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AN ECONOMIC MODEL OF FILING: ASSESSING DIFFERENT INSTITUTIONAL CONTEXTS

MARIA ALESSANDRA ANTONELLI AND VERONICA GREMBI

JEL Classification: K40, K41, H23

Keywords: Judicial Precedent, Decision to File, Comparative Efficiency of Legal Systems.

AN ECONOMIC MODEL OF FILING: ASSESSING DIFFERENT INSTITUTIONAL CONTEXTS[*]

Maria Alessandra Antonelli

Università di Roma "La Sapienza"

Veronica Grembi

Università Cattolica del Sacro Cuore, Milano

Abstract. In order to analyze the civil justice congestion problem, we propose a model in which institutional elements are considered to shape different forms of the payoff function of risk neutral agents who have to decide whether or not to file a suit. Our approach is twofold. First, we use a model with subjective probability introducing a discounting factor in order to take into account possible delay in resolutions. Secondly, we introduce an objective probability of winning (losing) given by the combination of a precedent-weight parameter (defining the type of legal system) and a transparency factor. In our model the transparency factor is considered both as an independent parameter and as a function of the weighing parameter. Such distinction is not only due to a theoretical need but also linked to the more traditional distinction between common law and civil law system. The simulation's results in the second part of the paper show that an over-dimension of the demand for civil justice is not necessarily a result of the agents' strategic behaviors, rather the result of a misperception of the expected payoffs due to a low transparency level.

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1. Introduction

The link between the efficiency of a legal system and the economic performance of a country has been quite assessed through several empirical investigations (La Porta et al. 2008). Even quite before those works, a great accuracy has been used in studying the factors, which can determine an inefficient deliverance of justice services both on the supply and the demand side of the market for justice. The main inefficiency has been identified in the congestion of the civil courts. Congestion affects the delivery of justice in a twofold way: 1) it makes more difficult for the agents to access to justice; 2) once the agents access to justice it might take a long time before they can get a final outcome. In order to define guidelines for the policy makers, the literature has been focusing on both the supply and the demand side elements of the congestion problem. While the supply-side analyses focus mainly on the institutional characteristics of the considered judicial system (e.g. incentives to judges) (i.e. Cooter and Rubinfeld 1989; Shavell 1995; Daughety and Reinganum 2000; Shavell 2006; CEPEJ 2006; Hadfield 2007), the demand-side studies address the increase in litigiousness or the potential parties' opportunistic behaviors as some among the reasons of civil justice inefficiencies (i.e. P'ng 1983; Bebchuk 1984; Miller 1989; Spier 1992 and 2007). This paper addresses the civil justice congestion problem from the demand side perspective. We will show that an increase in the demand for justice does not necessarily mean civil justice congestion. Consider an increase in the demand for justice in a situation in which the market for justice can automatically move towards an equilibrium position. As argued by Priest (1989), an increase in congestion will move the demand for justice more in the market of settlements cause the agents' expected payoff is reduced in the market of litigations. As a consequence, the equilibrium delay in the market for litigations decreases, making more convenient for the parties to move back again to that market. In other words, there is an equilibrium level of delay and a congestion equilibrium and, according to this interpretation, once the market for litigations is left free to adjust, the move in one or the other directions (in or out from the market) should not be contrasted by specific reforms which will have as probable outcome, the effect of bringing the congestion equilibrium to a higher level. Although debatable, Priest's mechanism is working given several assumptions: the possibility for the parties to move out of the market of litigation at any time-even once they have entered- and the absence of counter-mechanism, which might disrupt the adjusting mechanism. As a matter of fact, it seems necessary that the agents are perfectly able to compare the relative expected payoffs and they can easily (cheaply) get the information they need to realize that the level of delay has converged to its equilibrium quantity. The recalled literature on strategic filing witness as asymmetric information can play an essential role, and that it might be necessary a proper intervention to cope with trivial suits burdens (Spier 2007). Following such "market failure" approach, we address the problem of an increase in the demand for justice, which can be either a sign of the inefficiency of the system although not due to the strategic behavior of the parties, or the sign of efficiency of the system. Such distinction is based on the role played by transparency in the legal system.

The set of actions involved in the filing of a civil claim, are represented by a long list of decisions a potential plaintiff and a potential defendant have to cope with at different stages of their interaction. Such decisions affect the market for both pre-trial services (i.e. settlements) and trials (Gravelle, 1995), and at the same time the institutional features of these markets affect the agents' decisions. Nevertheless, the traditional theory offers a classic cost-benefit decision model according to which once attempts to settle a claim fail- due to the presence of transaction costs- agents decide to file a suit whenever the expected net gain from filing is more than the expected net loss. The expected net gains and losses are computed taking into account mainly *subjective* probabilities (i.e. Spier 2007; Kessler and Rubinfeld 2007). In other words, the calculation of the payoff relies strictly on an individual evaluation, which implicitly includes the information stemming from the legal system. However an implicit inclusion does not allow a correct weighing of the different elements influencing the parties' decisions, biasing the possible solution of public policy. Consequently it seems to be more accurate to build up the agents' expected payoffs in a two dimensional world where both *subjective* and *objective* (institutional) information sets play a fundamental role. Part of the supply side explanation of the inefficiency of civil justice can be considered in shaping the demand side explanation. This second, broader, model, a composed probability model, can easily collapse into a more "traditional" single probability model if the system does not allow the agents to get the correct information on the objective dimension. For instance, it might be the case that the system is not transparent and such a lack of transparency ends up biasing the correct evaluation of the payoffs. When this happens the parties' decision based only on individual evaluation can be misplaced, generating justice congestion. Yet, the congestion is not the result of strategic behavior but the consequence of an incorrect payoff perception.

Not all the institutional elements of the reference legal system will be included in the agents' payoff calculation, but only those which are more directly linked to the parties' interest. In this paper we stress mainly one element: the role of precedent. The social benefit of precedent stems from the predictability of a trial's outcome and from reduced costs associated with legal uncertainty. Hence, in a system that gives weight to precedent, the outcome of a claim at time t-1 affects the decision to file in two ways (Shavell 2006): 1) it modifies the probability that the new claimant will turn out to be a loser or a winner according to the interpretation of the law established by previous outcomes of similar cases; and 2) by decreasing uncertainty regarding the correct interpretation of the law it decreases the incentives for opportunistic filing[1].

There is a “traditional”, clear-cut way to conceive the precedent role characterizing legal systems. For instance, civil and common law are traditionally differentiated by their use of legal precedent, which the former avoids while the latter allows. Yet, several studies have shown that such a dramatic distinction is quite artificial: statutes and codes are not the exclusive bases of the civil law, and judicial opinions are not the unique legal product of the common law (e.g. Shäfer and Ott 2004; Hadfield 2007). Hence, the distinction between the common law concept of *stare decisis* and the civil law concept of *jurisprudence constante* (“settled jurisprudence”) (Fon and Parisi 2007, paying special attention to France and Germany) provides both a more accurate articulation of the difference between the civil and common law systems and a new perspective on the idea of precedent. Despite their different degrees of binding force both are forms of precedent. *Jurisprudence constante* is not directly binding because a court (or a judge)- within this institutional framework- considers past decisions only if there is *uniformity in the case law*, represented by an established “tradition”. That tradition is basically reinforced by the judiciary: in practice, a threshold is generally set in order to assess the existence of a judicial tradition. For instance, when more than the fifty percent of similar cases recognize a plaintiff’s claim, there is a judicial tradition relating to that claim and the next judge will follow it[2]. If it is *a priori* true that a judge may dissent from the judicial tradition, a low probability will be attached to such dissenting behavior because the judge would be aware that her decision could be easily reversed in a later stage of the adjudication[3]. *Stare decisis* is analogous but for the fact that there is no need to reach any threshold: one case can be authoritatively binding.

We move from the assumption that it is possible to distinguish legal systems according the weight placed on previous judicial decisions on similar cases. Therefore there are systems where precedent is heavily weighted (*stare decisis*) and systems where precedent is lightly weighted (*jurisprudence constante* when the threshold is a very high percentage). We then include the element, which distinguishes the legal systems (precedent parameter) in the payoff function of the agents. A discounting factor is considered as well, since in systems where judicial backlogs are pathologic (i.e. Italy), agents will discount the expected benefit-loss more than in institutional

[1] Furthermore it should affect the number and duration of the overall judicial load. Additionally, the judiciary plays a different role in civil and common law contexts regarded as much more active in common law rather than in civil law systems.

[2] A similar argument can be drawn for the defendant or for the case in which the precedent is negative.

[3] Judges as well as politicians (and bureaucrats) maximize their welfare. That notwithstanding such awareness can play a very different role in a judiciary system where judges are civil servants, as in Italy, from a system where they are elected, as (in some cases) in the US.

contexts where judicial backlogs are not pathological. Given these elements, or more generally what we define as the objective dimension of the decisions to file, we want to test what conditions more efficiently relieve (civil) legal systems of hypothetical judicial backlogs.

The paper has two sections. The first section provides the decision model according to which the agents will put claims on trial: moving from a basic model, a precedent weight and a transparency factor are introduced, within different scenarios of exogenous and endogenous transparency. The second section introduces an empirical analysis evaluating the performance of legal systems, which weigh the precedent (tradition) factor differently. For several institutional contexts, we create a random series of trial outcomes and we assess the plaintiff's probability of winning and her discounted expected payoff. Concluding remarks follow.

