driving force is that the more sensitive is the outcome of the trial to the talent of the attorneys, the more informative is winning or losing about the talent of the attorneys. I also study the implications of career concerns in the possible misalignment of interests between the plaintiff and her lawyer. The implicit incentives induced by career concerns may ameliorate the insufficient-investment distortion caused by contingent-fee arrangements (for a detailed analysis of such distortion, see Polinsky and Rubinfeld, 2003). However, this may not be the case if the opposing lawyer also has strong career concerns.

Section 2 describes the basic model set-up. Section 3 derives the attorneys' equilibrium effort levels when the attorneys are symmetric. Then I compare the results with the equilibrium effort levels when the career concerns, the cost functions, or the

priors on the attorneys' talents are different. Section 4 studies the implications of Section 3's results for the decision to settle. Section 5 studies the effect of changing the sensitivity of the trial outcome to the performance of the attorneys. Section 6 examines the effect of career concerns on the misalignment of interests between the plaintiff and her attorney. Finally, Section 7 concludes.

Related literature

The contract theory literature introduced career concerns to study agency problems in one-agent models. 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. However, as pointed out by Holmström (1982, 1999), the effect of career concerns is smaller the lower is the uncertainty about the ability of the agents. 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. In Dewatripont et al. (1999b), an application of this multitask model explains the important role of career concerns for government agencies' officials.

There are some other relevant applications of the career concerns framework. The literature in finance has done an extensive analysis of the effect of career concerns on investment decisions. In particular, career concerns may lead to inefficiencies (Scharfstein and Stein, 1990; Milbourn et al., 2001; and Dasgupta and Prat, 2008) or anomalies (Harbaugh, 2006). In general these models assume that agents have some private (although noisy) information about their talent.

The analysis in this paper differs from standard career concerns models because it considers a model with two opposing agents. That is, a lawyer's performance is determined not only by her talent and her effort level, but also by the performance of the other lawyer. In particular, I assume that the performance of the attorneys in court is determined by a contest success function. I use a "difference-form" success

function as in Che and Gale (2000), which implies that the probability of success is a function of the difference in the performance of the two lawyers. Examples of previous contest models' applications to litigation are Katz (1988), Farmer and Pecorino (1999, 2000), Wärneryd (2000), Hirshleifer and Osborne (2001), and Baik and Kim (2007). This paper is most closely related to Wärneryd (2000), and Baik and Kim (2007), which study strategic effects of delegating in lawyers the choice of effort. Nevertheless, none of these models accounts for career concerns.

In addition, the career concerns' model in this paper incorporates other features that are specific to litigation models. Legal disputes will not end up in court if parties settle. Therefore, the model will consider a settlement bargaining process prior to the trial stage, allowing me to study the impact of attorneys' career concerns on settlement decisions. Also, 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 paper 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. Their analysis is based on the assumption that talent is the private information of the agent. They find that 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.

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 a paper 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. As they argue, "for young workers it can be optimal for current pay to be completely independent of current performance."

As a first step to study the effect of career concerns on the attorney-client contractual stage, I study the effect of implicit incentives on lawyers' decisions when the plaintiff compensates her lawyer through a contingent fee (which consists of a percentage of the settlement or the award obtained by the plaintiff in court). Previous work has found three important results related to contingent fees. First, when the plaintiff does not observe the merits of her case and assuming that lawyers compete for plaintiffs' cases following a model of monopolistic competition, Dana and Spier (1993) show that compensation via contingent fees provides stronger incentives than hourly fees for the attorney to reveal when a case has low expected returns. In addition, Rubinfeld and Scotchmer (1993) find that, in a model with no restriction on the type of contracts that attorneys and clients can make but where all cases are assumed to go to trial, contingent fees serve as a screening device allowing clients to separate between high and low quality attorneys. High talent attorneys are willing to accept a lower contingent fee since they have a higher probability of prevailing in

court. Finally, Polinsky and Rubinfeld (2003) show that contingent fees provide insufficient incentives for the attorney to devote the effort level desired by the plaintiff. The authors propose an alternative compensation system in which, in addition to a contingent fee, attorneys are partially compensated for their costs by a third party and independently of the outcome from the trial. However, their model focuses on the choice of effort of the plaintiff's attorney; thus, strategic interactions with the opposing lawyer are not considered. Also, the model does not account for career concerns.

Related empirical findings

The equilibrium effort trap found in this paper is consistent with some empirical findings about lawyers. Landers et al. (1996) find evidence that associate lawyers overwork, in the sense that they prefer a decrease in hours of work to an increase in their wage keeping the number of hours unchanged. Surveyed lawyers had to decide between three hypothetical changes in their current income and work hours. The results showed that almost two thirds of the associate lawyers in the sample were interested in decreasing their hours of work. Specifically, 65.1 percent chose a decrease in their work hours keeping the same income while only 25.56 percent preferred to keep their hours of work unchanged and have an increase of 5 percent in their income. Finally, only 9.02 percent chose an increase of 5 percent in hours and 10 percent in income. The authors argue that law firms induce lawyers to overwork as a screening device. Their framework assumes that attorneys differ in their disutility of work, and that they have private information about their types. In contrast, I study whether career concerns induce lawyers to work more hours in a framework where there is no signaling or screening involved.

Using confidential survey data from the "After the JD Study," Ferrer (2009b) finds that young lawyers involved in court cases work nearly five hours per week more than

other young practicing lawyers, once controlling for salary, educational background, size of the law firm, and other variables. Table 1 below illustrates this result by showing the unconditional average weekly work hours of the lawyers in this study. Comparing the second and third rows, it can be seen that the average weekly work hours is larger for young lawyers working in law firms that are involved in court cases than for those who are not. In contrast, as shown in the second and third columns, young lawyers involved in court cases are not expected to work or to bill more hours than the others.

This is consistent with the equilibrium trap studied in this paper. Because the trial outcome is a quite important source of information for the market, lawyers involved in court cases attempt to influence the market’s beliefs by exerting more effort and winning the cases. In contrast, the measures to evaluate lawyers not directly involved in court cases are likely to be more diffuse (e.g., the market does not have such a clear measure of performance for lawyers involved in writing contracts or providing legal advice) and there is less room for an equilibrium trap.

TABLE 4 – AVERAGE WEEKLY HOURS OF WORK (REPORTED)

	Weekly hours of work	Weekly hours expected to work	Weekly hours expected to bill
Inexperienced lawyers	50.18	46.53	39.78
Inexperienced lawyers working in law firms not involved in court	50.49	47.76	40.01
Inexperienced lawyers working in law firms, and involved in court cases	52.58	46.91	39.97

Survey data from 2002 of lawyers that passed the bar examination in 2000
Source: The “After the JD” study

The model

The plaintiff's attorney (AP) and the defendant's attorney (AD) face the decision of how much effort to exert in a case at Court.

Attorney Ai 's talent is given by $t_i \in \{\tau_i^l, \tau_i^h\}$ where $0 < \tau_i^l < \tau_i^h \leq 1$ for $i = P, D$. I assume that AP and AD observe neither their own true talent nor their rival's talent. The market cannot observe the attorneys' talents either. In other words, there is imperfect but symmetric information in the model. Thus, there is a common prior over the talent of an attorney; however, the common priors over the talents of P and D may be different.³⁶ That is, the unconditional probability of attorney i having high talent is denoted by $\rho_i > 0$, which is common knowledge and where ρ_D may be different from ρ_P . This is an unconditional probability in the sense that it does not depend on the outcome of this specific dispute although it might depend on past trial outcomes. I denote as μ_i the *a priori* expected talent of attorney i . That is, $\mu_i = \rho_i \tau_i^h + (1 - \rho_i) \tau_i^l$.

The outcome of the trial, denoted by z , is a function of the attorneys' efforts, denoted e_i , $i = P, D$, and their talents:

$$z = \begin{cases} AP \text{ wins} & \text{with probability } \Phi(e_P, e_D, t_P, t_D) \\ AP \text{ loses} & \text{with probability } 1 - \Phi(e_P, e_D, t_P, t_D) \end{cases}.$$

After the trial takes place, the market estimates the talent of each attorney based on the outcome of the trial; that is, the value of z . I assume that Φ takes the form:

$$\Phi(e_P, e_D, t_P, t_D) = \frac{1 + e_P t_P - e_D t_D}{2}. \tag{16}$$

In order to ensure that $\Phi \in [0, 1]$, I will make parametric assumptions sufficient to

³⁶This assumption is standard in the career concerns literature (see for instance Holmström, 1982, 1999, and Dewatripont et al., 1999a). In the case of young attorneys, there seems to be little room for private information about talent since it is not difficult to have information about the academic background of the attorneys and because attorneys have uncertainty about how talented they are relative to their opponent.

keep e_P and $e_D \in [0, 1]$ in equilibrium. This functional form 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.³⁷

Given the functional form assumed for Φ :

$$E_t(\Phi(e_P, e_D, t_P, t_D)) = \frac{1}{2} + \frac{\mu_P e_P - \mu_D e_D}{2}; \quad (17)$$

the expectation over Φ is taken with respect to both t_P and t_D , since there is common imperfect information about both attorneys' talents.

I assume that the attorney's performance is determined by talent and effort which are complements. Notice that the cross partial derivative of Φ (respectively, $1 - \Phi$) with respect to e_P and t_P (respectively, e_D and t_D) is positive. Thus, if the attorney's talent were known, more talented attorneys would exert more effort than less talented attorneys. As a consequence, a higher level of effort increases how informative the outcome of the trial is about each attorney's talent. This is the case because the effect of the talent on Φ is higher the more effort is implemented.

Since the function is linearly separable with respect to e_P and e_D , in the absence of career concerns the attorneys will have dominant strategies; that is, their optimal levels of effort will be independent of each other. Thus, the interactions that arise between the attorneys' decisions are due to the effect of career concerns.

The timing of the attorneys' decisions is:

Stage 1: Settlement stage; various bargaining solutions will be considered.

Stage 2: In case of trial the attorneys simultaneously decide how much effort to exert in Court.

In order to find the optimal decision in the settlement stage, the attorneys anticipate

³⁷Previous research using the "difference-form" success function assumes linear costs of effort (Hirshleifer, 1989; Che and Gale, 2000) while I will assume quadratic effort costs. Also, this form of success function is not homogenous of degree zero, and thus it does not belong to the family of functions studied in Skaperdas (1996).

their optimal effort levels if they were to face each other in Court. The optimal levels of effort are determined by the attorneys' objective functions which are described below.

AP's objective function

I assume that the interests of the attorney and her client are aligned in the sense that the attorney maximizes the combined payoff of P and AP . Section 6 studies the case of misaligned interests. Let W be the award obtained by the plaintiff in case of winning the trial. Then, AP chooses the level of effort in order to solve the following problem:

$$\begin{aligned} \max_{e_P \in [0,1]} & W \cdot E_t(\Phi(e_P, e_D^*, t_P, t_D)) - \frac{c_P e_P^2}{2} + \beta_P \cdot \{E_t(\Phi(e_P, e_D^*, t_P, t_D)) \cdot \hat{t}_P(AP \text{ wins}; e_P^*, e_D^*) \\ & + E_t(1 - \Phi(e_P, e_D^*, t_P, t_D)) \cdot \hat{t}_P(AP \text{ loses}; e_P^*, e_D^*)\}, \end{aligned}$$

where c_P is a cost parameter, e_D^* is AP 's and the market's conjecture about AD 's effort and e_P^* is the market's conjecture about AP 's effort. The first two elements in the objective function represent AP 's explicit incentives: the expected award from Court minus effort costs. Effort costs are assumed to be quadratic because of decreasing returns from effort when finding evidence or legal arguments. In addition, effort may have an increasing cost in terms of the opportunity cost of having to decline other cases or clients.

The terms $\hat{t}_P(AP \text{ wins}; e_P^*, e_D^*)$ and $\hat{t}_P(AP \text{ loses}; e_P^*, e_D^*)$ are the key elements in modeling the attorney's reputational concerns. They represent the market's inference about AP 's talent conditioned on the outcome of the trial and on the market's conjecture about AP 's and AD 's efforts. Attorneys with career concerns have payoffs that are increasing in the expected market's inference about their talent, which is the expression in curly brackets. Finally, β_P measures the weight of this expected

inference with respect to the attorney's explicit incentives; that is, it measures the strength of AP 's career concerns.

The first-order condition³⁸ for the interior solution can be written as:

$$\frac{W\mu_P}{2} - c_P e_P + \frac{\beta_P \mu_P}{2} (\hat{t}_P(AP \text{ wins}; e_P^*, e_D^*) - \hat{t}_P(AP \text{ loses}; e_P^*, e_D^*)) = 0. \quad (18)$$

As shown in the Appendix, the difference between the market's inference about t_P in case of AP winning and in case of AP losing can be written as follows:

$$\hat{t}_P(AP \text{ wins}; e_P^*, e_D^*) - \hat{t}_P(AP \text{ loses}; e_P^*, e_D^*) = \frac{2e_P^* \sigma_P^2}{1 - (\mu_P e_P^* - \mu_D e_D^*)^2},$$

where σ_P^2 is the variance of the prior on AP 's talent. Finally, notice that in equilibrium the level of effort chosen by AP has to coincide with the market's conjecture of her effort, e_P^* .

AD's objective function

Similarly as for AP , assuming no agency problem between the defendant and her attorney, then AD chooses the level of effort in order to solve the following problem (reflecting the combined payoff of D and AD):

$$\begin{aligned} \max_{e_D \in [0,1]} & -W \cdot E_t(\Phi(e_P^*, e_D, t_P, t_D)) - \frac{c_D e_D^2}{2} + \beta_D \cdot \{E_t(\Phi(e_P^*, e_D, t_P, t_D)) \cdot \hat{t}_D(AP \text{ wins}; e_P^*, e_D^*) \\ & + E_t(1 - \Phi(e_P^*, e_D, t_P, t_D)) \cdot \hat{t}_D(AP \text{ loses}; e_P^*, e_D^*)\}, \end{aligned}$$

where e_P^* is AD 's and the market's conjecture about AP 's effort, and e_D^* is the market's conjecture of AD 's effort. The first two elements in the objective function represent AP 's explicit incentives: the expected award from Court minus effort costs. As in AP 's case, effort costs are assumed to be quadratic because of decreasing returns

³⁸Note that the objective function is strictly concave in e_P . Therefore, if the optimal $e_P \in (0, 1)$, then it must satisfy equation (3).

from effort when finding evidence or legal arguments.