2. The model

The potential plaintiff and defendant are two risk neutral agents with p^p and p^d subjective winning probability respectively. For the sake of the analysis, we consider two symmetrical agents, so that their cost function will be identical and given by:

$$S^p = S^d = \overline{S} + (st)Q$$

where $\overline{S}$ is a fixed cost associated with filing and appearing before the court and is assumed to be equal for both the plaintiff and the defendant without any lack of generality, being not an expected cost but a certain *sunk* cost, whereas *(st)Q* is the variable cost depending on the trial's length (*t*) and the claim amount (*Q*). As t[4] and *Q* increase, the variable cost increases with a proportion of $s \in [0;1]$. Basically (*st*) can be interpreted as an "erosion coefficient" of the expected claim amount. The expected discounted plaintiff payoff function[5] becomes:

$$E(G) = p^p Q e^{-rt} - (1 - p^p) 2st(e^{-rt}) Q - \overline{S} \qquad (1)$$

where Qe^{-rt} is the plaintiff's discounted gain from a positive trial outcome[6] and $2st(e^{-rt})$ is the discounted cost associated with a negative outcome. It is apparent that the plaintiff has to take her decision in the *English Rule* framework: the loser pays the total legal and trial expenses (*S*)[7]. The expected present value of the defendant payoff function is:

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[4] In order to nullify the effects of different time unit measurement (days, months, years) on the results, the time variable is standardized: $t \in [0;1]$.

[5] From here on, the plaintiff payoff function is meant the expected discounted plaintiff payoff function, unless it is differently specified.

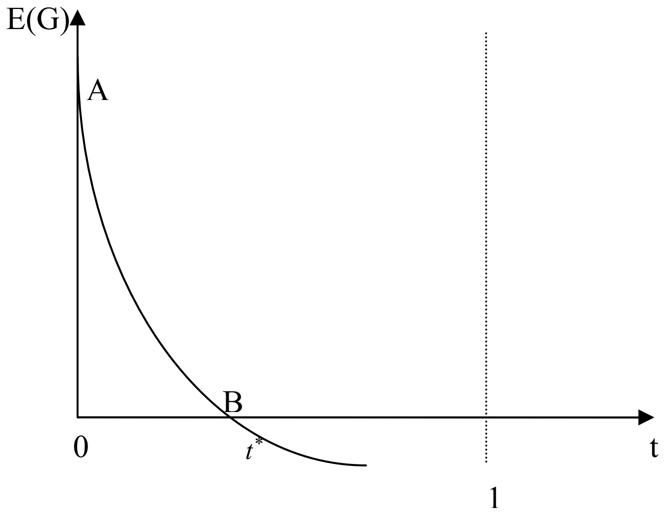
[6] Even the discount factor is standardized in [0; e^{-r}] and it can be interpreted as a subjective discount factor like the generic discount factor δ used by Vereeck and Mühl (2000).

[7] Alternative hypothesis are possible. An equal division of expenses (such that each agent pays $S/2$) or an asymmetric division of expenses (such that the plaintiff pays S^p and the defendant pays S^d) can be considered but it does not change the logic of the model.

$$E(L) = p^d 0 - \left[\left(1 - p^d\right)\left(Q + 2stQ\right)\left(e^{-rt}\right)\right] - \bar{S}$$
$$E(L) = -\left[\left(1 - p^d\right)\left(1 + 2st\right)\left(e^{-rt}\right)Q\right] - \bar{S} \qquad (2)$$

The (2) represents a discounted expected loss. Being that the plaintiff and the defendant are symmetrical agents, only one discount factor, e^{-rt}, is needed[8]. As stated by the theory of litigation (Cooter and Rubinfeld, 1989) the plaintiff has an incentive to file if the expected net payoff is greater than zero which means, considering the graphic representation of that payoff, that there are incentives to file a suit up to point B (*Figure 1*)[9].

Figure 1.



On the defendant side, we have:

$E(L) = -(1 - p^d)2st(e^{-rt})Q - \bar{S} < 0$.

If the absolute value of the defendant's expected loss is less than the plaintiff's net gain, the suit will be socially efficient and the agents go to trial; otherwise they settle the claim. When a settlement takes place, there is no trial: given that we are analyzing the effects of precedents on the trials' dynamics, the conditions and parameters needed to have a trial are assumed. The main focus of the analysis is the plaintiff's choice: therefore from now on the reference will be at the plaintiff's decision[10].

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[8] A subjective discount factor (φ_p and φ_d) can be introduced when the plaintiff and the defendant weigh differently the future.

[9] See the *Appendix*.

[10] From now on the analysis will be focused only on the plaintiff's decision, which is equivalent to assume that $\forall t \in [0;1]$ the condition $|E(L)| < E(G)$ is satisfied. Nevertheless, note that if the payoffs functions intersect, there is a smaller range of t where the condition $|E(L)| < E(G)$ is satisfied. In this case, the model holds in a subset of t- values.

2.1. Introducing a Precedent Weight

We now introduce an objective dimension to the probability function, the weight of precedent in the legal system. The addition changes the previous analysis in two ways. First of all, the variable *x*, representing the fraction of positive precedents to the plaintiff's claim out of the total amount of precedents, is introduced with $x \in [0,1]$. Hence, the plaintiff's probability of winning (the defendant's probability of losing) depends on two components: a historical component, i.e. *x*, (the so-called *tradition component* in Fon and Parisi, 2007) and a parameter α representing the weight that the legal system gives to precedents. In other words, the past history about legal cases (the values of *x*) and the kind of legal system (the value of α) define the plaintiff's objective probability of winning, which is given by the parametric function:

$$p = \Phi(x, \alpha) \qquad (3)$$

where Φ is continuous on [0,1], increasing in x(Φ_x>0) and such that $\Phi(0,\alpha) > 0$ and $\Phi(1,\alpha) < 1$; $\alpha \in [0;+\infty]$. In a legal system that is strongly precedent-bound (i.e. α very high),

$$x \to 1 \Rightarrow p \to 1$$
$$and$$
$$x \to 0 \Rightarrow p \to 0$$

whereas in a legal system that is weakly precedent-bound (i.e. α very low), $x \to 1$ does not imply $p \to 1$ and $x \to 0$ does not imply $p \to 0$. Since $p = \Phi(x, \alpha)$ is an *objective* probability stemming from the past judiciary history, the plaintiff's probability of winning is equivalent to the defendant's probability of losing.

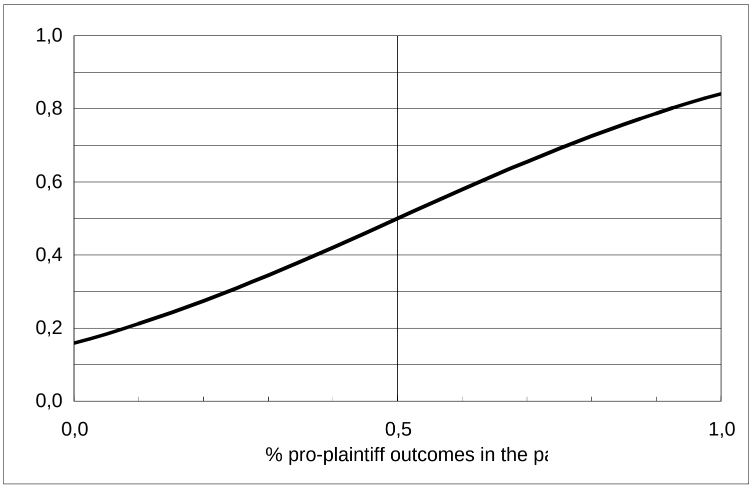
Abandoning its compact representation, we give Φ the functional form of a cumulative normal standard distribution function taken in the interval [-0.5, +0.5], and rescaled for the interval [0, 1][11]. The cumulative normal distribution is continuous, increasing, and cannot take the extreme values of the interval. Φ's inability to take the interval's extreme values is particularly important in order to give realism to the analysis. As a matter of fact, if there are no previous favorable pro-plaintiff decisions and the plaintiff decides to file the claim, then the probability of winning tends toward zero, but is not automatically null. Alternatively, if the previous 99 out of 100 verdicts were pro-plaintiff decisions then the plaintiff's case, the scenario in which the judge will take a different path is not excluded. Therefore the function Φ can be rewritten as:

$$p = \Phi\left(\left(x - \frac{1}{2}\right)\alpha\right) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\left(x-\frac{1}{2}\right)\alpha} e^{-\frac{t^2}{2}} dt \qquad (4)$$

[11] We use the cumulative standard normal distribution because its characteristics reflect the properties assigned to Φ. However any continuous function reflecting such properties could be used without invalidating the analysis.

This probability will be distributed with a mean of 0.5 and a standard deviation of 1/α. In particular, ½ is our scaling factor, changing the initial function's range of [-0.5, +0.5] into the new range of [0; 1]. In fact, when $x - \frac{1}{2} = -0.5$, then x=0; and if $x - \frac{1}{2} = 0.5$, then x=1[12]. α is a *position* factor that determines the function's position inside the range (see *Figure 2*): the higher the α value the steeper the probability function for *x*>0.5[13]. The explanation relies on the fact that when the fraction of positive precedent is greater than 0.5 there is uniformity in the case law, so the established tradition gets reinforced (Fon and Parisi 2007).

Figure 2.
α=2



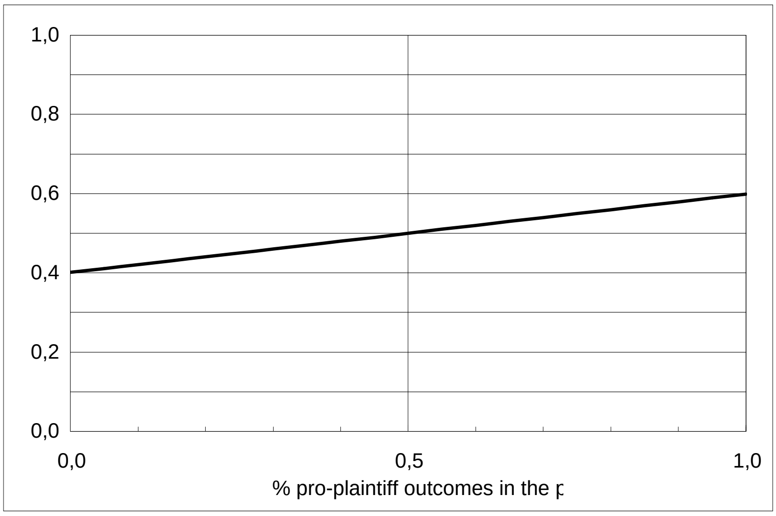
[12] Alternatively we can suppose that:

- *x* is a random variable and its density function is a normal distribution with a mean equal to ½ and a constant standard deviation equal to $1/\alpha$.
- The normal cumulative distribution Prob{x≤x_0} gives the plaintiff's probability of winning.

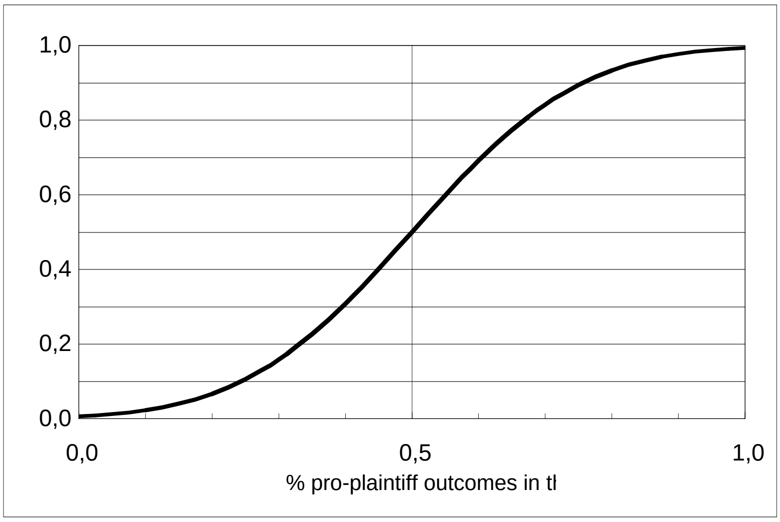
We use the standard cumulative normal distribution in order to give a more compact form to the (4). In this case $z = \left(x - \frac{1}{2}\right)\alpha$ is the standardization factor and the function is F(z)=Prob{z≤z_0}= $\frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z} e^{-u^2/2} du$.

[13] Whatever the threshold is, $\Phi\alpha$ >0 for x> x-threshold and $\Phi\alpha$<0 for x< x-threshold.

α**=0.5**



α**=5**



3.2. Introducing a Transparency Factor

In a precedent-bound legal system, the plaintiff's (defendant's) probability of winning (losing) q^p (q^d), is a convex combination of her subjective winning probability p^p (p^d), and of an objective/historical probability of winning, p[14], so that:

$$q^p = \beta p^p + (1-\beta)p \qquad (5)$$

The plaintiff's objective probability of winning (losing) p (*1-p*) stems from past legal history, and, at the same time, it represents the defendant's objective probability of losing (winning). Therefore, within the same system, the defendant's probability of winning is:

$$q^d = \beta p^d + (1-\beta)(1-p) \qquad (5')$$

We assume p^p (p^d) is independent from *p* (*1-p*): in fact, in the traditional model they coincide and the party's ideas about winning or losing a case are partly based on some elements

[14] As in (3) and (4).

which also stem from the legal system (i.e. the general idea that civil justice is inefficient rather than efficient). In both (5) and (5′) p^p and p^d represent the information only available to the party, information that civil procedure compels the party to reveal during the trial.

The parameter $\beta \in (0,1)$ represents the *transparency degree* of the system. Suppose, for example, that for a given α, p is high (therefore the fraction of positive precedents is high), but at the same time p does not affect too much q^p and q^d. This means that the parameter β is high and the subjective components of the probability (p^p and p^d) prevail. In the extreme case in which $\beta \to 1$, there is a total lack of transparency in the system, and the potential parties will make their decisions independently from any information stemming from the referenced institutional framework. It is not difficult to imagine such a scenario: each legal system is characterized by at least one feature which makes obtaining information on x difficult, and the reference is to the agency relationship between a lawyer and her client. Moreover the system might lack accurate statistical reports on court outcomes, so it might be hard for the lawyer to report reliable information even in a balanced lawyer-client relationship. Reversely, when the system is totally transparent ($\beta \to 0$) the individual choice is not affected nor biased by any personal evaluations, but mainly by objective considerations.

Precedent weight, as well as the transparency factor, also affects the plaintiff's valuation of trial length and, in this way, the plaintiff's valuation of trial expenses. In particular, with regard to the probability function, the plaintiff's valuation of the trial length is a convex combination of the average time of a civil trial $\bar{t} \in [0,1]$ and the average time of a civil trial similar to the plaintiff's claim[15].

$$\tau = \beta \bar{t} + (1-\beta)t(\alpha) \qquad (6)$$

$\bar{t}$ represents the *general information* available in every judiciary system, while the second piece which is *relative-to-the-specific-case* is not always available. As a matter of fact, it is known that within civil liability claims, medical malpractice claims tend to last longer than other kinds of claims. Whenever the potential party is able to obtain this information, her payoff evaluation is more accurate. From the analytical point of view, this second component is:

$$t = t(\alpha) \text{ with } \frac{dt}{d\alpha} < 0$$

If α assumes the extreme value $\alpha \to \infty$, $t \to 0$ because the more strongly precedent-bound the system is, the shorter the trial's duration is expected to be; on the contrary, if $\alpha \to 0$ then $t \to 1$ because every trial needs a particular evaluation and the party is not helped in the time dimension

[15] As stated previously, the time variables are normalized, so that the results are independent from the time unit measurement.

evaluation by the information on analogous cases. Following the setup of the previous analysis ((1),(2)), the plaintiff payoff [16]is:

$$E(G) = q^p Q e^{-r\tau} - (1-q^p) 2s\tau(e^{-r\tau})Q - \overline{S} \qquad (7)$$

2.3. Exogenous Transparency versus Endogenous Transparency

It is apparent from the analysis developed up to this point that the two factors that affect the parties' decision to file are the precedent weight and the transparency factor. The former shapes the institutional framework while the latter allows agents to perceive such framework. Moving from what characterizes a legal system the most, the transparency factor can be assumed to be either independent or dependent on the precedent weight. In precedent-bound systems (e.g. common law), it is logical to assume that the transparency factor might also be influenced by the historical organization of the judiciary (i.e. the previous case reports, the organization of decision datasets etc.), more than in less precedent-bound systems. We then analyze the distinct cases of exogenous and endogenous transparency.

<u>Case 1: Exogenous Transparency</u>

p (and therefore α) and β are independent. This means that a more precedent-bound system does not necessarily imply a greater transparency of information. As an extreme case, we consider $\beta=0$ (total transparency). This case gives an *objective* plaintiff payoff function for different α-values ≥ 0 (curve ABC *Figure 3*)[17]. The ABC curve is a *first best curve* because it gives the trials set in a transparent framework; that is, all possible combinations of expected payoff and trial length. The subset AB gives the "feasible trials", that is the efficient trials according to a cost-benefit analysis. Moving from a negative payoff value (point C), as α increases the party's payoff moves up on the ABC curve: the trial length decreases and the payoff increases. The plaintiff can have this relevant information and he/she will file only in an institutional setting with $\alpha \in [\alpha_0; +\infty]$ where her payoff is positive. As β increases (more "obfuscation"), for every given α, the winning probability q^p increases (decreases) if $p^p>p$ ($p^p<p$). This is a consequence of the following relation:

$$\frac{dq^p}{d\beta} = p^p - p > 0 \ (<0) \qquad \text{if } p^p>p \quad (p^p<p) \qquad (8)$$

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[16] Analogously the defendant payoff is: $E(L) = -(1-q^d)(Q + 2s\tau Q)e^{-r\tau} - \overline{S}$ (7′)

[17] Note that the vertical intersection of the expected discounted payoff ($pQ - \overline{S} \rightarrow$ AB curve) does not depend on τ (and so on t). On the horizontal axis $\tau(\alpha)$ is considered for any given β. $\beta=0$ corresponds to the ABC curve and the x- coordinate represents the τ-values as α changes in $[0,+\infty]$. For the DE curve, $\beta>0$ and the x- coordinate represent the τ-values as α changes in $[0,+\infty]$. Remember that for $\beta>0$ and $\alpha\rightarrow\infty$, $\tau>0$. In order to proceed with a comparison with the case $\beta=0$, we consider from the *Figure 1* that $\tau\rightarrow 0$ as $\alpha\rightarrow\infty$ for β-values >0.

Consider a small β value as β=ε>0 and α→∞ such that $\tau \to 0$. This case gives the vertical intersection of the payoff in a non-transparent system, which is $q^p Q - \overline{S}$[18]. If $q^p Q - \overline{S} > pQ - \overline{S}$, the plaintiff perceives a new payoff curve which is above the optimal one. This occurs if $q^p > p$. In other words, we know from (8), that q^p is increasing with respect to β for $p^p > p$[19]. So, the payoff on DE is derived for $p^p > p$: the DE curve is the relevant plaintiff payoff curve in a non-transparent setting. The *objective* payoff function is not perceived.

In this way, a small lack of transparency introduces a system's negative externality raising an *over-dimension* of demand for trials. The vertical distance between the real function of expected discounted gain (ABC) and the perceived expected discounted gain (DE) is the inefficiency of the system on the demand side. Suppose, for instance, that $\alpha \in [\alpha^*; +\infty]$ and $\tau \in [0; \tau(\alpha^*)]$. With β>0, the plaintiff might expect an N payoff (*Figure 4*), and decide to file her claim. However, the point P gives the real payoff. Therefore, from the plaintiff point of view it appears efficient to file even when her real expected payoff is negative. The value of the negative externality is measured as NP.