The key elements in modeling *AD's* reputational concerns are $\hat{t}_D(AP \text{ loses}; e_P^*, e_D^*)$ and $\hat{t}_D(AP \text{ wins}; e_P^*, e_D^*)$, which represent the market's inference about *AD's* talent conditioned on the outcome of the trial and on the market's conjectures about *AP's* and *AD's* efforts. Therefore, the expression in curly brackets represents the expected market's inference about *AD's* talent. Finally, β_D measures the strength of *AD's* career concerns.

Substituting $E_t(\Phi(e_P, e_D^*, t_P, t_D))$ in *AD's* maximization problem, the first-order condition for the interior solution can be written as:

$$\frac{W\mu_D}{2} - c_D e_D + \frac{\beta_D \mu_D}{2} (\hat{t}_D(AP \text{ loses}; e_P^*, e_D^*) - \hat{t}_D(AP \text{ wins}; e_P^*, e_D^*)) = 0. \quad (19)$$

As in the case of *AP*, it is shown in the Appendix that the difference between the market's inference about t_D in case of *AD* winning and in case of *AD* losing can be written as follows:

$$\hat{t}_D(AP \text{ loses}; e_P^*, e_D^*) - \hat{t}_D(AP \text{ wins}; e_P^*, e_D^*) = \frac{2e_D^* \sigma_D^2}{1 - (e_P^* \mu_P - e_D^* \mu_D)^2}.$$

where σ_D^2 is the prior variance on *AD's* talent. Finally, notice that in equilibrium the level of effort chosen by *AD* has to coincide with the market's conjecture of her effort, e_D^* .

The choice of effort in Court

In this section, first I find the equilibrium effort levels when the two attorneys are symmetric. Then I use the results of the symmetric case as a benchmark to study the effects of career concerns when the attorneys differ in the strength of their career concerns, in their cost functions, and in the prior on their talent.

The equilibrium level of effort in the symmetric case

When the attorneys are symmetric, then $\mu_P = \mu_D = \mu$, $\sigma_P^2 = \sigma_D^2 = \sigma^2$, $\beta_P = \beta_D = \beta$ and $c_P = c_D = c$. A first important implication is that:

$$E_t(\Phi(e_P, e_D^*, t_P, t_D)) = \frac{1}{2} + \frac{\mu(e_P - e_D)}{2}; \quad (20)$$

that is, whoever exerts more effort in court has a higher expected probability of winning the case. Notice that this is the case only for the expected probability of winning the case; the actual trial outcome depends on the realizations of the attorneys' talents.

According to the first-order condition in equation (3), AP 's equilibrium effort level, e_P^* , must satisfy:

$$e_P^* \left(c - \frac{\beta\mu\sigma^2}{1 - \mu^2(e_P^* - e_D^*)^2} \right) = \frac{W\mu}{2}. \quad (21)$$

In order to ensure that in equilibrium $e_P^* \in (0, 1)$, I assume that $c > W\mu/2 + \beta\mu\sigma^2/(1 - \mu^2(1 - e_D^*)^2)$ for all possible $e_D^* \in [0, 1]$. To ensure that this condition holds it is enough to assume that $c > W\mu/2 + \beta\mu\sigma^2/(1 - \mu^2)$. Under this parametric assumption AP 's optimal level of effort is always an interior solution since it ensures that $e_P^* < 1$. Notice that $e_P^* = 0$ is never an optimal level of effort for AP .

According to the first order condition in equation (4), AD 's first-order condition for the interior solution is actually symmetric to AP 's since it can be written as:

$$e_D^* \left(c - \frac{\beta\mu\sigma^2}{1 - \mu^2(e_P^* - e_D^*)^2} \right) = \frac{W\mu}{2}. \quad (22)$$

Since AD 's maximization problem is symmetric to AP 's, the parametric assumption taken for c also ensures that $e_D^* \in (0, 1)$. Therefore, that assumption ensures that

$\Phi \in [0, 1]$ in equilibrium. Simplifying these two equations:

$$\left(c - \frac{\beta\mu\sigma^2}{1 - \mu^2(e_P^* - e_D^*)^2} \right) = \frac{W\mu}{2e_P^*} = \frac{W\mu}{2e_D^*}. \quad (23)$$

Therefore it must be that $e_P^* = e_D^*$.

Proposition 15 *The symmetric equilibrium is the only solution to the effort optimization problem of the attorneys. Therefore, the optimal levels of effort are:*

$$e^* = e_P^* = e_D^* = \frac{W\mu/2}{c - \beta\mu\sigma^2}. \quad (24)$$

The equilibrium effort levels are increasing in the Court award, W , and in the *a priori* expected talent of the attorneys, μ . Also, the attorneys exert more effort the higher is the variance of the prior on their talent, holding the mean, μ , constant. In other words, the greater is the uncertainty about their talent, the more incentives they have to exert a higher level of effort. Since the variance of the prior may be expressed as $\rho(1 - \rho)(\tau^h - \tau^l)^2$, a mean preserving spread of the attorneys' types leads to an increase in the effort levels. However, the effect of ρ on the equilibrium effort level is ambiguous. Finally, the equilibrium effort levels are decreasing in the cost parameter, c . Notice that the parametric assumption made above to ensure interior solutions implies that $c - \beta\mu\sigma^2$ is always strictly positive. Table 2 below summarizes the effect of increases in the parameters on e^* .

TABLE 5 - Comparative statics regarding increases in the parameters

	W	μ	σ^2	$(\tau^h - \tau^l)^2$	ρ	β	c	
Effect on the equilibrium effort	e^*	↑	↑	↑	↑	?	↑	↓

Let $\Phi^* = \Phi(e_P^*, e_D^*, t_P, t_D)$ be the realized probability that AP succeeds at trial. Since the equilibrium effort levels are equal and the talents of the attorneys are not

known, the expected probability that AP wins the trial is $E_t\{\Phi^*\} = 1/2$. Furthermore, since the equilibrium efforts coincide, if one attorney has higher talent than the other, then the realized probability of prevailing in Court is also higher. If the talents of AP and AD are the same then Φ^* is also $1/2$.

The market anticipates how much effort to expect from the attorneys; hence, the attorney's effort decisions cannot mislead the market's inference (i.e., $E_t\{\Phi^*\} \cdot \hat{t}_P(AP \text{ wins}; e_P^*, e_D^*) + E_t\{1 - \Phi^*\} \cdot \hat{t}_P(AP \text{ loses}; e_P^*, e_D^*) = \mu$). However, the attorneys are trapped into providing higher effort than in the case without career concerns. Notice that if β is zero for both attorneys, then the effort implemented in equilibrium would be $\frac{W\mu}{2c}$, which is lower than e^* .

Therefore, as argued in a one-agent model by Fama (1980), career concerns provide incentives for agents to exert higher effort. As a consequence, explicit incentives may not need to be as strong in the presence of career concerns. However, as pointed out by Holmström (1982), the effect of career concerns is smaller the lower is the uncertainty about the ability of the agents. In this model, as the variance of the prior on the attorneys' talent decreases, so does the equilibrium effort. Therefore, reputational incentives are stronger the less precise is the market's initial information about the attorneys' talents.

Asymmetric career concerns

Assume now that AP and AD have career concerns measured by β_P and β_D , respectively, where $\beta_P > \beta_D$. Then the equilibrium levels of effort, e_P^* and e_D^* , must satisfy:

$$e_P^* \left(c - \frac{\beta_P \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right) = \frac{W\mu}{2}, \quad (25)$$

$$e_D^* \left(c - \frac{\beta_D \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right) = \frac{W\mu}{2}. \quad (26)$$

Therefore, since $\beta_P > \beta_D$ it must be that $e_P^* > e_D^*$ in any possible equilibrium³⁹, since the expression in parentheses is smaller in the first equation. Similarly, for $\beta_P < \beta_D$ it must be that $e_P^* < e_D^*$ in equilibrium. Put differently, the attorney with higher career concerns exerts more effort in equilibrium.

Furthermore, it can be shown that a change in β for one of the attorneys affects the level of effort of the other attorney even when her own β remains unchanged. To see this, let the initial attorneys' equilibrium effort levels be e^* as in equation (9), where career concerns are $\beta_P = \beta_D = \beta$. Now suppose that β_P increases while β_D remains equal to β , let e_P^* and e_D^* denote the new equilibrium effort levels in this case. As was shown at the beginning of this subsection, whenever $\beta_P > \beta_D$ then the equilibrium effort level of AP is greater than the equilibrium effort level of AD (i.e., $e_P^* > e_D^*$). In order to compare these new equilibrium effort levels with the initial equilibrium, notice that e_D^* and e^* must satisfy equation (11) and (9), respectively. Thus:

$$e_D^* \left(c - \frac{\beta_D \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right) = e^* (c - \beta \mu \sigma^2),$$

where since $\beta_D = \beta$, it must be that $e_D^* > e^*$ since (given the domains defined for effort and talent) $1 - \mu^2 (e_D^* - e_P^*)^2 \in (0, 1]$. Therefore, an increase in AP 's career concerns induces AD to increase her equilibrium effort level.

In addition, notice that e_P^* and e^* must satisfy equations (10) and (9), respectively. Thus:

$$e_P^* \left(c - \frac{\beta_P \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right) = e^* (c - \beta \mu \sigma^2),$$

where $e_P^* > e^*$ since $\beta_P > \beta$ implies that the expression in parentheses in the left-hand side of the equation is larger than the one in the right-hand side. Therefore, when AP 's career concerns increase, AP 's new equilibrium effort level is higher than her initial equilibrium effort level and higher than AD 's new equilibrium effort level.

³⁹It may be that more than one pair (e_P^*, e_D^*) satisfies the conditions above.

An analogous result holds for an increase in β_D when β_P remains fixed. The following proposition and Figure 1 summarize these results.

Proposition 16 *Starting from $\beta_P = \beta_D = \beta$, an increase in β_i (holding β_j fixed) implies that both attorneys increase their effort but A_i increases more than A_j .*

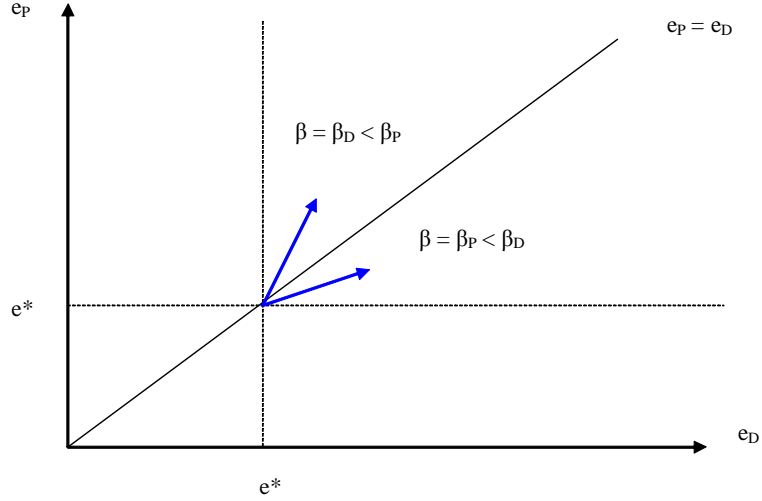


Figure 4: Equilibrium effort levels when increasing β_i while holding β_j fixed

Asymmetric costs

Assume now that the attorneys' costs functions differ such that $c_P < c_D$. The equilibrium effort levels, e_P^* and e_D^* , must satisfy:

$$e_P^* \left(c_P - \frac{\beta\mu\sigma^2}{1 - \mu^2(e_P^* - e_D^*)^2} \right) = \frac{W\mu}{2}, \quad (27)$$

$$e_D^* \left(c_D - \frac{\beta\mu\sigma^2}{1 - \mu^2(e_P^* - e_D^*)^2} \right) = \frac{W\mu}{2}. \quad (28)$$

Therefore, in any possible equilibrium⁴⁰ it must be that $e_P^* > e_D^*$. Because effort is less costly for AP , she exerts more effort than AD in equilibrium. Similarly, for c_P

⁴⁰It may be that more than one pair (e_P^*, e_D^*) satisfies the conditions above.

$> c_D$ it must be that $e_P^* < e_D^*$ in equilibrium. Thus, the attorney with higher costs exerts less effort in equilibrium.

Most importantly, following the same procedure as with asymmetric career concerns, it can be shown that when $\beta > 0$ a change in costs for one of the attorneys affects the level of effort of the other attorney even when her own costs remain unchanged. Notice that when the attorneys have no career concerns (i.e., $\beta = 0$), there are no interactions between the attorneys' choices of effort. More specifically, AP would exert a level of effort $W\mu/2c_P$ that is independent of the cost function of her opponent, while AD would choose a level of effort $W\mu/2c_D$.

In contrast, when $\beta > 0$ there are interactions between e_P^* and e_D^* . To see this, let the initial attorneys' equilibrium effort levels be e^* as in equation (9), where the attorneys' cost parameters are $c_P = c_D = c$. Now suppose that c_P decreases while c_D remains equal to c , let e_P^* and e_D^* denote the new equilibrium effort levels in this case. As shown above, because $c_P < c_D$ then the equilibrium effort level of AP is greater than the equilibrium effort level of AD (i.e., $e_P^* > e_D^*$). Hence, it is possible to compare these new equilibrium effort levels with the initial equilibrium. First, e_D^* and e^* must satisfy equations (13) and (9), respectively. Thus:

$$e_D^* \left(c - \frac{\beta\mu\sigma^2}{1 - \mu^2(e_P^* - e_D^*)^2} \right) = e^* (c - \beta\mu\sigma^2), \quad (29)$$

where it must be that $e_D^* > e^*$ since (given the domains defined for effort and talent) $1 - \mu^2(e_D^* - e_P^*)^2 \in (0, 1]$. That is, when AP 's cost of effort decreases (holding AD 's costs fixed), AD 's equilibrium effort level increases.

Second, notice that e_P^* and e^* must satisfy equations (12) and (9), respectively, which implies that:

$$e_P^* \left(c_P - \frac{\beta\mu\sigma^2}{1 - \mu^2(e_P^* - e_D^*)^2} \right) = e^* (c - \beta\mu\sigma^2), \quad (30)$$

where $e_P^* > e^*$ since $c_P < c$ implies that the expression in parentheses in the left-hand side of the equation is smaller than the one in the right-hand side. Therefore, when AP 's cost of effort decreases, AP 's new equilibrium effort level is higher than her initial equilibrium effort level and higher than AD 's new equilibrium effort level.

An analogous result holds for an increase in c_D when c_P remains fixed. The following proposition and Figure 2 summarize these results.