Although the over-demand phenomenon can be easily grasped as an inefficient degeneration of the civil justice market, an under-demand is inefficient as well. In the mid-eighties an interdisciplinary study group based at Harvard University ran an empirical investigation on medical malpractice in several New Yorker Hospitals. This controversial study (*Harvard Medical Practice Study*, 1990) found evidence of a lack of correspondence between the number of classified medical errors and the number of medical malpractice suits. In other words, only a very small percentage of the patients injured by a physician decided to go to trial (Weiler et al. 1993). Notwithstanding the fact that the survey's author addressed the tort law as the main culprit for the mismatch, whenever the payoff curve lies beneath ($p^p<p$) the efficient frontier the inefficiency cost is given by the lower expected benefit (FM), which reduces the number of cases filed.

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[18] Since the payoff is *E(G)=* $q^p Q e^{-r\tau} - (1-q^p) 2 s \tau Q e^{-r\tau} - \overline{S}$ and $q^p = \beta p^p + (1-\beta) p$, for $\tau \to 0$ we have *E(G)=* $q^p Q - \overline{S}$.

[19] Note that assuming a "neutral case" of $p^p=0.5$, $p^p>p$ is verified for $x<0.5$. See *Figure 2*.

Figure 3.

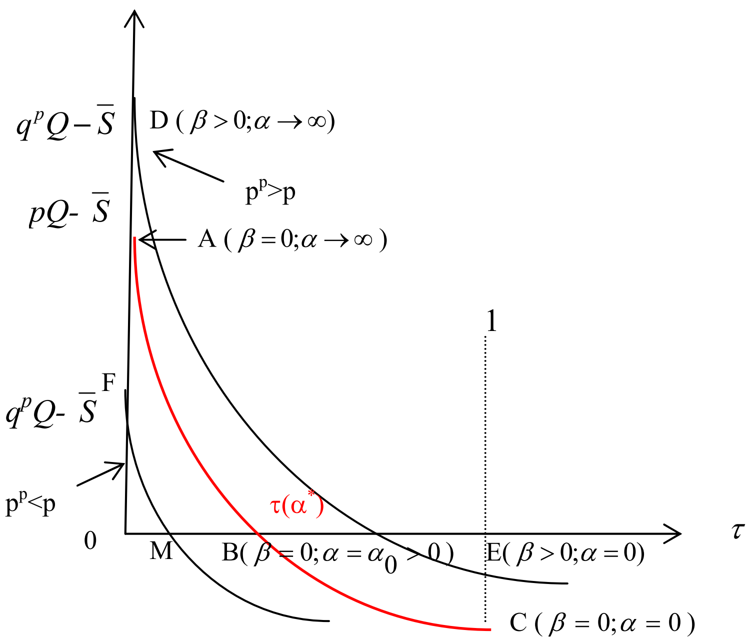
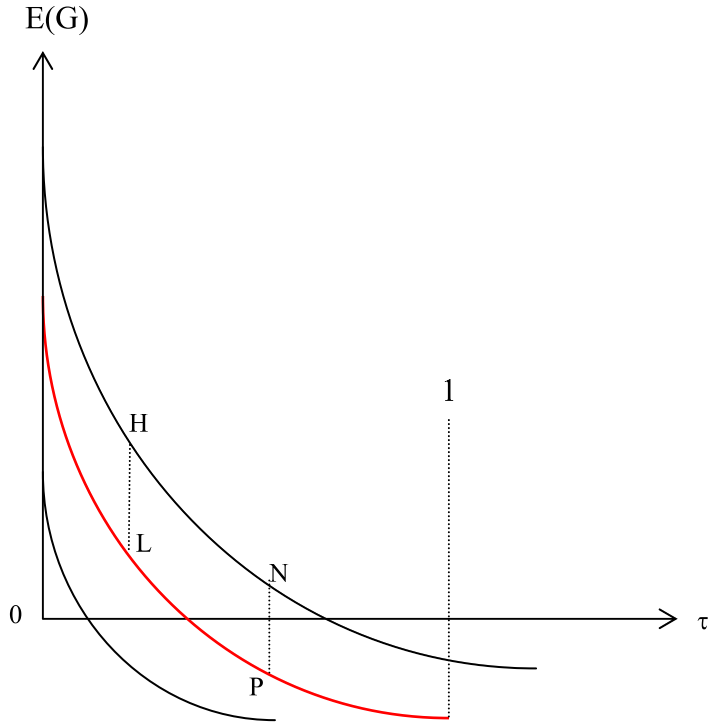


Figure 4.



Case 2: Endogenous Transparency

If β depends on α, then $\beta = \beta(\alpha)$ with $\frac{d\beta}{d\alpha}$<0. This means that the more precedent-bound (high α) the system is, the more characterized by transparency ($\beta \to 0$) it is and the more important precedent weight becomes to the model. Following the previous analysis, for very high α values (and very small β values) the expected discounted gain function is the real function (AB). As α decreases and β increases, there is a misperception of the expected discounted payoff because of the double effects of a wrong evaluation of the probability of winning (p) and a wrong evaluation of the trial length τ (and consequently of the trial expenses). As before, either a DE or FM curve is perceived.

3. Simulations

In this section the previous analysis is tested through simulations, which reproduce a random series of 12,500 trials. Initially we select the values of the parameters of interest according to a "neutrality" context that represents our "average scenario" (see *Table 1*).

Table 1. Starting Values

Claim Amount	10,000
p^p	0.5
r	0.05
$\bar{t}$	0.3
s	0.8
$\bar{S}$	300

We first consider a plaintiff who is neither particularly optimistic (high p^p) nor particularly pessimistic (small p^p) and an average long run interest rate. The average duration of civil trials ($\bar{t}$), and the variable trial costs coefficient (s) are calculated considering data on civil trials duration and civil trials costs used in Djankov et al. (2003), which provides cross-sectional data on trial duration of a set of both common law and civil law countries. The resulting average normalized[20] value of $\bar{t}$ is equal to 0.3. Using a World Bank dataset (2000) the average coefficient of the variable trial costs (s) is set equal to 0.8[21]. Finally, random although reasonable values are given to

[20] Djankov et al. (2003) measures the trials' duration in days. Nevertheless, in order to avoid problems due to the different unit of measurement (days, months, years) we use normalized values.

[21] As a matter of fact, the average cost of trials for the same countries is calculated as a percentage of the claim. Since the average variable cost represents about the 25% of the claim, we obtained that the s value has to be 0.8.

both the fixed cost ($\overline{S}$= 300) and the claim amount (Q) variables. It is worthwhile recalling that the standardized time component depending on α is represented by a function: $t(\alpha)= e^{-\alpha}$[22].

We defined three ideal legal systems: a *lower* legal system, an *average* legal system, and an *upper* legal system, to be analyzed both for the case of endogenous and exogenous transparency. Such a choice stems from the necessity to modify several variables (independent from either α or β) we have used in the model, defining a sort of range between a minimum and a maximum, which are potentially inclusive of a real legal system declensions. For the moment, we are not assuming that one legal system is more efficient than another. In fact, for each scenario the main interest relies on the determinants of the demand for civil justice which, according to our model, is twofold: a) given precedent weights, the effect of transparency; and b) given transparency levels, the effect of precedent weights. For instance, if we set $\beta \to 1$ (or $\alpha \to 0$ for the endogenous case) we basically drop the interest in the variations of α values: being that the system is not transparent, even a huge increase in α will not be taken into account at the individual's decision level. The plaintiff's probability of winning will perfectly match her subjective probability. On the other hand, when we set $\beta \to 0$ (or $\alpha \to +\infty$), the analysis mainly relies on the different values of α, which will heavily affect the individual's decisions[23].

3.1. Exogenous Transparency

The case of β's independence allows us to have several interactions not otherwise obtainable under the endogenity hypothesis. To this purpose we set three different α values representing three different legal systems: 1) a system where precedents have a small weight (α=2); 2) a system where precedents have an average weight (α=5); and 3) a system where precedents have a strong weight (α=7). Analogously, we set three different β values representing alternative transparency levels: 1) an almost-transparent system (β=0.2); 2) an average-transparent system (β= 0.5); 3) a non-transparent system (β= 0.8). The combinations of the previous α and β values give us a sort of ideal outline from which we can select the case of interest to be tested in the simulation, in order to provide some policy guidelines.

Starting from the average scenario (*Table 1*), we can see that as transparency diminishes, we have the same consequences regardless of the α value (*Table 2*): an over-dimension of the demand for justice compared to the efficient level characterizing a transparent system (β=0.2). In a not-transparent system, a greater precedent weight affects only the plaintiff's perceived payoff.

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[22] The same reasons for the analytical representation of an exogenous β are applied. See *infra*.

[23] Because of this, our attempt is to exclude the extreme values (β=0 and β=1) and focus on a feasible range.

Table 2. Percentages of Trials

Percentages of litigated claims			
β \ α	0.2	0.5	0.8
2	52%	100%	100%
5	44%	100%	100%
7	38%	100%	100%

If β=0.2 as α gets higher, the erosion coefficient of the claim amount (sτ) gets lower, together with the trials' length. The information on the real length of trials is available to the plaintiff, as well as the amount of favorable precedents and the resulting objective probability of winning. As a consequence of complete information disclosure, an increase in α produces a selection mechanism of trials, such that fewer claims turn out to be fully litigated within the same system (*Graph 1*). The sequence can be compared to a creaming mechanism, which naturally relieves the congestion of justice. For instance, for the pair β=0.2 and α=7, only 4,750 claims out of 12,500 will be fully litigated while the rest will probably undergo other forms of conflicts resolutions (i.e. out of trial settlements).

For any given value of α, as the level of transparency falls (i.e. β=0.5 and β=0.8), it affects the expected payoff frontier. For instance, set α=5, with β=0.8 the trend of the perceived payoff is basically constant since it is almost independent from both the precedents and the objective probability of winning. On the other hand, the frontier is primarily depending on the subjective probability of winning, which here is equal to 0.5 (*Graph 2*).

Finally, the difference along the x-axis between the different plaintiffs' payoff frontiers (*Graph 2*) represents the negative externality due to the lack of transparency, as shown in *Figure 3*. Such a negative externality produces inefficiency along the demand for civil justice dimension identified by the number of claims, now litigated beyond the threshold (transparent) efficient level. In other words, the amount of inefficiency can be proxied by the 56% of new trials which would not take place in the β=0.2 scenario.

Moving to a set of both a smaller and greater values subjective probability, the variable cost coefficient and the trials' duration, we aim to detect the effects of these variables on the plaintiffs' decision to file. The values used are reported in *Table 3*. The analysis of those effects is twofold. On the one hand we focused on the effect of the change of a single variable on the scenario previously described. So keeping everything else constant, first we decrease/increase the subjective probability, then *s*, and finally the average duration. As a result, the payoff frontier was changing, moving up or down compared to our average benchmark. We then start to analyze the combined effect of a contemporary change in each of those variables.

Table 3. Lower and Upper Scenarios

	Lower Scenario	Average Scenario	Upper Scenario
Claim Amount	10,000	10,000	10,000
p^p	0.2	0.5	0.8
r	0.05	0.05	0.05
$\bar{t}$	0.2	0.3	0.5
s	0.6	0.8	1
$\bar{S}$	300	300	300

Starting from the lower scenario, for the intermediate value of β, a selection mechanism is enforced no matter the value of α. A greater precedent weight counts for a strong selection mechanism (*Graph 3*): the percentage of trials drops from about 50% (α=2) to 16% (α=5), and it can reach up to 8% (α=7). The crucial role of the subjective probability on the decision to file is apparent. In fact, even if the trial costs and duration fall, a smaller percentage of claims are still litigated. An analogous finding stems from the study of the upper scenario (*Graph 4*) where, even if the trial costs and duration are greater, no selection mechanism of the trials increases mainly because of the optimistic attitude of the agents[24]. As the number of trials raises and the proportion of favorable precedents changes, the objective probability of winning changes (*Figure 2*), as do the relationships between the expected perceived payoffs. The findings differ when a change in transparency is considered: less transparency inefficiently restricts the trials in a lower scenario (*Graph 5*), while under the same circumstances an over-dimension of trials takes place in an upper scenario (*Graph 6*).

Finally, a comparison between the three scenarios (*Graph 7-8*) highlights the joint interactions. As stated, the subjective probability affects the agents' decisions in both cases: with pessimistic agents the perceived payoff is smaller than it would be otherwise, generating a rationing of litigated claims; when the agents are optimistic the perceived payoff is greater than the average case and no selection mechanism of claims verifies. A smaller average trial duration increases the litigated claims in lower scenarios, as a higher value $\bar{t}$ is responsible for a reduction of litigated claims in the upper case. The effect of the cost amount is rather ambiguous. While a reduction of

[24] Different perceived payoffs distinguish this case from the average scenario with β=0.5.

the cost (s decreases) has a positive effect in a lower scenario, raising the number of trials. The growth of the same element in an upper scenario does not have any significant effect.

3.2. Endogenous Transparency

When β is assumed to be dependent on α[25], the system is becoming more precedent bound (or vice versa), and as α gets higher the system becomes more transparent, affecting the efficiency of the system by both diminishing trial length and enlarging the available information set. In other words, a favorable (or negative) precedent effect is fully exploited by the agents through the available information. This is the main difference between an endogenous transparency system and an exogenous transparency system, where every institutional change occurs for a given transparency degree. As we will see, this difference might be responsible for dissimilar results.

Starting from the average scenario, the greater the precedent weight[26] the higher the number of litigated claims (*Graph 9*), which is exactly the reverse of what takes place in the exogenous context (*Graph 2*). The same outcome defines both lower and upper scenarios (*Graph 10-11*). Comparing average and extreme scenarios, it is apparent that, as in the independent case, the subjective probability of winning has a great effect in either rationing (pessimist agent) or increasing (optimist agent) the number of litigated claims; the variable costs and the trial length also greatly affect the demand for justice. As costs and duration increase (decrease), it will be more (less) convenient to file for a greater number of agents (*Graph 12-13*).

3.3. Exogenous vs. Endogenous Transparency

From the comparison of the findings of endogenous and exogenous systems (*Graph 14-15*) it is possible to detect the uncertain effect of transparency on the demand justice for very low β values. *Graph 14* compares the plaintiff's expected payoffs for dependent and independent β in an average scenario. The same values of all parameters are considered except for transparency: in the independent case, β is set to 0.2 while in the dependent case β takes a smaller value, which represents higher transparency. As previously stated, the outcome of the exogenous context (*Graph 2*) indicates a creaming effect of the transparency growth[27], while from the comparison it looks like the higher the transparency level the greater the number of litigated claims (*Graph 14-15*).

In other words, for small values of β, the marginal impact of transparency does not produce a clear-cut effect. This is because in very transparent systems, that is for $0<\beta<0.2$, the subjective

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[25] In order to run the simulations we assume that $\beta = e^{-\alpha}$, so that if α=0 then β=1, while is $\alpha \to +\infty$ then β=0. Since β is the parameter of a convex combination (both for the winning probability and the time evaluation), $\beta(\alpha) \in [0;1]$ with $\alpha \in [0;+\infty]$. The inverse exponential class of functions satisfies such relationship.

[26] As far as the upper scenario is concerned we did not consider the case for α=7. In fact, for such precedent weight the value of $\beta \to 0$, and, as stated at the outset, we are not considering the extreme values.

[27] The results of *Graph 2* assume α=5, but the logic underneath is the same.

parameters (p^p) and the "general information" set ($\bar{t}$) do not affect the expected payoff, while the outcome depends entirely on both the proportion of favorable precedents available and the overall trials' duration, where the latter is basically insignificant and the former plays the main role. In other words, in a very transparent system ($\beta \rightarrow 0$) and for a given distribution of favorable (negative) precedents a greater α will move the position of the efficient payoff frontier to the right (left).

4. Concluding Remarks

Agents take their decisions base on the available information and pursuing their own welfare. Moving from this basic assumption we showed that we could have an excess of trials even when the agent do not follow any particular strategy. We have assumed that agents cannot decide to settle once the trial is started, and that, without lack of generality, this information is available. On the other hand, we show that an increase in the demand for justice can just coincide with a move of the efficient frontier of "amount of litigation". In fact, most of the literature assesses that only a small proportion of claims are litigated: interacting the precedent weight and the transparency level we show how this is actually the case.

Stating the superiority of a legal system, which weighs precedents more heavily, is not so straightforward. In fact, the agents' decision to file relies on several variables among which the time dimension and the evaluation of the probability of winning play a determinant role. In our model these variables are functions of the weight of the precedent (α), within the considered legal system and the degree of transparency (β), which together define the reference institutional framework. In general, a little transparency introduces a negative externality in the system. This effect can be interpreted in two ways. The first case (the over-dimension of trials' demand) occurs when the negative externality of a little transparency outweighs the positive externality of precedents (in terms of better prediction about trial outcomes and so in terms of efficient individual rational choice). The second case (an inefficient trials' demand rationing) occurs when the positive externality of precedents is not considered in the individual choice. So the individual choice implies an inefficient rationing, respect to the efficient level.

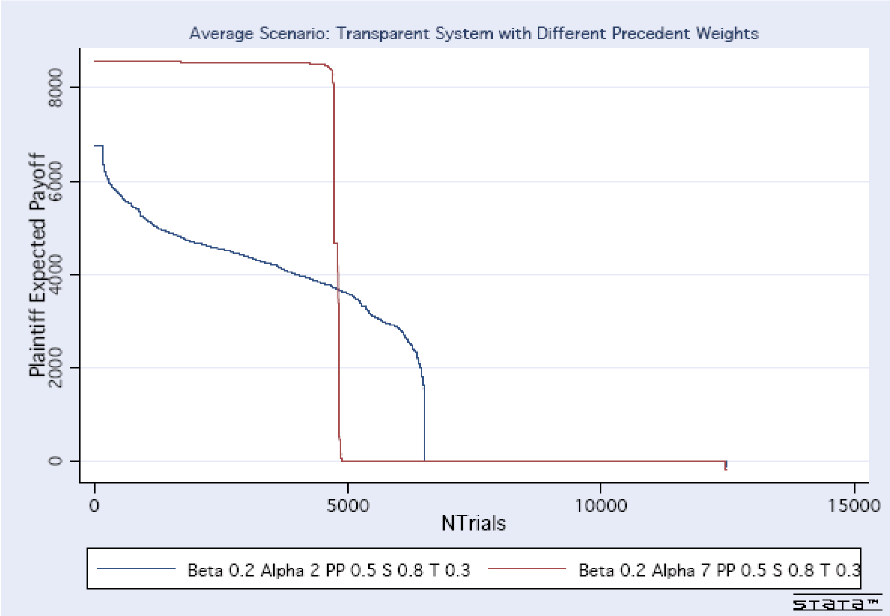
The relationship between α and β is analyzed both for the case in which β is assumed to be independent from α, and for the case of dependence. In the first scenario β plays a more relevant role, because even though α can assume high values its (positive) effects cannot be used by the agents. This is apparent when $\beta \rightarrow 1$, but it is confirmed also for lower β values. The implications in policy terms move to focus on the reasons of such lack of transparency: from the agency problem between the lawyer and a potential plaintiff/defendant to the lack of reliable statistics about the courts outcomes; from the courts' understaffing to the judges' productivity. In the second scenario,

α becomes the more relevant variable and the system is characterized by a reinforced positive effect of the precedent, which affects not only other relevant variables but also the degree of available information (level of transparency). Basically we witness a move of the efficient payoff frontier, which can determine either a greater or a lower amount of litigated claims, but not congestion of the system.