Proposition 17 *Starting from $c_P = c_D = c$, a decrease in c_i (holding c_j fixed) implies that, for $\beta > 0$, both attorneys increase their effort, but A_i increases more than A_j .*

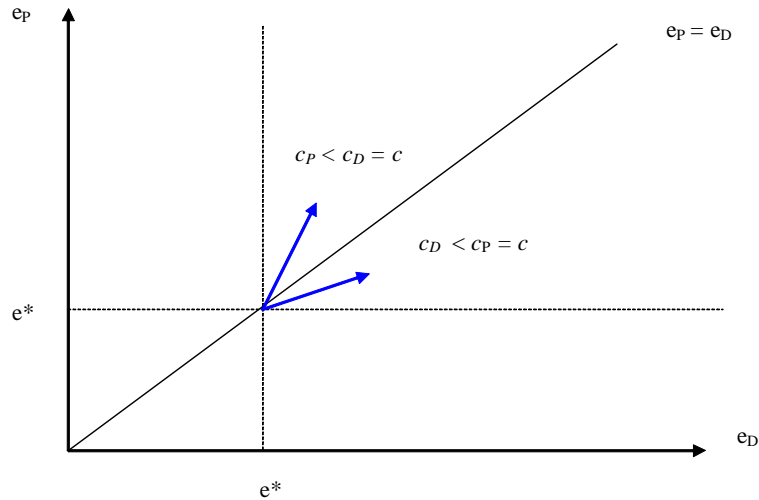


Figure 5: Equilibrium effort levels when decreasing c_i holding c_j fixed

Asymmetric priors

The priors on the attorneys' talents may be different due, for instance, to differences in the rank of the law school from which they graduated, or in past performance in Court. An important difference with respect to the symmetric case is that exerting more effort in court does not necessarily imply a higher expected probability of winning. In particular, for attorney i to have a higher expected probability of prevailing in court than attorney j , her effort level must be such that $e_i > e_j \mu_j / \mu_i$.

According to the first-order condition in equation (3), AP 's equilibrium effort level, e_P^* , must satisfy:

$$\frac{W\mu_P}{2} = e_P^* \left(c - \frac{\beta\mu_P\sigma_P^2}{1 - (\mu_P e_P^* - \mu_D e_D^*)^2} \right). \quad (31)$$

In order to ensure that in equilibrium $e_P^* \in (0, 1)$, I assume that $c > W\mu_P/2 + \beta\mu_P\sigma_P^2/(1 - (\mu_P - \mu_D e_D^*)^2)$ for all possible $e_D^* \in [0, 1]$. To ensure that this condition holds it is enough to assume that c is large enough.⁴¹ Notice that, as in the case of symmetric priors, $e_P^* = 0$ is never an optimal level of effort for AP .

Similarly, AD 's first-order condition for an interior solution is given by:

$$\frac{W\mu_D}{2} = e_D^* \left(c - \frac{\beta\mu_D\sigma_D^2}{1 - (e_P^*\mu_P - e_D^*\mu_D)^2} \right). \quad (32)$$

As in the case of AP , in order to ensure that in equilibrium $e_D^* \in (0, 1)$, I assume that $c > W\mu_D/2 + \beta\mu_D\sigma_D^2/(1 - (\mu_P e_P^* - \mu_D)^2)$ for all possible $e_D^* \in [0, 1]$. To ensure that this condition holds it is enough to assume that c is larger enough.⁴² Notice that, as in the case of symmetric priors, $e_D^* = 0$ is never an optimal level of effort for AD .

In equilibrium, AP 's and AD 's levels of effort must satisfy equations (16) and (17). Thus, they must satisfy:

$$\frac{e_P^*}{\mu_P} \left(c - \frac{\beta\mu_P\sigma_P^2}{1 - (\mu_P e_P^* - \mu_D e_D^*)^2} \right) = \frac{e_D^*}{\mu_D} \left(c - \frac{\beta\mu_D\sigma_D^2}{1 - (e_P^*\mu_P - e_D^*\mu_D)^2} \right).$$

To compare the equilibrium effort levels when the priors are asymmetric, I focus on one possible interesting case of asymmetric priors: attorneys having the same prior

⁴¹Specifically, $c - W\mu_P/2 > \text{Max} \{ \beta\mu_P\sigma_P^2/(1 - \mu_D^2), \beta\mu_P\sigma_P^2/1 - (\mu_P - \mu_D)^2 \}$. Under this parametric assumption, AP 's optimal level of effort is always an interior solution since the assumption ensures that $e_P^* < 1$.

⁴²Specifically, $c - W\mu_D/2 > \text{Max} \{ \beta\mu_D\sigma_D^2/(1 - \mu_D^2), \beta\mu_D\sigma_D^2/1 - (\mu_P - \mu_D)^2 \}$. Under this parametric assumption, AD 's optimal level of effort is always an interior solution since the assumption ensures that $e_D^* < 1$.

expected talent but different prior variance. This case arises if, for instance, there is more uncertainty over the talent of one of the lawyers because of shorter experience. As discussed previously, higher expected talent is associated with higher effort levels because of the complementarities between effort and talent. In order to focus only on the effects of differences in the prior variance, Proposition 4 and Figure 3 compare the equilibrium effort levels when assuming the same prior expected talent.

Proposition 18 *Let $\tau_i^l, \tau_i^h, \tau_j^l, \tau_j^h, \rho_i$ and ρ_j for $i, j \in \{P, D\}$ be such that $\mu_i = \mu_j$ and $\sigma_j < \sigma_i$. Then:*

- i) In equilibrium, the attorney with a higher prior variance exerts more effort in Court (i.e., $e_j^* < e_i^*$).*
- ii) Starting at $\mu_i = \mu_j = \mu$ and $\sigma_i^2 = \sigma_j^2 = \sigma$, an increase in σ_i^2 (holding σ_j^2 fixed) implies that both attorneys increase their effort but A_i increases more than A_j .*

Proof. See the Appendix ■

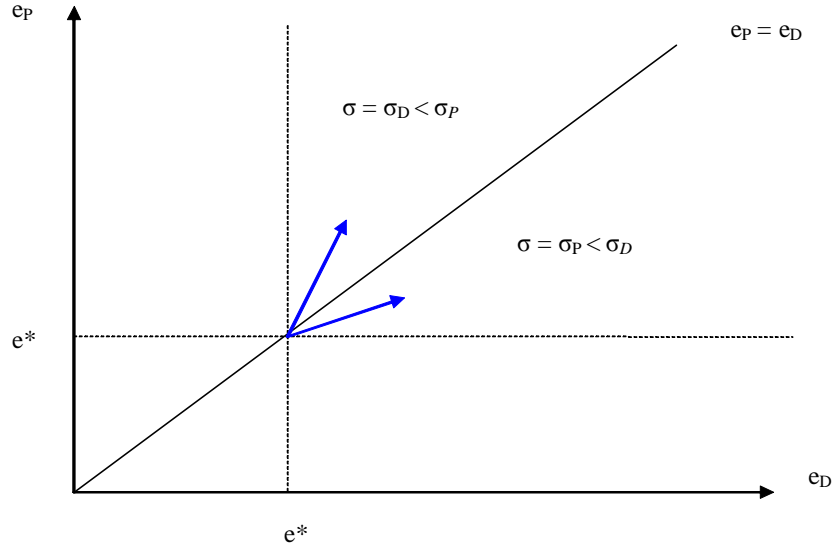


Figure 6: Equilibrium effort levels when increasing σ_i while holding μ and σ_j fixed. Intuitively, winning a case has a larger positive effect for the attorney with a higher prior variance because the market has greater uncertainty over her talent. Similarly,

losing a case has a larger negative effect. Thus, her incentives to exert more effort in Court are stronger.

Settlement

Considering the equilibrium effort levels in case of trial, it is possible to study the effects of career concerns on the settlement process. As usual in settlement bargaining models, the concession limits are increasing in the court costs. In this model the court costs depend on the equilibrium choice of effort, and thus are determined endogenously in the litigation stage. Thus, the settlement range depends on the attorneys' anticipated equilibrium choices of effort.

In this section I focus on the case in which settlement is not informative about the talent of the attorneys and thus has no effect on the priors of the litigation stage. For instance, this is the case when the kind of talent relevant for bargaining is different (and somehow uncorrelated) from the kind of talent relevant in the trial stage. Also, trials appear to be more informative about talent than settlement process because trials are usually complex procedures that test the attorneys' skills to a greater extent, and because many settlement agreements are sealed, in contrast with court judgments that are publicly available in general.

In other cases, settlement provides information about the attorneys' litigation talent. In particular, reaching a good settlement agreement might reveal that the attorney is talented. If the settlement agreement is sealed then the attorney would acquire private information about her talent and there would be asymmetric information in the litigation stage. Also, depending on whether a settlement agreement is reached or not, the market might also update its information about the attorneys' talents. Alternatively, if the agreement is publicly available, then the settlement outcome would be informative about the attorneys' talents and would affect the priors on the attorneys' talents. As a consequence, career concerns may affect the attorneys'

strategies in a similar way as in the litigation stage studied above. These cases are left for further research.

Settlement in the symmetric case

When the career concerns, the cost functions, and the priors of AP and AD are identical, the attorney's equilibrium effort levels in case of trial coincide. I continue to assume that the interests of the client and the attorney are aligned; thus, the choice of whether to settle or not is made by considering the combined payoff of each attorney and her client. Section 6 discusses a possible attorney-client misalignment of interests in the settlement stage.

Denote the market's inference of attorney i 's talent in case of settlement as $\hat{t}_i(\textit{settle}; e_P^*, e_D^*)$, $i = P, D$. Since settlement does not provide any additional information over the talent of the attorneys, $\hat{t}_i(\textit{settle}; e_P^*, e_D^*)$ is the *a priori* expected talent, μ . Notice that since attorneys have the same uncertainty over their talents as the market does, settlement decisions do not signal any information about the attorneys' talents either.

Therefore, AP settles as long as the payoff from settlement, S , is at least as large as the *ex ante* expected combined payoff from going to trial. That is, if it satisfies:

$$S + \beta \cdot \hat{t}_P(\textit{settle}; e_P^*, e_D^*) \geq \frac{W}{2} - \frac{ce^{*2}}{2} + \beta E_{t,z} \{ \hat{t}_P(z; e_P^*, e_D^*) \},$$

which is equivalent to:

$$S + \beta\mu \geq \frac{W}{2} - \frac{ce^{*2}}{2} + \beta\mu.$$

Thus, career concerns affect the settlement constraint only through their effect on the effort choice.

Similarly, AD settles as long as the settlement amount, S , is at most what she

expects to lose from going to trial. That is:

$$S + \beta \cdot \hat{t}_D(\text{settle}; e_P^*, e_D^*) \leq \frac{W}{2} + \frac{ce^{*2}}{2} - \beta E_{t,z}\{\hat{t}_P(z; e_P^*, e_D^*),$$

which is equivalent to:

$$S + \beta\mu \leq \frac{W}{2} + \frac{ce^{*2}}{2} - \beta\mu.$$

Therefore, the settlement range is given by:

$$S \in \left[\frac{W}{2} - \frac{ce^{*2}}{2}, \frac{W}{2} + \frac{ce^{*2}}{2} \right].$$

Since e^* is increasing in β , stronger career concerns of the attorneys lead to larger trial costs. As a consequence, stronger career concerns result in a larger scope for settlement. In other words, because career concerns provide incentives to be more aggressive at the trial stage, the gains from settlement, ce^{*2} , are increasing in the strength of the attorneys' career concerns. Thus, career concerns (as modeled here) do not make the attorneys uniformly (i.e., in all the stages of the legal dispute) more aggressive.

Settlement with asymmetric career concerns

Suppose as in Section 3.4 that $\beta_P \neq \beta_D$. Then in case of trial, the attorneys' equilibrium levels of effort differ from each other; that is, $e_P^* \neq e_D^*$. Consequently, the attorneys no longer have the same expected probability of prevailing in Court and the costs of going to trial also differ.

As in the symmetric case, the market's inference after settlement is also the *a priori* expected talent, μ . Thus, career concerns affect settlement decisions again only through their effect on the effort choice.

AP settles as long as the payoff from settlement, S , is at least as large as the

expected combined payoff from going to trial. That is:

$$S \geq AP's \text{ concession limit} \equiv W \cdot E_t\{\Phi^*\} - \frac{c(e_P^*)^2}{2}. \quad (33)$$

Similarly, AD settles as long as the settlement amount, S , is at most what she expects to lose from going to trial:

$$S \leq AD's \text{ concession limit} \equiv W \cdot E_t\{\Phi^*\} + \frac{c(e_D^*)^2}{2}. \quad (34)$$

Therefore, the settlement range is now given by:

$$S \in \left[\frac{W}{2}(1 + \mu(e_P^* - e_D^*)) - \frac{c(e_P^*)^2}{2}, \frac{W}{2}(1 + \mu(e_P^* - e_D^*)) + \frac{c(e_D^*)^2}{2} \right]. \quad (35)$$

An increase in the career concerns of one of the attorneys affects the settlement range because the equilibrium levels of effort change, and hence so do the trial costs. For instance, recall from Section 3.4 that if AP 's career concerns increase such that $\beta_P > \beta_D = \beta$, then $e_P^* > e_D^* > e^*$. As a consequence, AD 's concession limit increases not only because her expected probability of prevailing in Court decreases but also because her anticipated trials costs are larger. Notice that this is true even though AD 's career concerns remain fixed, as shown in Proposition 2.

More generally, if an attorney Ai 's career concerns increase (holding β_j fixed) such that $\beta_i > \beta_j$, then Aj 's equilibrium level of effort increases but her expected probability of prevailing in Court decreases. Consequently, an increase in Ai 's career concerns affects Aj 's concession limit. On the other hand, Ai 's expected probability of prevailing in Court is larger than in the symmetric case because now $e_i^* > e_j^*$, as shown in Proposition 2. However, i 's trial costs also increase when β_i increases. Therefore, the effect on Ai 's concession limit is ambiguous. The following proposition summarizes these results.

Proposition 19 *Starting from $\beta_P = \beta_D = \beta$:*

i) An increase in β_P (holding β_D fixed) implies that AD's concession limit increases, while the effect on AP's concession limit is ambiguous.

ii) An increase in β_D (holding β_P fixed) implies that AP's concession limit decreases, while the effect on AD's concession limit is ambiguous.

Settlement with asymmetric costs

Suppose as in Section 3.5 that $c_P \neq c_D$. Then in case of trial, the attorneys' equilibrium levels of effort differ from each other; that is, $e_P^* \neq e_D^*$. Hence, the attorneys no longer have the same expected probability of prevailing in Court.