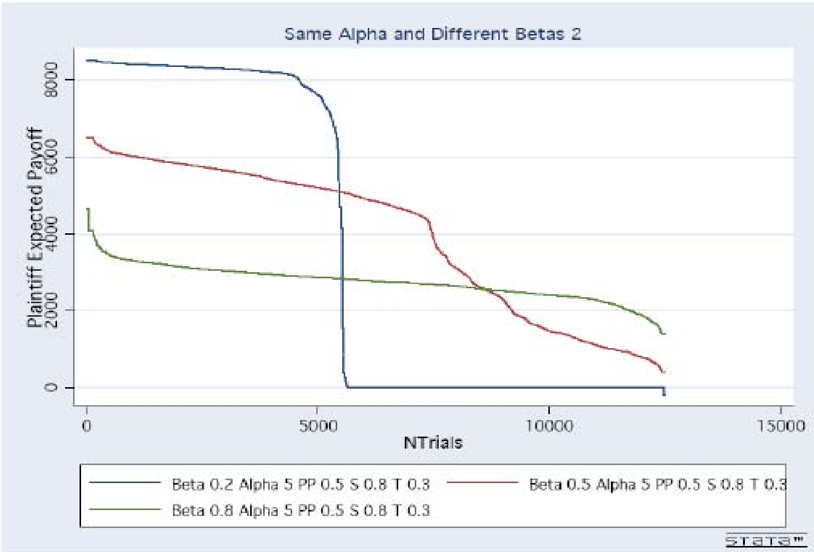
The main findings can describe both different legal system and different branches of the same legal system. For instance in Italy, the precedent weights more in the administrative justice than in the civil justice system. As a consequence administrative justice is delivered at a faster pace. Finally, further developments of this analysis concern the adoption of a different rule of cost sharing, the introduction of risk aversion of the agents, and the extension of the model to a more dynamic context where the more recent precedents weigh more than the older ones.

Beta Independent

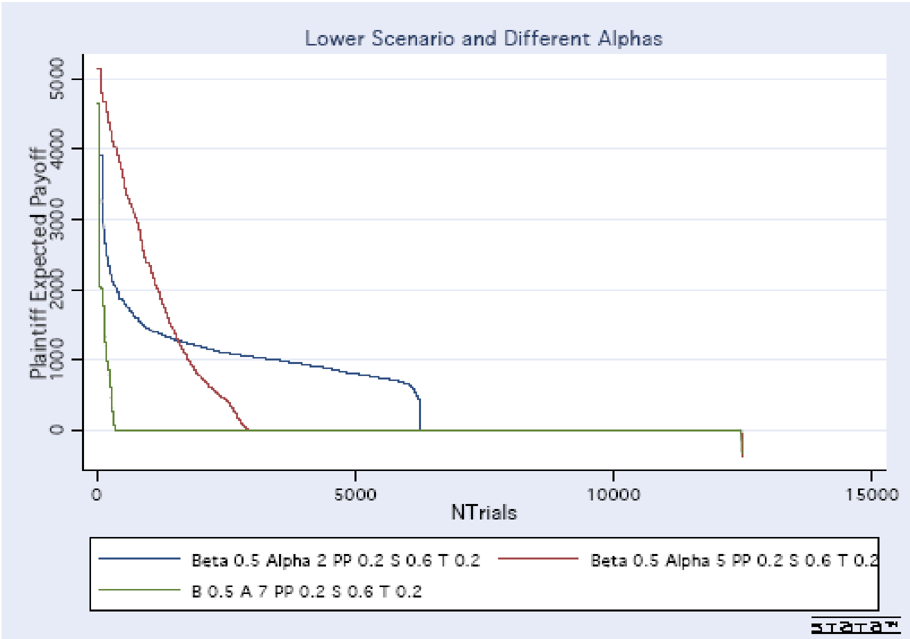
Graph 1



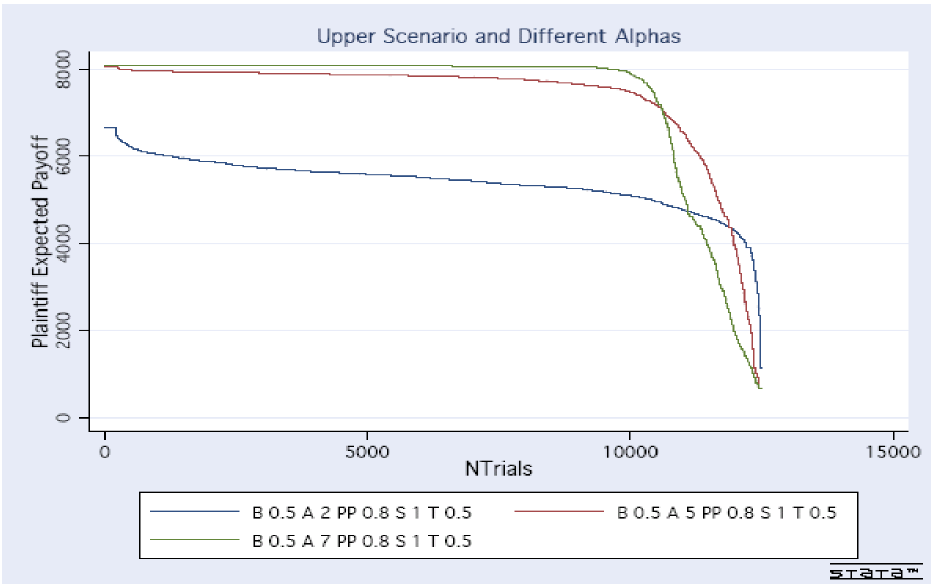
Graph 2



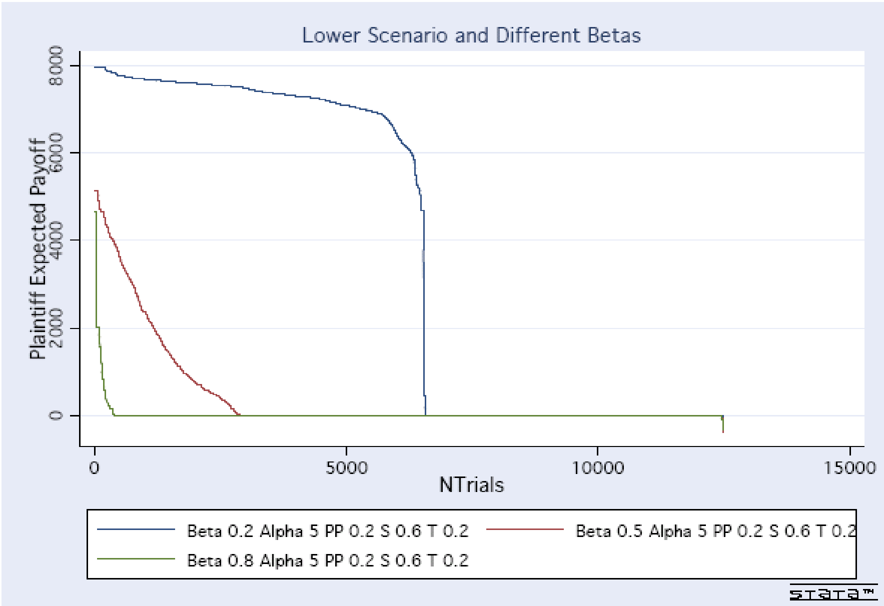
GRAPH 3



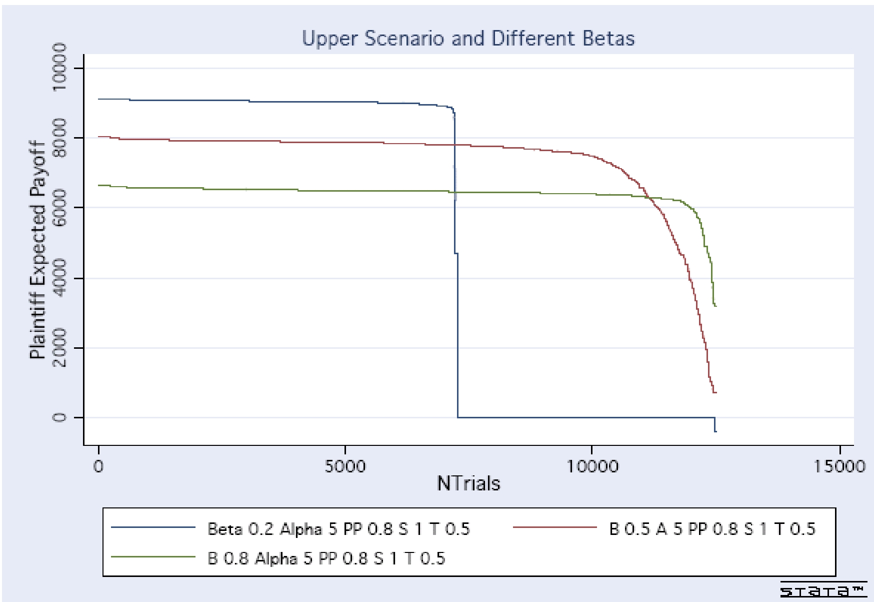
GRAPH 4



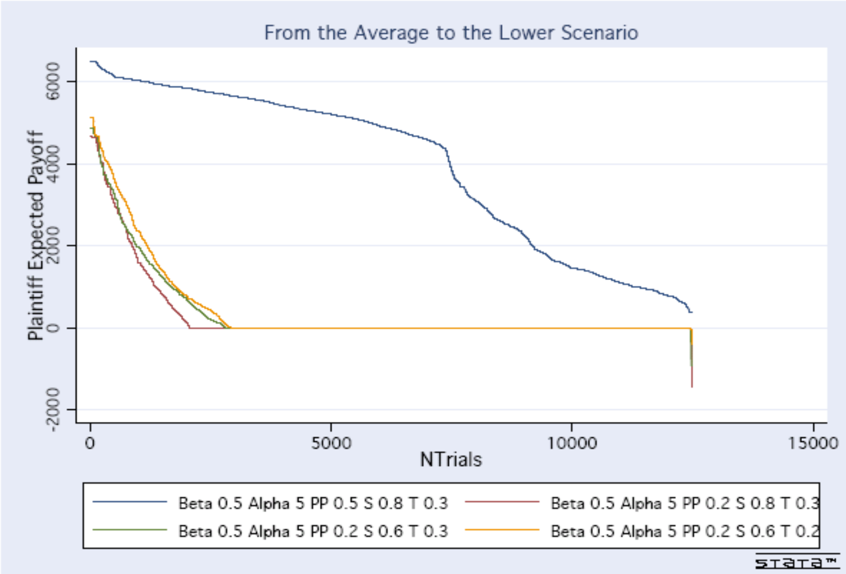
GRAPH 5



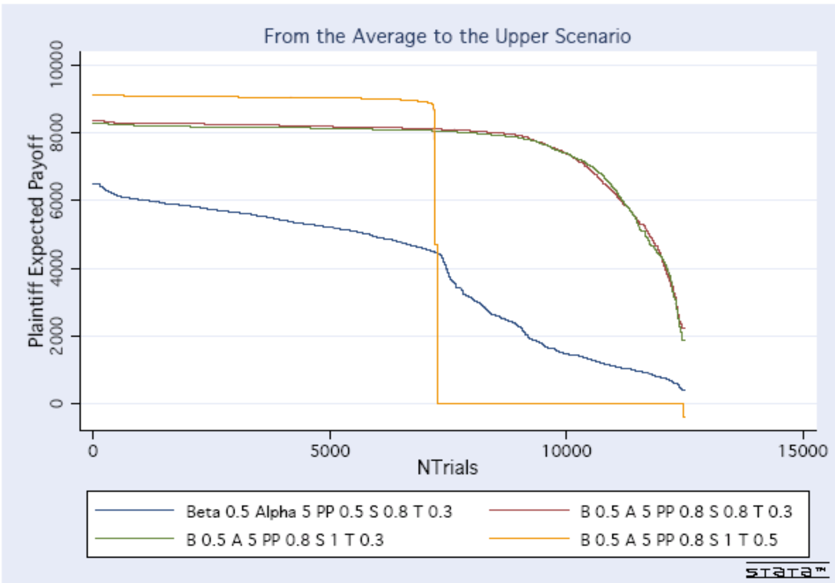
GRAPH 6



GRAPH 7

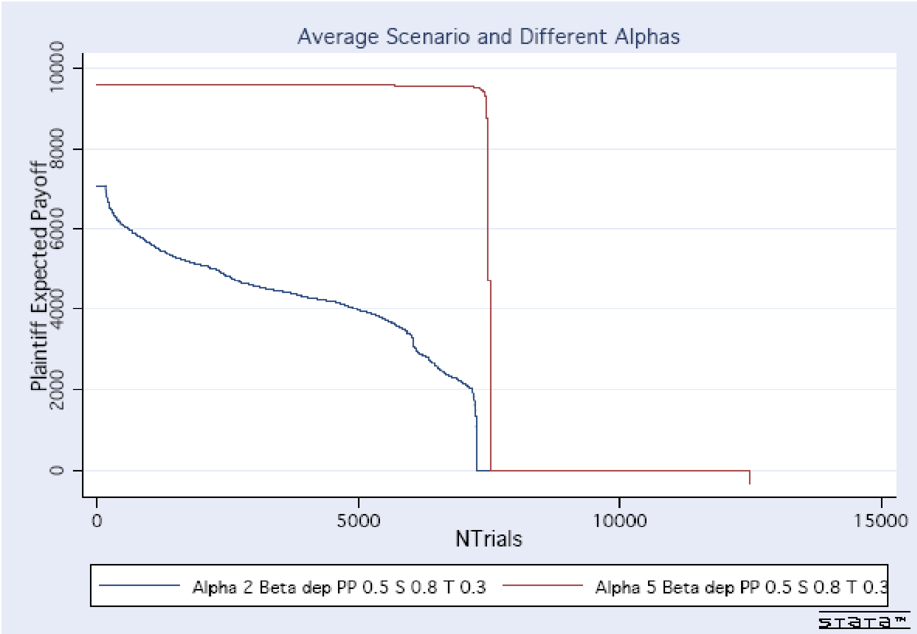


GRAPH 8

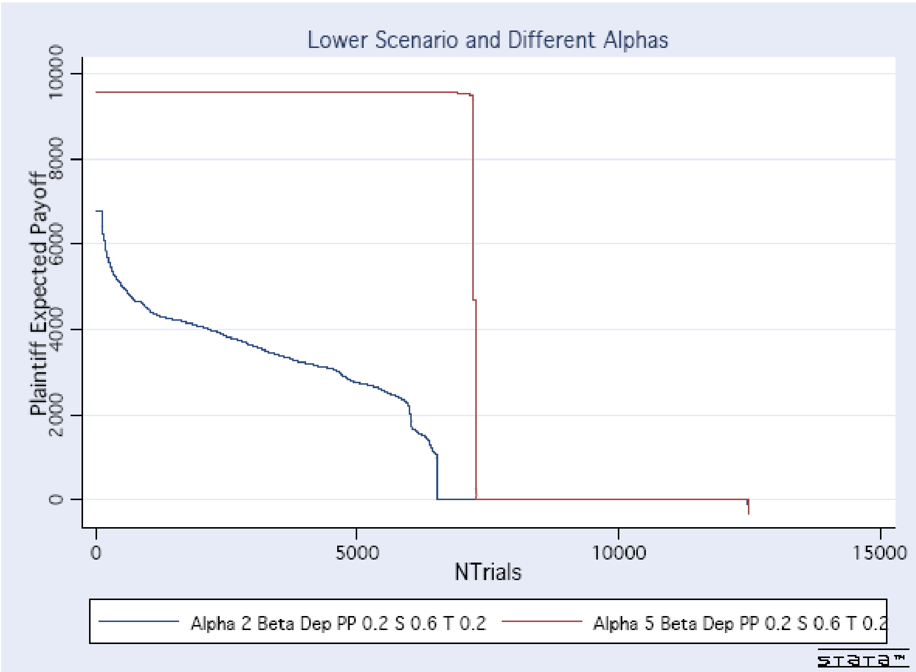


BETA DEPENDENT

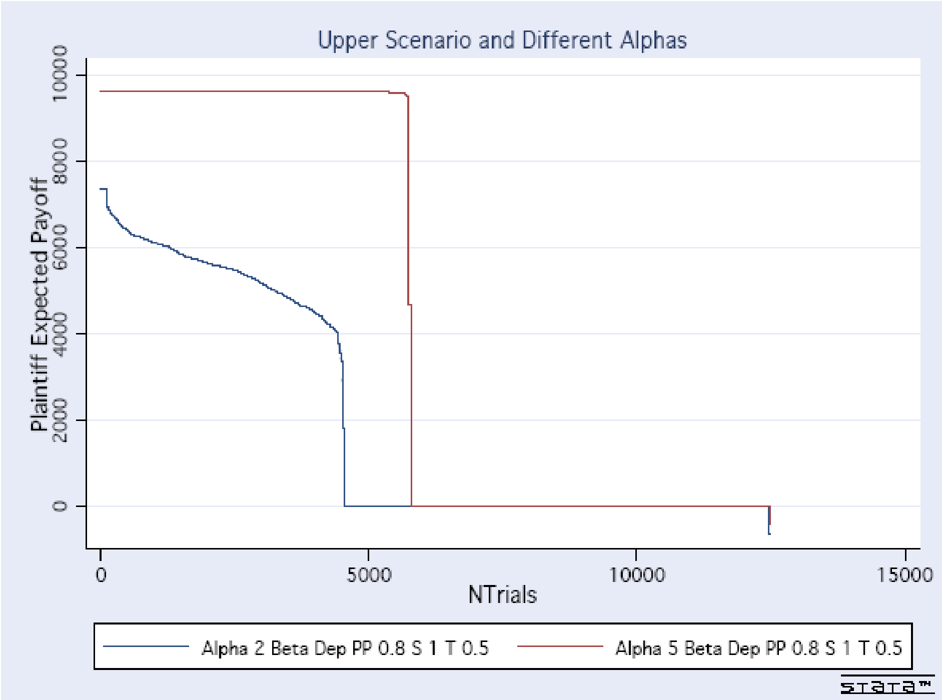
GRAPH 9



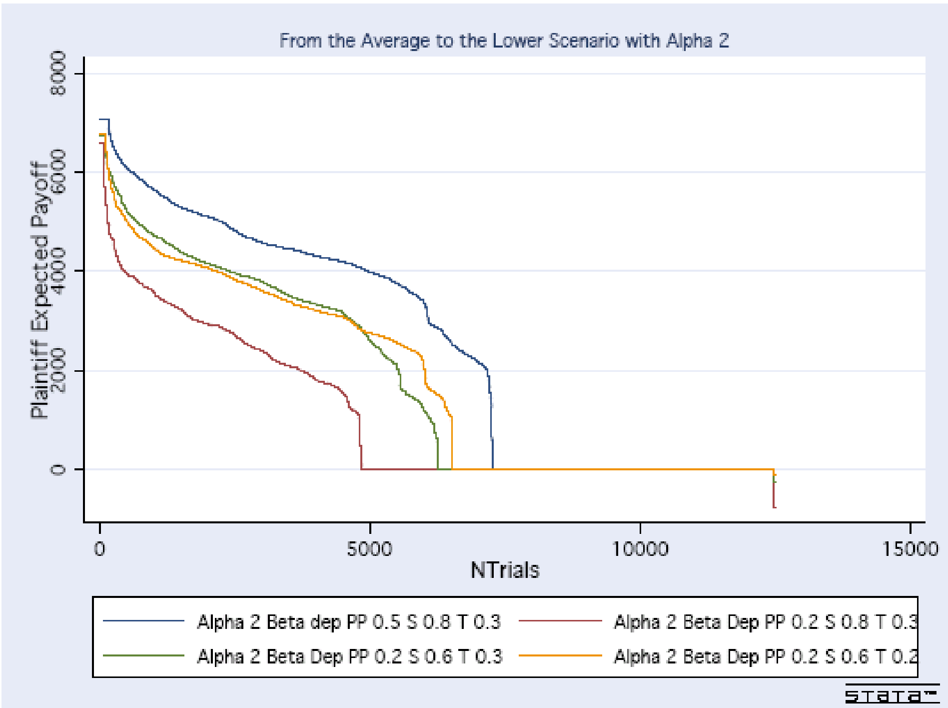
GRAPH 10



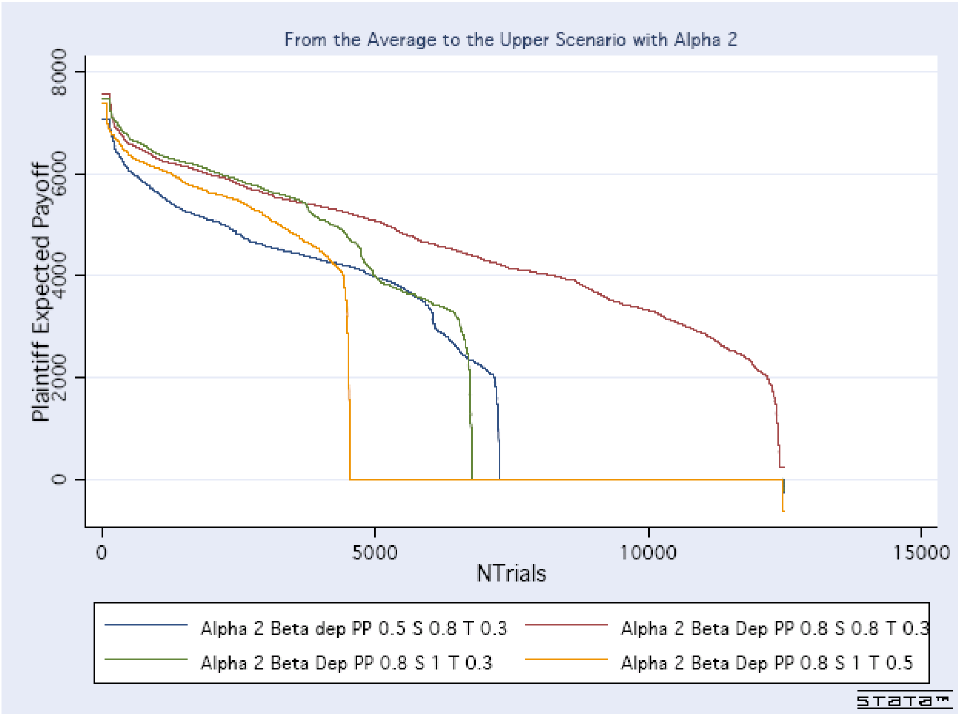
GRAPH 11



GRAPH 12

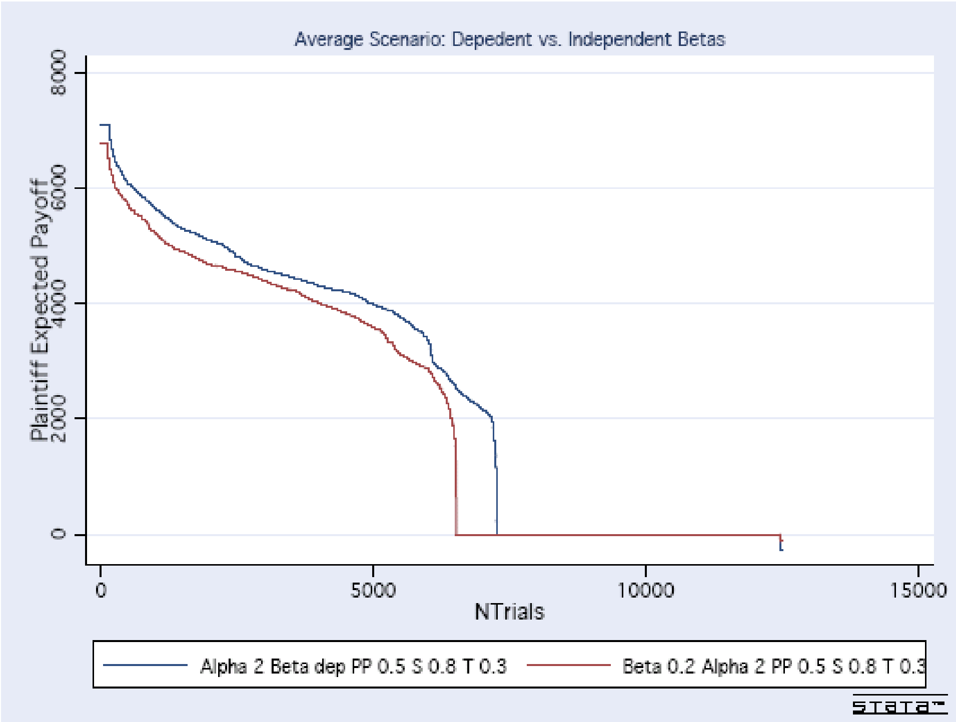


GRAPH 13


From the Average to the Upper Scenario with Alpha 2
Plaintiff Expected Payoff
0
2000
4000
6000
8000
0
5000
10000
15000
NTrials
Alpha 2 Beta dep PP 0.5 S 0.8 T 0.3
Alpha 2 Beta Dep PP 0.8 S 0.8 T 0.3
Alpha 2 Beta Dep PP 0.8 S 1 T 0.3
Alpha 2 Beta Dep PP 0.8 S 1 T 0.5

EXOGENOUS VS. ENDOGENOUS TRANSPARENCY: A COMPARISON.

GRAPH 14



GRAPH 15

APPENDIX

Extreme values of the plaintiff payoff in a not precedent-bound system

The extreme values of the expected discounted plaintiff payoff are:

$$\begin{cases} t = 0 \Rightarrow E(G) = p^p Q - \overline{S} > 0 \\ t = 1 \Rightarrow E(G) = p^p Q e^{-r} - 2se^{-r} Q(1 - p^p) - \overline{S} < 0 \end{cases}$$

Where the second inequality is satisfied for $p^p < \dfrac{2sQe^{-r} + \overline{S}}{2sQe^{-r} + Qe^{-r}}$

If $Qe^{-r} < \overline{S}$ the previous condition will be always satisfied because the second term of inequality is greater than 1 and, so, the probability is always smaller than 1. Otherwise, we assume the probability is such that the condition is satisfied. In the contrary case, in fact, the plaintiff payoff is always positive and he/she always decides to file. In such scenario there would not be any individual choice problem. He most interesting case is when the plaintiff payoff is positive for *t=0* and negative for *t=1*, and there is a threshold t^* where *E(G)=0.*

$\dfrac{\partial E(G)}{\partial t} < 0$ and $\dfrac{\partial^2 E(G)}{\partial t^2} > 0$

Trend of the payoff function in a precedent- bound system