Since the cost parameters are common knowledge, the market's inference after settlement is also the *a priori* expected talent, μ . Therefore, changes in the settlement decisions arise due only to the changes created in the effort levels. Also, the attorneys' *ex ante* expectation of the market's inference about their talent is the average talent, μ , both in case of settlement and in case of trial.

The attorneys' concession limits and settlement range are again given by expressions (18), (19) and (20). Using the results in Proposition 3, if an attorney A_i 's cost parameter c_i decreases (holding c_j fixed) such that $c_i < c_j$, then A_j 's equilibrium effort level increases but her expected probability of prevailing in Court decreases. Consequently, an increase in A_i 's career concerns affects A_j 's concession limit. With respect to A_i , her expected probability of prevailing in Court is larger than in the symmetric because now $e_i^* > e_j^*$. However, i 's trial costs also increase since e_i^* increases when c_i decreases. Therefore, the effect on A_i 's concession limit is ambiguous. The following proposition summarizes these findings.

Proposition 20 *Starting from $c_P = c_D = c$:*

i) A decrease in c_P (holding c_D fixed) implies that AD's concession limit increases, while the effect on AP's concession limit is ambiguous.

ii) A decrease in c_D (holding c_P fixed) implies that AP 's concession limit decreases, while the effect on AD 's concession limit is ambiguous.

Settlement with asymmetric priors

When the priors on the attorneys' talents differ, the equilibrium effort levels, and therefore the settlement stage, are affected. Given the attorneys' concessions limits and settlement range in expressions (18), (19) and (20), Proposition 4 implies that an increase in the prior variance of one of the attorneys increases the scope of settlement. More specifically, when the priors are such that $\mu_P = \mu_D$ and $\sigma_P > \sigma_D$, AP exerts more effort in equilibrium (i.e., $e_P^* > e_D^*$), and has a higher expected probability of prevailing in court than AD . Also, Proposition 4 shows that AD 's effort level is larger than in the symmetric case. Thus, AD 's concession limit increases because when facing an attorney with a larger σ_P , her probability of prevailing in Court decreases and her anticipated trial costs increase. On the other hand, the effect on AP 's equilibrium level of effort is ambiguous since her expected probability of prevailing in Court is larger than in the symmetric, because now $e_P^* > e_D^*$, as shown in Proposition 4, but her trial costs also increase. The analogous result can be shown for an increase in σ_D . The following proposition summarizes these results.

Proposition 21 *Starting from $\sigma_P = \sigma_D = \sigma$:*

i) *An increase in σ_P (holding σ_D , μ_P and μ_D fixed) implies that AD 's concession limit increases, while the effect on AP 's concession limit is ambiguous.*

ii) *An increase in σ_D (holding σ_P , μ_P and μ_D fixed) implies that AP 's concession limit decreases, while the effect on AD 's concession limit is ambiguous.*

The outcome of bargaining

Since there is symmetric information in the model, the parties always settle. That is, the parties never reach the trial stage because they agree on a settlement amount.

Within the settlement range, the settlement amount resulting from the bargaining stage depends on the bargaining power of the parties. Table 3 shows settlement outcomes using four possible bargaining solutions for both the case of symmetric and asymmetric career concerns.

In the first bargaining solution considered, AD has all the bargaining power. The outcome corresponds to a sequential game in which AD makes a take-or-leave-it-offer.⁴³ If AP rejects the offer the parties go to trial. Thus, AD offers a settlement amount S^* equal to AP 's concession limit, and AP accepts it.⁴⁴ Analogously, in the second bargaining solution considered AP has all the bargaining power. Thus, AP offers a settlement amount equal to AD 's concession limit, and AD accepts it.

In both of these cases, as shown in Table 3, an increase in the career concerns of the attorneys benefits the party that has all the bargaining power. Intuitively, such an increase leads to higher equilibrium effort levels, and thus to a larger surplus from settlement, which is fully captured by the party with all the bargaining power. By the same reasoning, the attorney with all the bargaining power benefits from an increase affecting only her career concerns. Specifically, when AD has all the bargaining power then $\beta_D > \beta_P$ (assuming that the attorneys have the same costs and average talent) implies that $S^* < W/2 - ce^{*2}/2$, which is the bargaining outcome when the attorneys have the same career concerns and AD has all the bargaining power. Similarly, when AP has all the bargaining power, then $\beta_P > \beta_D$ (assuming that the attorneys have the same costs and average talent) implies that $S^* > W/2 + ce^{*2}/2$, which is the bargaining outcome when both attorneys have the same career concerns and AP has all the bargaining power. Therefore, asymmetric career concerns reinforce the

⁴³This case is particularly relevant since, as shown by Schwartz and Wickelgren (2009), its outcome coincides with the outcome of an alternating-offer bargaining game with an indefinite number of possible offers and counter-offers. Intuitively, in such a game, the defendant has no interest in terminating the bargaining and she can always deter the plaintiff from doing so by making an offer equal to the plaintiff's outside option.

⁴⁴ AP is indifferent between accepting the offer and going to trial. I assume that AP accepts since otherwise AD could induce AP 's acceptance by increasing the offer slightly.

bargaining advantage in these cases.

TABLE 6: Outcome of the Settlement Bargaining Stage

Bargaining solution	Symmetric case		Asymmetric case
	S^*	Effect of $\uparrow \beta$	S^*
AD has all bargaining power	$\frac{W}{2} - \frac{ce^{*2}}{2}$	$S^* \downarrow$	$\frac{W}{2}(1 + \mu_P e_P^* - \mu_D e_D^*) - \frac{c_P e_P^{*2}}{2}$
AP has all bargaining power	$\frac{W}{2} + \frac{ce^{*2}}{2}$	$S^* \uparrow$	$\frac{W}{2}(1 + \mu_P e_P^* - \mu_D e_D^*) + \frac{c_D e_D^{*2}}{2}$
Nash Bargaining Solution	$\frac{W}{2}$	No effect	$\frac{W}{2}(1 + \mu_P e_P^* - \mu_D e_D^*) - \frac{1}{4}(c_P e_P^{*2} - c_D e_D^{*2})$
Random proposer with γ prob. that AP proposes	$\frac{W}{2} + ce^{*2}(\gamma - 1/2)$	$S^* \uparrow$ if $\gamma > 1/2$ $S^* \downarrow$ if $\gamma < 1/2$	$\frac{W}{2}(1 + \mu_P e_P^* - \mu_D e_D^*) - \frac{1}{2}((1 - \gamma)c_P e_P^{*2} - \gamma c_D e_D^{*2})$

However, asymmetric career have an ambiguous effect on the settlement amount when the attorney with stronger career concerns is the one with no bargaining power. Recall from Section 4.2 that the expected probability of prevailing in Court is larger for the attorney with stronger career concerns. A similar effect on the outcome of bargaining arises for asymmetric costs and asymmetric priors. Table 3 also reports the bargaining outcomes under the notion of Nash (1950)'s bargaining solution. As shown in the Table, an increase in the career concerns of the attorneys does not affect the settlement amount when both attorneys have the same career concerns. However, the settlement outcome does change when the attorneys have different career concerns. When increasing the career concerns of *AP* while *AD*'s career concerns

remain unchanged, then S^* increases and AP obtains a better outcome while AD is worse off.⁴⁵ Analogously, when increasing the career concerns of AD , then S^* decreases and AD obtains a better outcome while AP is worse off.⁴⁶ A similar effect on the outcome of bargaining arises for asymmetric costs and asymmetric priors.

In the last of the bargaining solutions considered in Table 3, the attorney making a take-it-or-leave-it offer is chosen randomly where γ represents the probability that AP is the proposer. As shown in the middle column of the Table, raising β increases i 's payoff if she is the attorney that is more likely to propose. However, if both attorneys are equally likely to propose (i.e., if $\gamma = 1/2$), then raising β has no effect on the settlement amount. Notice that the Nash bargaining outcome coincides with the outcome when both attorneys are equally likely to be the proposer (i.e., when $\gamma = 1/2$). Therefore, career concerns reinforce again the position of the party with larger bargaining power.

Modeling the trial outcome's sensitivity to the attorneys' performance

In this section I study how previous results are affected by the trial outcome's sensitivity to the performance of the attorneys. The sensitivity of the trial outcome might vary depending on the type of case, on the type of court that makes the decision, or on the type of legal system. For instance, verdicts from judges and verdicts from juries sometimes differ, as studied by previous research.⁴⁷ In my particular framework, it could be that juries are more sensitive to the skills of the attorneys (e.g., communication skills), while judges might focus more on the merits of the case. Similarly, the outcome of the trial in the adversarial system perhaps depends more on the talents of the attorneys while in the inquisitorial system the skills of the lawyers might not be as important. As argued by Glendon et al. (1982) in civil law countries

⁴⁵This is true except if β_P increases to the extent that $e_P^* + e_D^* > 2W\mu/c$.

⁴⁶This is true except if β_D increases to the extent that $e_P^* + e_D^* > 2W\mu/c$.

⁴⁷See Spier (2007) for an overview of some of the results.

"the judge may inject new theories, new legal and factual sides, thus reducing the disadvantage of the party with the less competent lawyer."

An interesting feature of the form assumed for Φ is that it is possible to parametrize the level of sensitivity, as noticed by Che and Gale (2000). Let the probability of AP prevailing in Court, Φ , take now the form:

$$\Phi(e_P, e_D, t_P, t_D) = \frac{1 + s(e_P t_P - e_D t_D)}{2}, \quad (36)$$

where s measures the sensitivity of the trial outcome to the difference in the attorneys' performance. When $s = 0$ the outcome of the trial is completely insensitive to the performance of the attorneys. In contrast, when s is large, a slightly better performance implies a large probability of winning the case. For simplicity in the analysis, I will restrict the sensitivity to be $s \in [0, 1]$. Notice that the results in previous sections correspond to the case where $s = 1$.

The expected probability of AP prevailing in Court is then given by:

$$E_t(\Phi(e_P, e_D^*, t_P, t_D)) = \frac{1}{2} + \frac{s(\mu_P e_P - \mu_D e_D)}{2},$$

where μ_P and μ_D are AP 's and AD 's a priori expected talents, respectively. Substituting this expected probability, it is possible to solve the maximization problems of AP and AD from Section 2. As shown in the Appendix, the difference between the market's inference about t_P in case of AP winning and in case of AP losing can be written as follows:

$$\hat{t}_P(AP \text{ wins}; e_P^*, e_D^*) - \hat{t}_P(AP \text{ loses}; e_P^*, e_D^*) = \frac{2s e_P^* \sigma_P^2}{1 - s^2 (\mu_P e_P^* - \mu_D e_D^*)^2}.$$

Similarly for t_D :

$$\hat{t}_D(AP \text{ loses}; e_P^*, e_D^*) - \hat{t}_D(AP \text{ wins}; e_P^*, e_D^*) = \frac{2se_D^*\sigma_D^2}{1 - s^2(e_P^*\mu_P - e_D^*\mu_D)^2}.$$

As shown in the following proposition, the effect of career concerns on the level of effort depends on the level of sensitivity.

Proposition 22 *Holding effort fixed, the more sensitive is the trial outcome to the performance of the attorneys, the more informative it is about the attorneys' talent. More specifically, $\hat{t}_P(AP \text{ wins}; e_P^*, e_D^*)$ and $\hat{t}_D(AP \text{ loses}; e_P^*, e_D^*)$ are increasing in s , while $\hat{t}_P(AP \text{ loses}; e_P^*, e_D^*)$ and $\hat{t}_D(AP \text{ wins}; e_P^*, e_D^*)$ are decreasing in s . Furthermore, when the trial's outcome is completely insensitive to the attorney's performance (i.e., $s = 0$), career concerns have no effect because the outcome of the trial is not informative about the talent of the attorneys.*

Proof. See the Appendix. ■

As a consequence, a more informative trial outcome amplifies the effect of career concerns on the choice of effort. For instance, when the prior of the attorneys' talent coincides and both attorneys have the same career concerns and cost functions, then:

$$e_P^* = e_D^* = \frac{Ws\mu/2}{c - \beta s^2\mu\sigma^2}.$$

Thus, effort levels are increasing in s . Notice that $\partial^2 e_i^* / \partial \beta \partial s > 0$. The effect of career concerns on effort is increasing in the trial outcome's sensitivity, s . As a consequence, the additional gains from settlement due to the effect of career concerns are also increasing in the level of sensitivity, s . Intuitively, the more sensitive is the trial outcome, the more aggressive are the attorneys in court.

**The effect of career concerns on the conflict of interest between the
plaintiff and her attorney**

As described in Dana and Spier (1993), “contingent fees are the most pervasive form of payment in personal injury and medical malpractice litigation.” As they also explain, contingent fees are rarely used by defendants. Contingent fees provide insufficient incentives for the attorney, whose optimal effort level is below the plaintiff’s aim (Polinsky and Rubinfeld, 2003). To examine the effect of career concerns on this misalignment of interests, I assume that AP is compensated through a contingent fee while the defendant has aligned interests with her client. The alignment of interests may arise if there is a repeated interaction between the defendant and her attorney. For instance, in a large number of cases, defendants are corporations with in-house lawyers or that have a long-term contractual relationship with a specific law firm.

Thus, I assume that AP is compensated only if she wins the trial and that AD has aligned interests with her client. For simplicity, I assume that the attorneys’ cost functions and the priors on their talents coincide. Denoting by $\alpha \in (0, 1]$ the exogenously-given⁴⁸ fraction of the Court award kept by AP , then AP chooses the level of effort in order to solve the following problem:

$$\max_{e_P \in [0,1]} \alpha W \cdot E_t(\Phi(e_P, e_D^*, t_P, t_D)) - \frac{ce_P^2}{2} + \beta_P \cdot \{E_t(\Phi(e_P, e_D^*, t_P, t_D)) \cdot \hat{t}_P(AP \text{ wins}; e_P^*, e_D^*) + E_t(1 - \Phi(e_P, e_D^*, t_P, t_D)) \cdot \hat{t}_P(AP \text{ loses}; e_P^*, e_D^*)\},$$

where e_P^* denotes the market’s conjecture about AP ’s equilibrium effort when she is compensated via a contingent fee, and e_D^* denotes AP ’s and the market’s conjecture about AD ’s equilibrium level of effort when AP is compensated via a contingent fee. Following the same procedure as in Section 3, the interior optimal level of effort, e_P^* ,

⁴⁸I consider α to be exogenous in the present stage of the game wherein attorneys are choosing effort levels. Solving by backwards induction allows me to endogeneize α if I introduce an initial contractual stage between AP and P , prior to the settlement stage. Notice that modeling the contractual stage requires having the results for the effort choice and for the settlement stage.

must then satisfy⁴⁹:

$$\frac{\alpha W \mu}{2} = e_P^* \left(c - \frac{\beta_P \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right). \quad (37)$$

Since AD 's interests are aligned with her clients' interests, then e_D^* satisfies the same condition as in Section 3:

$$\frac{W \mu}{2} = e_D^* \left(c - \frac{\beta_D \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right). \quad (38)$$

In any possible equilibrium⁵⁰ both conditions are satisfied which leads to:

$$\frac{e_P^*}{\alpha} \left(c - \frac{\beta_P \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right) = e_D^* \left(c - \frac{\beta_D \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right). \quad (39)$$

Notice that when AP has no career concerns (i.e., $\beta_P = 0$), then $e_P^* = \alpha W \mu / 2c$. This level of effort is a lower bound of e_P^* since for any $\beta > 0$, the expression in parentheses in equation (24) is smaller than c . Notice also that when AD has no career concerns (i.e., $\beta_D = 0$), then $e_D^* = W \mu / 2c$. When $\beta_P = \beta_D = 0$, there are no strategic interactions between the attorneys.

When $\beta_P = \beta_D$, then $e_P^* = \alpha e_D^*$. Intuitively, since AP is obtaining only a fraction α of the Court award, her incentives are lower than those of AD . Therefore, in equilibrium AD exerts higher effort than AP . As a consequence, the expected probability that AP prevails in Court is $E\{\Phi^*\} < 1/2$.

Alternatively, when $\beta_P > \beta_D$ then $e_P^* > \alpha e_D^*$. These has implications for the plaintiff's payoff, $(1 - \alpha)WE\{\Phi^*\}$, as shown in the following Proposition.

Proposition 23 *When AP is compensated through a contingent fee, and AD has aligned interests with her client (given everything else equal) and starting from $\beta_P =$*

⁴⁹In order to ensure that in equilibrium $e_P^* \in (0, 1)$, I assume that $c > \alpha W \mu / 2 + \beta_P \mu \sigma^2 / (1 - \mu^2)$. For the case of AD , I assume $c > \alpha W \mu / 2 + \beta_D \mu \sigma^2 / (1 - \mu^2)$ as in Section 3.

⁵⁰It may be that more than one pair (e_P^*, e_D^*) satisfies the conditions above.

$\beta_D = \beta$, an increase in β_P holding β_D fixed implies that:

i) AP 's equilibrium effort level, e_P^* , increases and AD 's equilibrium effort, e_D^* , decreases.

Thus, $E\{\Phi^*\}$ increases.

ii) The plaintiff's payoff increases.

Proof. See the Appendix. ■

Therefore, career concerns may help align the interests between the plaintiff and her client. However, the career concerns of the opposing lawyer matter. Moreover, a larger β_P increases the effort costs of the attorney and thus, it does not necessarily increase AP 's payoff. As a consequence, it could affect the misalignment of interests in settlement described in Miller (1987).

Misaligned interests in the settlement stage arise because an attorney compensated through a contingent fee pays all the costs in the event of trial. Thus, the concession limit of the attorney is lower than the concession limit of the plaintiff when the lawyer exerts a strictly positive level of effort. I assume for simplicity that the contingent fee is the same in case of settlement and in case of trial. Then, the plaintiff's concession limit is given by:

$$(1 - \alpha)S \geq (1 - \alpha)WE\{\Phi^*\}.$$

In contrast, AP is willing to accept the defendant's settlement offer as long as:

$$\alpha S \geq \alpha WE\{\Phi^*\} - \frac{c(e_P^*)^2}{2}.$$

Therefore AP 's concession limit is necessarily smaller than her client's concession limit when $e_P^* > 0$. More specifically, for any settlement offer:

$$S \in \left(WE\{\Phi^*\} - \frac{c(e_P^*)^2}{2\alpha}, WE\{\Phi^*\} \right),$$

AP is willing to accept S and avoid going to trial, while her client is better off by going to court.

Since stronger career concerns (i.e., larger β_P) implies that AP exerts more effort in equilibrium, this implies a larger range of settlement offers for which the interests of the attorney and her client are misaligned. Notice that the difference between P 's and AP 's concession limits is $c(e_P^*)^2/2\alpha$ which is increasing in AP 's effort level. Career concerns also affect the attorneys' effort and settlement decisions when they are compensated on an hourly fee basis and the clients cannot observe the attorneys' effort levels. This case can be modeled using a framework as in Garoupa and Gomez (2008).

Conclusion

As shown in this paper, when lawyers have career concerns, their equilibrium effort levels increase and strategic effects in their decisions arise. Moreover, stronger career concerns increase the surplus from settlement, affect the parties' concession limits and may affect the bargaining outcome. In particular, if a party has a larger bargaining power than the other party, stronger career concerns reinforce such advantage and lead to an even more beneficial settlement agreement. For instance, if the defendant has all the bargaining power (as shown by Schwartz and Wickelgren (2000) the outcome of this case coincides with the outcome of an alternating-offer bargaining game with an indefinite number of possible offers and counter-offers), hiring a lawyer with stronger career concerns than the plaintiff's lawyer may be beneficial for the defendant because it leads to a decrease in the settlement outcome.

This paper contributes to the career concerns literature by studying a model with two opposing agents where performance is determined by a contest success function. A lawyer is then not only affected by her own career concerns, but also by the career concerns of her opponent. Consequently, there are interesting interaction effects between the parties. For instance, hiring a lawyer with strong career concerns may

help align the interest between the plaintiff and her lawyer; however, such alignment depends on how strong are the career concerns relatively to the opposing lawyer.

Throughout the paper I have assumed that attorneys do not have private information about their own talents. This assumption is reasonable for inexperienced lawyers; however, lawyers obtain information about their capabilities as they gain experience. The analysis done in this paper could be extended to attorneys observing a private and noisy signal about their own talent. In addition, I have assumed that when two attorneys perform the same (in terms of the product of effort and talent), they are equally likely to win the trial. However, some cases have different merits than others. Career concerns may affect the type of case that attorneys accept. Being able to win a difficult case may enhance significantly the career of a lawyer. In addition, the negative impact of losing the case on the attorney's career may be small if the case was difficult. Therefore, the decision of whether to take a case or not may be more related to implicit career incentives (e.g., the prospect of earnings growth upon winning) than to explicit incentives (e.g., the expected compensation of the attorney). Finally, further analysis may examine the effect of career concerns on the contractual stage between attorneys and clients. In particular, it would be interesting to determine when stronger career concerns imply that the plaintiff's attorney is willing to accept a lower contingent fee.

Appendix

Derivation of the market's inference about t_P and t_D :

This part of the Appendix contains the derivation of the difference in market's inference about t_P and t_D . Following Bayes' rule, the market's inference about t_P when AP wins can be rewritten as:

$$\begin{aligned}
 \hat{t}_P(AP \text{ wins}; e_P^*, e_D^*) &= \tau_P^h \cdot \Pr\{\tau_P^h \mid AP \text{ wins}\} + \tau_P^l \cdot \Pr\{\tau_P^l \mid AP \text{ wins}\} = \\
 &= \frac{\tau_P^h \cdot \Pr\{AP \text{ wins} \mid \tau_P^h\} \Pr\{\tau_P^h\}}{\Pr\{AP \text{ wins}\}} + \frac{\tau_P^l \cdot \Pr\{AP \text{ wins} \mid \tau_P^l\} \Pr\{\tau_P^l\}}{\Pr\{AP \text{ wins}\}} \\
 &= \tau_P^h \cdot \frac{\rho_P E_{t_D}(\Phi(e_P^*, e_D^*, t_D; t_P = \tau_P^h))}{E_t(\Phi(e_P^*, e_D^*, t_P, t_D))} + \\
 &\quad + \tau_P^l \cdot \frac{(1 - \rho_P) E_{t_D}(\Phi(e_P^*, e_D^*, t_D; t_P = \tau_P^l))}{E_t(\Phi(e_P^*, e_D^*, t_P, t_D))} \\
 &= \frac{\mu_P - e_D^* \mu_P \mu_D + e_P^* \cdot \psi_P}{1 + (e_P^* \mu_P - e_D^* \mu_D)},
 \end{aligned}$$

where $\psi_P = \rho_P (\tau_P^h)^2 + (1 - \rho_P) (\tau_P^l)^2$.

Conversely, when AP loses:

$$\begin{aligned}
 \hat{t}_P(AP \text{ loses}; e_P^*, e_D^*) &= \tau_P^h \cdot \Pr\{\tau_P^h \mid AP \text{ loses}\} + \tau_P^l \cdot \Pr\{\tau_P^l \mid AP \text{ loses}\} = \\
 &= \frac{\tau_P^h \cdot \Pr\{AP \text{ loses} \mid \tau_P^h\} \Pr\{\tau_P^h\}}{\Pr\{AP \text{ loses}\}} + \frac{\tau_P^l \cdot \Pr\{AP \text{ loses} \mid \tau_P^l\} \Pr\{\tau_P^l\}}{\Pr\{AP \text{ loses}\}} \\
 &= \tau_P^h \cdot \frac{\rho_P (1 - E_{t_D}(\Phi(e_P^*, e_D^*, t_D; t_P = \tau_P^h)))}{(1 - E_t(\Phi(e_P^*, e_D^*, t_P, t_D)))} + \\
 &\quad + \tau_P^l \cdot \frac{(1 - \rho_P) (1 - E_{t_D}(\Phi(e_P^*, e_D^*, t_D; t_P = \tau_P^l)))}{(1 - E_t(\Phi(e_P^*, e_D^*, t_P, t_D)))} \\
 &= \frac{\mu_P + e_D^* \mu_P \mu_D - e_P^* \cdot \psi_P}{1 - (e_P^* \mu_P - e_D^* \mu_D)}.
 \end{aligned}$$

Therefore, letting $e_P^* \mu_P - e_D^* \mu_D$ be K :

$$\hat{t}_P(AP \text{ wins}; e_P^*, e_D^*) - \hat{t}_P(AP \text{ loses}; e_P^*, e_D^*) =$$

$$\begin{aligned}
&= \frac{\mu_P - e_D^* \mu_P \mu_D + e_P^* \cdot \psi_P - K(\mu_P - e_D^* \mu_P \mu_D + e_P^* \cdot \psi_P)}{(1+K) \cdot (1-K)} + \\
&+ \frac{-\mu_P - e_D^* \mu_P \mu_D + e_P^* \cdot \psi_P - K(\mu_P + e_D^* \mu_P \mu_D - e_P^* \cdot \psi_P)}{(1+K) \cdot (1-K)} \\
&= \frac{2e_P^* \cdot \psi_P - 2e_D^* \mu_P \mu_D - 2K\mu_P}{1-K^2} = \\
&= \frac{2e_P^* \cdot \psi_P - 2e_D^* \mu_P \mu_D - 2\mu_P(e_P^* \mu_P - e_D^* \mu_D)}{1 - (e_P^* \mu_P - e_D^* \mu_D)^2} = \\
&= \frac{2e_P^*(\psi_P - \mu_P^2)}{1 - (e_P^* \mu_P - e_D^* \mu_D)^2} = \frac{2e_P^* \sigma_P^2}{1 - (e_P^* \mu_P - e_D^* \mu_D)^2}.
\end{aligned}$$

Regarding the defendant's attorney, the market's inference about t_D when AP loses can be rewritten as:

$$\begin{aligned}
\hat{t}_D(AP \text{ loses}; e_P^*, e_D^*) &= \tau_D^h \cdot \Pr\{\tau_D^h \mid AP \text{ loses}\} + \tau_D^l \cdot \Pr\{\tau_D^l \mid AP \text{ loses}\} = \\
&= \tau_D^h \cdot \frac{\rho_D(1 - E_{t_P}(\Phi(e_P^*, e_D^*, t_P; t_D = \tau_D^h)))}{(1 - E_t(\Phi(e_P^*, e_D^*, t_P, t_D)))} + \\
&+ \tau_D^l \cdot \frac{(1 - \rho_D)(1 - E_{t_P}(\Phi(e_P^*, e_D^*, t_P; t_D = \tau_D^l)))}{(1 - E_t(\Phi(e_P^*, e_D^*, t_P, t_D)))} = \\
&= \frac{\mu_D - e_P^* \mu_P \mu_D + e_D^* \cdot \psi_D}{1 - (e_P^* \mu_P - e_D^* \mu_D)}.
\end{aligned}$$

where $\psi_D = \rho_D(\tau_D^h)^2 + (1 - \rho_D)(\tau_D^l)^2$.

Conversely, when AP wins:

$$\begin{aligned}
\hat{t}_D(AP \text{ wins}; e_P^*, e_D^*) &= \tau_D^h \cdot \Pr\{\tau_D^h \mid AP \text{ wins}\} + \tau_D^l \cdot \Pr\{\tau_D^l \mid AP \text{ wins}\} = \\
&= \tau_D^h \cdot \frac{\rho_D \cdot E_{t_P}(\Phi(e_P^*, e_D^*, t_P; t_D = \tau_D^h))}{E_t(\Phi(e_P^*, e_D^*, t_P, t_D))} + \\
&+ \tau_D^l \cdot \frac{(1 - \rho_D) E_{t_P}(\Phi(e_P^*, e_D^*, t_P; t_D = \tau_D^l))}{E_t(\Phi(e_P^*, e_D^*, t_P, t_D))} = \\
&= \frac{\mu_D + e_P^* \mu_P \mu_D - e_D^* \cdot \psi_D}{1 + (e_P^* \mu_P - e_D^* \mu_D)}.
\end{aligned}$$

Therefore, again letting $e_P^* \mu_P - e_D^* \mu_D$ be K :

$$\begin{aligned}
& \hat{t}_D(AP \text{ loses}; e_P^*, e_D^*) - \hat{t}_D(AP \text{ wins}; e_P^*, e_D^*) = \\
&= \frac{\mu_D - e_P^* \mu_P \mu_D + e_D^* \cdot \psi_D + K(\mu_D - e_P^* \mu_P \mu_D + e_D^* \cdot \psi_D)}{(1+K) \cdot (1-K)} + \\
&+ \frac{-\mu_D - e_P^* \mu_P \mu_D + e_D^* \cdot \psi_D + K(\mu_D + e_P^* \mu_P \mu_D - e_D^* \cdot \psi_D)}{(1+K) \cdot (1-K)} \\
&= \frac{e_D^* \cdot \psi_D - 2e_P^* \mu_P \mu_D + 2\mu_D(e_P^* \mu_P - e_D^* \mu_D)}{1-K^2} = \\
&= \frac{2e_D^*(\psi_D - \mu_D^2)}{1 - (e_P^* \mu_P - e_D^* \mu_D)^2} = \frac{2e_D^* \sigma_D^2}{1 - (e_P^* \mu_P - e_D^* \mu_D)^2}.
\end{aligned}$$

Proof of Proposition 4:

To compare the equilibrium effort levels in the case of asymmetric priors with the equilibrium effort levels of the symmetric case, I will denote the former as e_i^* and e_j^* , while e^* denotes the latter.

i) Since $\mu_i = \mu_j$, then:

$$\frac{W\mu}{2} = e_j^* \left(c - \frac{\beta\mu\sigma_j^2}{1 - \mu^2(e_P^* - e_D^*)^2} \right) = e_j^* \left(c - \frac{\beta\mu\sigma_i^2}{1 - \mu^2(e_P^* - e_D^*)^2} \right).$$

Thus, $\beta\mu\sigma_j^2 < \beta\mu\sigma_i^2$ implies that $e_j^* < e_i^*$.

ii) Comparing the first-order conditions of the asymmetric priors case with the first-order conditions of the symmetric case for j :

$$\frac{W\mu}{2} = e_j^* \left(c - \frac{\beta\mu\sigma^2}{1 - \mu^2(e_P^* - e_D^*)^2} \right) = e^* (c - \beta\mu\sigma^2).$$

Thus, $e_j^* > e^*$. Since $e_j^* < e_i^*$ as shown in part i), then $e^* < e_i^*$.

Derivation of the market's inference about t_P and t_D given a level of sensitivity s :

This part of the Appendix contains the derivation of the difference in the market's inference about t_P and t_D considering the sensitivity of the trial's outcome to the performance of the attorneys, s . Letting ε_i denote se_i , then Φ takes the form:

$$\Phi(e_P, e_D, t_P, t_D) = \frac{1 + \varepsilon_P t_P - \varepsilon_D t_D}{2},$$

which is equivalent to the form used above to compute the market's inference about t_P and t_D when $s = 1$. Thus

$$\begin{aligned} & \hat{t}_P(AP \text{ wins}; e_P^*, e_D^*) - \hat{t}_P(AP \text{ loses}; e_P^*, e_D^*) = \\ &= \frac{2\varepsilon_P^* \sigma_P^2}{1 - (\varepsilon_P^* \mu_P - \varepsilon_D^* \mu_D)^2} = \frac{2se_P^* \sigma_P^2}{1 - s^2(e_P^* \mu_P - e_D^* \mu_D)^2}, \end{aligned}$$

and similarly:

$$\begin{aligned} & \hat{t}_D(AP \text{ loses}; e_P^*, e_D^*) - \hat{t}_D(AP \text{ wins}; e_P^*, e_D^*) = \\ &= \frac{2\varepsilon_D^* \sigma_D^2}{1 - (\varepsilon_P^* \mu_P - \varepsilon_D^* \mu_D)^2} = \frac{2se_D^* \sigma_D^2}{1 - s^2(e_P^* \mu_P - e_D^* \mu_D)^2}. \end{aligned}$$

Proof of Proposition 8:

Using the expressions found above in Case 3 for $\hat{t}_P(AP \text{ wins}; e_P^*, e_D^*)$, $\hat{t}_P(AP \text{ loses}; e_P^*, e_D^*)$, $\hat{t}_D(AP \text{ wins}; e_P^*, e_D^*)$, and $\hat{t}_D(AP \text{ loses}; e_P^*, e_D^*)$, the derivatives with respect to s are:

$$\frac{\partial \hat{t}_P(AP \text{ wins}; e_P^*, e_D^*)}{\partial s} = \frac{e_P \sigma_P^2}{(1 + s(e_P \mu_P - e_D \mu_D))^2} > 0;$$

$$\begin{aligned}\frac{\partial \hat{t}_P(AP \text{ loses}; e_P^*, e_D^*)}{\partial s} &= \frac{-e_P \sigma_P^2}{(1 - s(e_P \mu_P - e_D \mu_D))^2} < 0 \\ \frac{\partial \hat{t}_D(AP \text{ wins}; e_P^*, e_D^*)}{\partial s} &= \frac{-e_D \sigma_D^2}{(1 + s(e_P \mu_P - e_D \mu_D))^2} < 0 \\ \frac{\partial \hat{t}_D(AP \text{ loses}; e_P^*, e_D^*)}{\partial s} &= \frac{e_D \sigma_D^2}{(1 - s(e_P \mu_P - e_D \mu_D))^2} > 0\end{aligned}$$

Finally, when $s = 0$, then career concerns have no effect because $\hat{t}_P(AP \text{ wins}; e_P^*, e_D^*) - \hat{t}_P(AP \text{ loses}; e_P^*, e_D^*) = \hat{t}_D(AP \text{ loses}; e_P^*, e_D^*) - \hat{t}_D(AP \text{ wins}; e_P^*, e_D^*) = 0$.

Proof of Proposition 9:

i) First, if $\beta_P > \beta_D$ it must be that $e_P^* > \alpha e_D^*$. Notice that $e_P^* = \alpha e_D^*$ is not possible as it can be shown by contradiction. If it was possible then:

$$\frac{e_P^*}{\alpha} \left(c - \frac{\beta_P \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right) = e_D^* \left(c - \frac{\beta_P \mu \sigma^2}{1 - \mu^2 (e_D^* (\alpha - 1))^2} \right).$$

But then:

$$e_D^* \left(c - \frac{\beta_P \mu \sigma^2}{1 - \mu^2 (e_D^* (\alpha - 1))^2} \right) > e_D^* \left(c - \frac{\beta_D \mu \sigma^2}{1 - \mu^2 (e_D^* (\alpha - 1))^2} \right),$$

which contradicts equation (26). Similarly, if $e_P^* < \alpha e_D^*$ then again for $\beta_P > \beta_D$:

$$\frac{e_P^*}{\alpha} \left(c - \frac{\beta_P \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right) < e_D^* \left(c - \frac{\beta_P \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right),$$

which would also contradict equation (26).

Therefore, if β_P increases above β_D , then $(e_P^* - e_D^*)^2$ decreases. Hence, since β_D remains fixed it must be that e_D^* decreases in order to satisfy:

$$\frac{W\mu}{2} = e_D^* \left(c - \frac{\beta_D \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right).$$

In addition, e_P^* must increase in order to satisfy:

$$\frac{\alpha W \mu}{2} = e_P^* \left(c - \frac{\beta_P \mu \sigma^2}{1 - \mu^2 (e_P^* - e_D^*)^2} \right),$$

given that $(e_P^* - e_D^*)^2$ decreases and β_P increases.

ii) The plaintiff's payoff is given by:

$$(1 - \alpha) W E\{\Phi^*\} = (1 - \alpha) W \left(\frac{1}{2} + \frac{\mu(e_P^* - e_D^*)}{2} \right).$$

Thus, increase in β_P holding β_D , increases $E\{\Phi^*\}$ and the plaintiff's payoff.

CHAPTER IV

OVERWORKING TO WIN THE CASE: REPRESENTING CASES IN COURT AND YOUNG LAWYERS' HOURS OF WORK

Introduction

Lawyers are among the highest paid professionals but they also work more hours than the average college graduate (Rosen, 1992). It is common for lawyers to be blamed for the high cost of litigation and, in fact, lawyers' long hours of work could be a possible source of the problem. However, it may be that trials trap lawyers into working longer hours because of the effect of winning or losing a case on their reputation. This effect may be particularly true for young lawyers because there is more uncertainty about their skills and thus they have more to win or lose from a case in terms of reputation.

This paper uses confidential survey data on young lawyers' weekly hours to determine whether representing cases in court creates additional incentives for lawyers to work more hours. I separate the representative sample of young lawyers working in US law firms into those representing cases in court (treatment group) and those who are not (control group). I study differences in the number of hours worked of these two groups. Differences between these two groups could be due to the law firms assigning court cases to lawyers that are willing to work more hours, for instance to those with a lower disutility of work. Hence, I also test whether lawyers representing cases in court also work significantly more hours than what is expected from them. This allows me to control for some unobservable heterogeneities that may affect the job assignment, such as a taste for leisure.

Theoretical results in Ferrer (2009a) show that the equilibrium effort level in court is increasing in lawyers' career concerns and in the uncertainty about their talent. Intuitively, the market will infer that lawyers winning cases are talented lawyers

and hence their prospective earnings will increase. Thus, lawyers with strong career concerns will work more hours attempting to affect the market's belief about their talent.

To test this hypothesis, I focus on survey data of lawyers that passed the bar examination two years prior to responding to the survey. I find that lawyers representing cases in court work significantly more than the rest of lawyers working in law firms. This result is robust when estimating alternative possible specifications. Moreover, the results suggest that lawyers representing cases in court work more hours due to incentive effects rather than due to selection effects.

There are several reasons why I focus on young lawyers. First, career concerns are expected to be stronger for young lawyers. Second, I want to test whether lawyers work more hours even when there is no signaling or screening involved. Young lawyers are likely to have as much uncertainty about their talent as the market does, and thus, there is little room for private information.

The next subsection discusses related research. Section 2 describes the data and relevant theoretical results. Section 3 presents the estimation methodology. Sections 4 and 5 present the results and robustness tests. Finally, Section 6 concludes.

Related literature

The legal profession has attracted researchers' attention for a number of reasons such as studying the gender gap in lawyers' wages (Wood et al., 1993, Noonan et al., 2008), studying lawyers' job mobility (Sauer, 1998), determining the effect of beauty on their earnings (Biddle and Hamermesh, 1998) or providing a rationale for law firms' specific promotion rules (O'Flaherty and Siow, 1995). However, relatively little has been written about the labor supply of lawyers.⁵¹ In particular, to my knowledge

⁵¹To my knowledge, the only exception is a short section in the study of the legal industry during the period 1967-1987 by Rosen (1992). The main finding related to hours of work is that the variation of lawyers' earnings along a life-cycle pattern is considerably larger than the variation of hours of work in such pattern.

there have been no studies that explore the effect of representing cases in court on lawyers' hours of work.

The most related paper to mine is Landers et al. (1996), which finds that lawyers prefer a decrease in the hours of work to a commensurate increase in the salary. They asked lawyers of two major law firms in the United States to decide between three hypothetical changes in their current income and work hours. The results show that almost two thirds of the associate lawyers in the sample were interested in decreasing their hours of work. Specifically, 65.1 percent chose a decrease in their work hours while keeping the same income. In contrast, only 25.56 percent preferred to keep their hours of work unchanged and have an increase of 5 percent in their income. Finally, only 9.02 percent chose an increase of 5 percent in hours and 10 percent in income. The authors conclude that law firms are "organizational settings in which professionals employees are required to work inefficiently long hours." Their argument is that law firms induce lawyers to overwork as a screening device.⁵² Lawyers in their model have private information on the taste for leisure. In contrast, I argue that lawyers overwork due to an incentive effect rather than to a selection effect.

This paper is also related to the empirical literature on contract incentives (for a survey see Chiappori and Salanié, 2002). For instance, Paarsch and Shearer (2000) compare the productivities of workers at a tree-planting firm under two different compensation systems: fixed rate and piece rate. In contrast, this paper focuses on incentive effects that arise due to the career concerns of the attorneys instead of due to a specific contract or form of compensation. However, as in these papers, my objective is to separate the incentive effect from possible selection effects.

⁵²Akerloff (1976) was the first to use a screening model to explain overwork.

Finally, I use average treatment effect estimation to measure the effect of representing cases in court. Thus, the literature on treatment effects is closely related (see for instance, Heckman et al., 1999), although it is generally used to estimate the effects of policies, education or training programs on individuals' behavior.

Career concerns and data characteristics

Implications from the theoretical analysis of career concerns

In a seminal article, Holmström (1982, 1999) shows that career concerns provide an implicit incentive that induces agents to exert more effort. However, the results also show that this incentive effect is smaller as the uncertainty about agents' skills decreases. Thus, in the case of trial lawyers, as they accumulate experience in court, the more the market learns about their performance. As a consequence, the market obtains more precise information and the uncertainty about the lawyers' skills decreases. Thus, the effect of career concerns is expected to be stronger for young lawyers.

In addition, in a model where two lawyers are facing each other in court, Ferrer (2009a) shows that career concerns create strategic interactions between the two lawyers which may amplify the implicit incentive effect. In particular, Ferrer shows that career concerns create an equilibrium effort trap for the two lawyers. Thus, there are two ways in which career concerns induce lawyers to provide more effort in court. First, since effort is unobservable, lawyers with career concerns attempt to manipulate the market's inference on their talent by working more hours. The results show that lawyers work more hours even though the market makes the correct inference on the attorneys' talents in equilibrium (i.e., even though the market cannot be fooled in equilibrium). Second, the effort level of a lawyer is affected by her opponent's career concerns. In particular, the model illustrates how the lawyer's equilibrium effort level increases when facing an opponent with stronger career concerns.

In contrast, information on performance is more diffuse for lawyers that do not represent cases in court. Lawyers writing contracts or providing legal advice to clients are evaluated in terms of more diverse and frequent outcomes. Thus, each of the tasks is very unlikely to have an effect on the lawyers' careers as relevant as the effect of the trial outcome for lawyers representing cases in court.

The data

The "After the JD Study" is a national confidential survey of law graduates. This study, sponsored by the American Bar Foundation (ABF), the National Association for Legal Placement (NALP), and other legal associations, tracks the professional careers of lawyers that passed the bar examination for the first time in 2000.⁵³ The first wave of the survey was obtained in 2002. The respondents in the sample are young lawyers from 18 different legal markets in the United States including the four largest markets, namely New York, Washington D.C., Chicago and Los Angeles.

A committee of social scientists designated by the ABF and the NALP selected a ten percent (approximately) representative sample of the roughly 40,000 lawyers that were accepted to the bar in 2000 in the United States. Among the lawyers in the sample of the "After the JD Study," I focus on those working full-time in law firms. I am excluding from the analysis those respondents that work part-time, for the government, or for non-profit sectors. This allows me to concentrate on those who may have stronger career concerns. The sample size of the respondents working full-time in law firms is 2282. Table 1 presents descriptive statistics of all lawyers working full-time while Table 2 reports the statistics of lawyers working in law firms. As explained below, I also excluded from both tables those lawyers who reported to be on vacation the week they were asked about hours of work. Variables *white*,

⁵³The sample is restricted to those who passed the bar examination for the first time in order for all the members of the cohort to have the same experience level. For instance, the sample excludes lawyers that retook the bar examination in 2000 to practice law in a different state than initially. For my analysis this restriction is useful because it ensures that all the lawyers in the sample are at an early stage of their careers.

NYDC, *female* and *femalewithkids* in Tables 1 and 2 are dummy variables. *NYDC* indicates which respondents work in the two largest legal markets, namely New York and Washington D.C.

TABLE 7 – DESCRIPTIVE STATISTICS OF LAWYERS IN THE AJD STUDY

Variable	Mean	Std. Dev.
Hours of work per week	50.19	11.86
Hours expected to work	46.53	8.80
Annual salary	86,094	50,156
Age	31.45	5.50
Female	.43	.49
Female with kids	.07	.26
NYDC	.18	.38
White	.70	.46

Source: “The After the JD Study”. Respondents working part-time or that were on vacation the week they were asked about hours of work have been excluded

Not surprisingly, Tables 1 and 2 illustrate that the average salary for lawyers working in law firms is \$12,000 above the average salary of the whole sample, even though the average number of working hours is not considerably larger. Although not shown in the table, the difference in salaries is even larger when comparing the median salary of each group. Differences with respect to gender, age and race between the two tables do not seem noteworthy. In both tables the average age is roughly 31, slightly above forty percent of the respondents are female, and around 16 percent of the female lawyers have kids.

TABLE 8 – DESCRIPTIVE STATISTICS OF LAWYERS IN LAW FIRMS

Variable	Mean	Std. Dev.
Hours of work per week	51.38	11.71
Hours expected to work	47.94	8.72
Annual salary	98,080	49,434
Court	.26	.44
Number lawyers in the firm	253.39	397.23
Number lawyers same office	90.76	128.28
Age	30.96	4.94
Female	.41	.49
Female with kids	.07	.25
NYDC	.17	.38
White	.72	.45

Source: “The After the JD Study”. Respondents working part-time or that were on vacation the week they were asked about hours of work have been excluded

The survey data provides information about the lawyers' salaries, hours of work, type and size of organization where they work, reported job satisfaction, and so on. My primary variable of interest is the lawyers' reported hours of work. The survey asked lawyers "*How many hours did you actually work last week, even if it was atypical?*" in order to obtain a more precise and sincere answer than if referring to an average number of hours per week. There was a space available for lawyers to fill out. Around 8 percent of the lawyers in the sample reported to be on vacation that specific week and thus reported zero hours of work. I exclude those individuals from the sample; however, the main results of the paper hold when I include them and identify them using a dummy variable.

Variable *court* in Table 2 is the variable that allows me to distinguish between lawyers frequently representing cases in court (treatment group) and those who do not (control group). This variable is constructed using question 16.e in the survey which asks "*Over the total legal matters you worked on over the past three months, on how many of them were you appearing in court as a first or second chair on a case?*" The emphasis on being "first or second chair" on a case is relevant. In order for career concerns to induce additional incentives, it is important that the name of the lawyer is associated to the case. In contrast, simply participating in discussions about a case or providing assistance does not seem as relevant for lawyers' reputation.

The possible responses to question 16.e were "none," "some," "half," "most," and "all." I consider that lawyers that answered "none" or "some" do not frequently represent cases in court and thus spend most of their time in other activities such as writing contracts, providing legal advice, etc. Therefore, *court* is a binary indicator that takes value one when respondents report "half", "most", "all" and zero otherwise. Section 4.3 discusses the robustness of the results to changes in the role of "half" and "some" in variable *court*. The treatment group consists of those respondents for which *court* = 1. The response of the median respondent was "some" while the mode was

"none." Around 25 percent of the respondents working in law firms responded "half", "most" or "all."

Finally, the data also contains information about the educational background of the lawyers. In particular, there is bracketed information of the ranking of the law school from where the lawyers graduated gathered in variable *reputschool* and based on U.S. news 2003 law schools' ranking) and bracketed information about their reported class rank and GPA during their law school education.

Estimation methodology

I use average treatment effect estimation to study the difference in hours of work between lawyers representing cases in court (treatment group) and the rest of lawyers working in law firms (control group). The estimate of the average treatment effect:

$$ATE \equiv E[\text{hours court lawyers} - \text{hours no court lawyers}],$$

will allow me to evaluate whether those representing cases in court have incentives to work more hours, as predicted by the theoretical analysis.

The standard regression analysis

The difference in sample means (also called difference in means estimator) would be an unbiased and consistent estimator of the average treatment effect if the assignment to represent cases in court was completely random (e.g., the outcome of flipping a coin). In the sample, I find that lawyers in the treatment group work on average two hours more than lawyers in the control group. That is:

$$E[\text{hours} \mid \text{court} = 1] - E[\text{hours} \mid \text{court} = 0] = 2.04.$$

However, if the assignment is based on lawyers' personal characteristics (which seems clearly more realistic) then the difference in sample means is not a valid estimator. If

these personal characteristics are observable in the data then it is possible to assume that hours of work of the treatment and hours of work of the control group are conditional mean independent of the value of *court* once we partial out the other regressors in the model. Specifically, this is the assumption known as ignorability of treatment:

$$ASS\ 1.a : E[hours\ court \mid x, court] = E[hours\ court \mid x],$$

$$ASS\ 1.b : E[hours\ no-court \mid x, court] = E[hours\ no-court \mid x],$$

where x is the vector of observed covariates in the model.

Denoting hours of work for no-court lawyers as $hours_0$, and hours of work for court lawyers as $hours_1$, then using a parametric regression method:

$$hours_0 = \mu_0 + v_0, \tag{40}$$

$$hours_1 = \mu_1 + v_1, \tag{41}$$

where $E[v_0] = 0$ and $E[v_1] = 0$.

Under ignorability of the treatment, then:

$$ATE = E[hours_1 - hours_0 \mid w, x] = E[hours_1 - hours_0 \mid x] = E[\mu_1 - \mu_0 \mid x] + E[v_1 - v_0 \mid x].$$

Thus:

$$Hours\ of\ work = \mu_0 + (\mu_1 - \mu_0)(court) + (v_1 - v_0)(court) + v_0.$$

If, in addition, $v_1 - v_0$ has zero conditional mean, then a valid estimate of the average treatment is the coefficient for the dummy variable *court*, $\mu_1 - \mu_0$, as discussed in Wooldridge (2002). Hence, I estimate the following standard regression model for

hours of work:

$$\text{Hours of work} = \mu_0 + \alpha \text{Court} + x\beta, \quad (42)$$

where α is the average treatment effect and the vector of observed covariates, x , includes the annual salary, the size of the firm and its square, the size of the lawyer's specific office, the lawyers' age and its square, variables for the lawyers' educational background and dummy variables for females with kids and for those lawyers working in New York City or Washington DC.

An alternative dependent variable to address selection problems

Assumptions 1.a and 1.b would not hold if the assignment to represent cases in court was done on the basis of characteristics not observable in the data. For instance, a potential problem would be if the law firms can distinguish lawyers by their taste for leisure and use this information for the job assignment. In such case, assumptions 1.a. and 1.b. would be violated because *court* would not be fully determined by the observable personal characteristics.

To address this problem of possible unobservable heterogeneities, I introduce an alternative dependent variable using the response to question 11.b in the survey "*How many hours are you expected to work during a typical week at your job?*" Subtracting the hours expected to work from the hours of work allows me to control for characteristics that are observable by the law firm but not available in the data. I call the resulting variable *hours beyond expected*.

Thus, the assumptions would then be:

$$\text{ASS 1.c: } E[\text{Hours beyond exp. court} \mid \mathbf{x}, \text{court}] = E[\text{Hours beyond exp. court} \mid \mathbf{x}],$$

$$\text{ASS 1.d: } E[\text{Hours beyond exp. no-court} \mid \mathbf{x}, \text{court}] = E[\text{Hours beyond exp. no-court} \mid \mathbf{x}],$$

Under these assumptions, I estimate the average treatment effect using the following specification:

$$\begin{aligned} \textit{Hours beyond expected} &\equiv \\ \textit{Hours of work} - \textit{Hours expected to work} &= \mu_0 + \gamma \textit{Court} + x\delta, \end{aligned} \quad (43)$$

where γ is the average treatment effect and where the vector of observed covariates, x , is the same as in the previous subsection.

This approach allows me address the problem of job assignments based on unobservable characteristics of the lawyers; however, it does not rule out the possibility of *court* being endogenous. In particular, it could be that the assignment of young lawyers to court is determined by hours of work rather than the other way around. However, this possibility seems unlikely considering two specific characteristics of the data. First, respondents were asked to report how many hours they had worked in the previous week, while *court* is constructed based on a question about legal matters on which they had worked in the past three months. Therefore, if lawyers representing cases in court had worked very hard prior to obtain the court assignment (i.e., to self-select themselves), this effect would not show in their answer to the question about their past week's hours of work. Second, lawyers in the sample have only two years of experience. It could be that the lawyers representing cases in court are very hardworking because being trial lawyers is a vocational choice for them. However, one would then expect them to have shown it during their recent graduate school education. That is, one would expect them to have a higher GPA or to have gone to a better ranked law school. In contrast, I find that *GPA* and *reputschool* are bad predictors of the lawyers' hours of work. Moreover, *GPA* and *reputschool* have negative coefficients (highly significant in the case of *GPA*) as explanatory variables for *court*.

Endogeneity of the annual salary

Salary is potentially endogenous in this regression since hours of work and the annual salary may be determined simultaneously. If *salary* is endogenous in equations (3) and (4), this could affect the estimate of *court*. Thus, I also estimate these equations using instrumental variables for *salary*.

To construct the instruments I use the reported salary of individuals in the "After the JD Study" sample that do not work in law firms.⁵⁴ Specifically, I obtain four different instruments by computing the average salary per region of those lawyers working for the federal government, for the state and local government, for the private industry (e.g., accounting, investment banking, consulting) and for non-profit organizations. Then, separately for each of the four types of organizations, I assign the corresponding average salary of the region to the subjects of interest (lawyers working in law firms). The resulting variables are *slryfedgov*, *slryregiongov*, *slrynonprofit* and *slryindustry*. Since there are 18 regions in the study, each instrumental variable has 18 possible values.

Using these instruments for *salary*, I estimate equations (3) and (4) using a two-stage least-squares procedure. *Slryfedgov*, *slryregiongov*, *slrynonprofit* and *slryindustry* appear to be legitimate instruments because they are highly correlated with the salaries of lawyers working in law firms but not correlated with their hours of work. Intuitively, an important determinant of the salary is the cost of living of the region; thus, in a region with a high cost of living, salaries will be higher than usual in law firms as well as in government jobs, non-profit organizations and in the private industry. In fact, the first-stage regression of salary on the four instruments provides a reasonably high R^2 . In addition, the instruments appear to be legitimate because there is no apparent reason why the average salary of lawyers working outside law firms could be explained by the hours of work of lawyers working in law firms in that

⁵⁴Even though these lawyers do not work in law firms, they also passed the bar examination in 2000.

same region. In fact, they are uncorrelated.

The propensity score method

Lawyers in the sample may be part of the treatment group for different causes. For instance, a law firm may assign a lawyer to represent cases in court because of her educational background and a different lawyer because of her age. The propensity score is a measure of the likelihood of being part of the treatment group. Estimating the effect of *court* when controlling for the estimated propensity score allows me to match the lawyers by their likelihood of being the treatment group (following Rosebaum and Rubin, 1983).

To find the average treatment effect I estimate α in the following model that uses a propensity score method:

$$\text{Hours of work} = \mu_0 + \alpha_1 \text{Court} + \alpha_2 \hat{p}(x), \quad (44)$$

where $\hat{p}(x)$ is the propensity score which I obtain from a probit model of *court* on x .

Results

The standard regression model

Tables 3, 4 and 5 present the main results. Among lawyers working in law firms, lawyers that represent cases in court work nearly five hours more per week than the rest. Variable *court* is highly significant in all of the specifications: including *salary* as one of the covariates (Table 3), excluding *salary* (Table 4), and when using instruments for *salary* (Table 5). Although not included in the tables, the result also holds when introducing additional covariates, such as the number of children, and dummy variables for race, for being a male lawyer with children and for working in a large city. None of these variables' coefficients were significant.

In addition, the results suggest that the difference between the treatment and the control group is due to incentive effects rather than to selection effects. Lawyers representing cases in court work more hours even when controlling for the number of hours that is expected from them. That is, as shown in columns (2A) and (2B) of the tables, lawyers that represent cases in court work significantly more hours beyond what is expected from them than other young lawyers working in law firms. If the law firm was able to select those lawyers with a lower disutility of work and send them to court, then they will expect them to work more hours and *court* would not be significant (or as significant) in columns (2A) and (2B). In contrast, we observe that lawyers representing cases in court work more hours even though they are not expected to do so; thus, going to court seems to induce lawyers to work more hours in an implicit way. This result is consistent with Ferrer (2009a) that finds an equilibrium effort trap for trial lawyers due to their career concerns.

With respect to the effect of *salary*, I find that lawyers with higher annual salaries work more hours. Therefore, it seems that in this case the substitution effect dominates the wealth effect of higher earnings, although a more detailed analysis might be needed. The coefficient for *salary* is positive and significant in all three tables, except for columns (2A) and (2B) of Table 5. That is, the only case where the coefficient for *salary* is not significant is when the dependent variable is *hours beyond expected* and I use instruments for *salary*. This result suggests that the annual salary positively affects the weekly hours of work but does not have a clear effect on lawyers' decision to overwork (beyond what is expected from them).

Although not shown in the tables, it is worth mentioning the relation between *salary* and other covariates. When estimating equations where *salary* is the dependent variable, the coefficients of *reputschool* and *GPA* are positive and significant; that is, those respondents from better law schools and who performed better in their classes get significantly higher salaries. The annual salary is also increasing in the size of the

law firm and in the size of the office, although this effect is diminishing because the squares of these variables have negative coefficients. Finally, lawyers working in New York or Washington D.C. have higher salaries, possibly due to higher costs of living.

TABLE 9: OLS Results including salary

	Hours of work		Hours beyond expected	
	(1A)	(1B)	(2A)	(2B)
court	4.151** (5.15)	4.658** (4.89)	4.212** (3.82)	4.442** (3.43)
logsalary	5.294** (5.80)	5.584** (4.44)	3.894* (2.84)	4.364** (2.92)
sizefirm	0.001 (0.48)	0.002 (0.54)	-0.006* (2.80)	-0.006 (2.06)
sizefirmsq	$-6.57 \cdot 10^{-7}$ (0.48)	$-9.02 \cdot 10^{-7}$ (0.70)	$2.09 \cdot 10^{-6}$ * (2.15)	$9.52 \cdot 10^{-7}$ (1.96)
sizeoffice	0.0004 (0.07)	0.002 (0.29)	0.003 (0.78)	0.002 (0.38)
age	0.675* (2.22)	0.573 (1.79)	-0.091 (0.19)	-0.201 (0.43)
agesq	-0.009* (2.54)	-0.008* (2.15)	0.003 (0.59)	0.005 (0.93)
femalewithkids	-2.464* (2.20)	-3.170* (2.43)	0.493 (0.22)	0.700 (0.27)
reputschool		-3.573* (2.52)		-6.462** (3.63)
GPA		-0.761 (1.44)		-2.968 (2.06)
GPAreput		0.482 (2.10)		1.158* (2.77)
NYDC		-0.438 (0.29)		-0.207 (0.20)
Constant	-22.214** (2.99)	-17.286 (1.47)	-41.281* (2.69)	-28.929 (1.43)
Observations	965	834	965	834
R-squared	0.07	0.09	0.03	0.05

Source: "After the JD Study." Sample includes lawyers working full time in law firms

Notes: t-statistics are in parentheses, **significant at 1% , *significant at 5%

The results in Tables 3, 4 and 5 also suggest that female lawyers with children work around three hours less than the rest of lawyers. Notice that the coefficient of *femalewithkids* is negative and significant at 5% level in all columns (1A) and (1B) of the tables, except for Column (1B) of Table 5 where it is significant at 10% level. This result is not surprising considering that lawyers in the sample are young (the average age is 31, as shown in Table 2) and thus are likely to have small children. A large

number of studies in the labor economics literature have found a negative correlation between female labor supply and childbearing, although Angrist and Evans (1998) find that the effect is much smaller for college educated women.

A perhaps more interesting result related to *femalewithkids* is that its coefficient is no longer significant in columns (2A) and (2B) of any of the tables. Moreover, it is positive (although not significant) in Tables 3 and 5. This result suggests that female lawyers with children work significantly less but their employers also expect them to work significantly less. That is, female lawyers with children do not appear to overwork (beyond what is expected from them) significantly less than other individuals in the sample. Contrasting this result with the results for *court*, it is worth highlighting that the effect of representing cases in court persists when accounting for the employer's expectations of hours of work while the effect of having children does not.

Another remarkable result is that the coefficient for *reputschool* is negative when controlling also for the interaction between the reputation of the law school and the grade point average of the respondent, *GPAreput*, which has a positive and significant coefficient. This appears to indicate that young lawyers from better ranked law schools that have a strong academic record work more hours, while young lawyers from better ranked law schools work less in general. Notice that this seems particularly true in columns (2A) and (2B); that is, when explaining young lawyers' decision to overwork (beyond what is expected from them).

TABLE 10: OLS Results excluding salary

	Hours of work		Hours beyond expected	
	(1A)	(1B)	(2A)	(2B)
court	3.699** (3.91)	4.431** (4.20)	3.919** (3.29)	4.121** (2.96)
sizefirm	0.006* (2.20)	0.006* (2.23)	-0.003 (1.70)	-0.002 (1.01)
sizefirmsq	-2·10 ⁻⁶ (1.48)	-2.2·10 ⁻⁶ (-1.74)	1.07·10 ⁻⁶ (1.32)	6.2·10 ⁻⁷ (0.75)
sizeoffice	0.006 (1.15)	0.005 (0.68)	0.008* (2.28)	0.003 (0.58)
age	1.010** (3.79)	0.952** (3.45)	0.186 (0.40)	0.111 (0.24)
agesq	-0.014** (4.46)	-0.013** (4.21)	-0.001 (0.15)	0.0004 (0.08)
femalewithkids	-3.505** (3.06)	-4.007** (3.13)	-0.356 (0.16)	-0.039 (0.01)
reputschool		-3.081 (2.03)		-6.056** (3.27)
GPA		-0.417 (0.83)		-2.623 (1.90)
GPAreput		0.453 (1.91)		1.122* (2.63)
NYDC		0.699 (0.47)		0.700 (0.77)
Constant	31.131** (5.83)	35.372** (5.38)	-2.659 (0.28)	11.838 (0.83)
Observations	1002	859	1002	859
R-squared	0.05	0.07	0.02	0.04

Source: "After the JD Study." Sample includes lawyers working full time in law firms
Notes: t-statistics are in parentheses, **significant at 1% , *significant at 5%

Table 5 shows the results when using the instruments for *salary*. The coefficient for *court* not only is still significant but is also larger than in the OLS regressions. Lawyers representing cases in court appear to work more than five hours more per week than other lawyers working in law firms. For these results I used *slryfedgov*, *slryregiongov*, and *slryindustry* as instruments. Results are very similar when using also *slrynonprofit* as an instrument; however, that implies excluding Florida from the analysis because there are no observations for lawyers working in non-profit organizations in the state of Florida.

TABLE 11: Results using IV for salary

	Hours of work		Hours beyond expected	
	(1A)	(1B)	(2A)	(2B)
court	4.250** (5.32)	5.163** (4.94)	4.526** (3.31)	4.801** (3.22)
logsalary	5.861** (3.17)	10.160** (3.23)	5.709 (1.56)	7.777 (1.38)
sizefirm	0.001 (0.31)	-0.002 (0.55)	-0.008 (1.94)	-0.009 (1.61)
sizefirmsq	$-4.87 \cdot 10^{-7}$ (0.40)	$1.51 \cdot 10^{-7}$ (0.14)	$2.65 \cdot 10^{-6}$ (1.74)	$2.67 \cdot 10^{-7}$ (1.62)
sizeoffice	$-2.6 \cdot 10^{-5}$ (0.006)	0.0003 (0.03)	0.002 (0.42)	0.001 (0.14)
age	0.634* (2.81)	0.244 (0.92)	-0.221 (0.42)	-0.449 (0.96)
agesq	-0.008** (3.20)	-0.003 (1.05)	0.005 (0.83)	0.008 (1.42)
femalewithkids	-2.363* (2.24)	-2.492 (2.08)	0.815 (0.33)	1.205 (0.47)
reputschool		-3.945* (2.64)		-6.749** (3.96)
GPA		-1.057 (1.83)		-3.209* (2.24)
GPAreput		0.498* (2.17)		1.172* (2.86)
NYDC		-1.465 (1.12)		-1.012 (0.54)
Constant	-27.812 (1.30)	-59.924 (1.88)	-59.216 (1.58)	-60.589 (1.03)
Observations	965	834	965	834
R-squared	0.07	0.07	0.03	0.04

Source: "After the JD Study." Sample includes lawyers working full time in law firms
Notes: t-statistics are in parentheses, **significant at 1% , *significant at 5%

Notice that the coefficient for *NYDC* is not significant in any of the specifications. This is somehow surprising since lawyers in these cities are known to work for long hours; however, they might work more because their earnings are also higher. As discussed above, my results show that lawyers with higher earnings work more hours and that earnings in New York and Washington DC are higher than in other regions. Therefore, the insignificant coefficient of *NYDC* could be due to the fact that I am already controlling for the lawyers' salary. Notice that although the results of Table 4 do not include the salary, they do include the size of the law firm, the size of the law office and the respondents' age, which seem to act as proxy variables for *salary* in these specifications.

As a final remark, all the regressions are weighted using the national sample selection probability weight. This is the weight recommended by the "After the JD Study" in order to ensure a more representative sample when obtaining national estimates.

The propensity score method

In order to estimate the average treatment effect using propensity scores, first I estimate a probit model for *court* using the covariates of previous estimations. This allows me to obtain the predicted likelihood of being assigned to court cases, $\text{Pr}(\text{court})$, which I use as the control function. As shown in Table 6, *court* is still positive and significant when controlling for the propensity score.

TABLE 12: Results with propensity score matching

	Hours of work		Hours beyond expected	
	(1A)	(1B)	(2A)	(2B)
court	3.911** (4.37)	4.410** (4.82)	3.647** (2.93)	3.963** (2.98)
Pr(court)	-11.753** (4.10)	-10.598** (5.10)	0.221 (0.09)	-2.078 (1.12)
Constant	53.173** (56.66)	52.54** (62.64)	2.574* (2.77)	2.679** (3.25)
Observations	1002	859	1002	859
R-squared	0.03	0.03	0.02	0.02

Source: "After the JD Study." Sample includes lawyers working full time in law firms
Notes: t-statistics are in parentheses, **significant at 1% , *significant at 5%
Covariates used to obtain Pr(court) are the same as used in Table 4 for each corresponding column

If salary is endogenous in this probit model, then I cannot consistently estimate the average treatment effect using this method. Thus, I exclude salary from the control variables in these regressions.

Robustness discussion

In previous regressions I consider as lawyers representing cases in court those respondents in my sample that reported to be first or second chair in a case in at least half of the cases they worked on over the past three months. Table 7 shows the results when using dummy variables for the possible responses of question 16.e instead of using variable *court*. As can be seen in the table, responses "all" and "most" are the driving force of the obtained results. Although the coefficient is also positive for the lawyers that reported to appear in court in some or half of the legal matters, the effect is clearer stronger for lawyers that appear in court very frequently.

TABLE 13: Results with *court* split into four dummies

	Hours of work		Hours beyond expected	
	(1A)	(1B)	(2A)	(2B)
All	4.802** (3.02)	5.666** (2.92)	5.909* (2.26)	6.386* (2.18)
Most	5.415** (4.79)	6.367** (5.43)	6.344** (4.45)	6.517** (4.02)
Half	1.565 (0.95)	3.004 (1.79)	1.164 (0.66)	2.253 (1.30)
Some	1.416 (1.66)	1.942 (2.03)	2.310** (3.83)	2.620** (4.42)
<u>Controls</u>				
Group 1	YES	YES	YES	YES
Group 2	NO	YES	NO	YES
Constant	31.377** (5.65)	34.694** (4.38)	-2.319 (0.24)	10.685 (0.77)
Observations	1002	859	1002	859
R-squared	0.06	0.08	0.03	0.05

Source: "After the JD Study" Sample includes lawyers working full time in law firms

Notes: t-statistics are in parentheses, **significant at 1% , *significant at 5%

Group 1: size law firm, sq size law firm², size office, age, age², female with kids

Group 2: reputschool, GPA, GPAreput, NYDC

Sample selection problem

This section studies a possible selection problem in the sample. The distinction between lawyers representing cases in court and those who do not is possible through a question of the survey that a part of the lawyers in the sample did not respond. In particular, this question was not a part of the phone version of the survey.⁵⁵ Although all lawyers in the sample received a questionnaire in the mail, around 40 percent of them were asked to respond over the phone after several unsuccessful attempts by mail. Specifically, from the 2282 respondents that work full time in law firms, variable *court* is only available for 1272 of them.

This selection of the sample could create a bias in the results by distorting the error term of in equations (3) and (4). Notice that the number of hours of work could be correlated with the type of questionnaire (mail or phone). To test whether there exists a sample selection problem, let *sample* be a dummy variable that identifies those lawyers who did not respond over the phone. That is:

$$sample = \begin{cases} 1 & \text{if response through questionnaire} \\ 0 & \text{if response over the phone} \end{cases} .$$

Hence, variable *court* is only available if *sample* is one. An initial analysis of the sample selection problem shows that *hours of work* is not significant in explaining the likelihood of answering over the phone. That is, those who work more hours do not seem to be more or less likely to respond the survey over the phone. Variables that appear to be significant in explaining *phone* are *male*, *size of the law firm*, and *salary*, all of them with positive coefficients. That is, female lawyers, lawyers from smaller law firms or with lower earnings were more likely to answer the mail questionnaire.

⁵⁵There was also a web version of the questionnaire available; however, only 12 respondents in the sample used this version. Furthermore, of the sample of lawyers working full-time in law firms, only four web respondents did not respond to the question related to variable *court*.

I use a type II Tobit model to test for selection bias, following Heckman (1976). Table 8 reports the results. *Invmillsratio* is the coefficient of the estimated inverse Mills ratios. None of the coefficients is significant and thus the null hypothesis of no selection bias cannot be rejected. This result suggests that there is no sample selection problem in the results of previous sections.

TABLE 14: Testing for sample selection bias

	Hours of work		Hours beyond expected	
	(1A)	(1B)	(2A)	(2B)
court	3.631** (4.12)	4.346** (4.36)	3.844** (3.40)	4.005** (3.03)
Invmillsratio	-206.907 (1.69)	-227.694 (1.55)	-215.865 (1.86)	-277.307 (2.00)
<u>Controls</u>				
Group 1	YES	YES	YES	YES
Group 2	NO	YES	NO	YES
Constant	113.177* (2.19)	125.952 (2.08)	83.136 (1.54)	122.414 (1.84)
Observations	1002	859	1002	859
R-squared	0.05	0.07	0.02	0.04

Source: "After the JD Study." Sample includes lawyers working full time in law firms
Notes: t-statistics are in parentheses, **significant at 1% , *significant at 5%
Group 1: size law firm, sq size law firm², size office, age, age², female with kids
Group 2: reputschool, GPA, GPAreput, NYDC.

Conclusion

This paper finds that young lawyers representing cases in court work more hours per week than other young lawyers working full-time in law firms. I obtain this result using confidential survey data of lawyers that passed the bar examination in 2000. The results of the paper support the theoretical findings in Ferrer (2009a). Being involved in court cases seems to induce lawyers to work more hours. Intuitively, lawyers with career concerns (as it seems the case for the case of young lawyers working full-time in law firms), have additional incentives to win cases in court due to the prospect of earnings growth upon showing to be a successful trial lawyer.

For further analysis, it is desirable to know more about the process used in law firms to assign lawyers to represent cases in court; in particular, to know how this process works as lawyers acquire experience. The second wave of the "After the JD study," which will be available soon, will be helpful in this direction and may allow me to use panel data estimation to confirm my findings. In addition, the results in this paper indicate that there is more to learn about how career concerns affect lawyers' decisions. Specifically, it would be interesting to obtain data about personal characteristics and working hours of lawyers matched to be opponents in court. With this information I could use techniques of the empirical literature on tournaments to study specific interactions between different types of lawyers. Finally, experimental evidence could be very useful in complementing the results presented here.

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