In this case the extreme values of the expected discounted plaintiff payoff are the same of the previous case considering q^p instead of p^p. The expected discounted plaintiff payoff is a decreasing function of τ, so that:

$$\begin{cases} \dfrac{\partial E(G)}{\partial \tau} = -rq^p Q e^{-r\tau} - \left[2sQ\left(1 - q^p\right)\left(e^{-r\tau} - r\tau e^{-r\tau}\right)\right] \\ \dfrac{\partial E(G)}{\partial \tau} = -rq^p Q e^{-r\tau} - 2sQe^{-r\tau}\left(1 - q^p\right)\left(1 - r\tau\right) < 0 \end{cases}$$

since $(1-r\tau) > 0, \forall\ r,\ \tau \in [0;1]$

Reputational Extension

In a possible extension of the model, we should take into account the role of reputation, introducing reputational gains (γ) and reputational costs (δ). In this case the (7) and the (7′) become:

$$E(G) = q^p e^{-r\tau}(Q + \gamma_p) - 2s\tau Q e^{-r\tau}(1 - q^p) - \delta_p(1 - q^p) - \overline{S}$$

$$E(L) = q^{d}\gamma_{d}e^{-r\tau} - (1-q^{d})(Q + 2s\tau Q + \delta_{d})e^{-r\tau}$$

where γ_p and γ_d are the reputational gain respectively of the plaintiff and of the defendant, while δ_p and δ_d represent their respective reputational costs. However, the weight of reputation in the model depends on the nature of the agents. For instance we would expect to play a very important role when a professional practitioner or a renowned institution is involved.

REFERENCES

Bebchuk, L. A. (1984). “Litigation and Settlement Under Imperfect Information”, *RAND Journal of Economics* 15: 404-415.

Brito, D., Sheshinski, E., and M. D. Intriligator (1991). “Externalities and Compulsory Vaccinations”, *Journal of Public Economics* 45: 69-90.

Browne, M. J. and R. Puelz (1999). “The Effect of Legal Rules on the Value of Economic and Non-Economic Damages and the Decision to File”, *Journal of Risk and Uncertainty* 18: 189-213.

Chase, O. G. (1988). “Civil Litigation Delay in Italy and The United States”, *American Journal of Comparative Law* 36: 41-87.

Cooter, R. D. and D. L. Rubinfeld (1989). “Economic Analysis of Legal Disputes and Their Resolution”, *Journal of Economic Literature* 27: 1067-1097.

Daughety, A. F. and J. F. Reinganum (2000). “Appealing Judgments”, *RAND Journal of Economics* 31: 502-525.

Djankov, S.; R. La Porta; F. Lopez-de- Silanes; A. Shleifer (2003). “Courts”, *Quarterly Journal of Economics* 118 (2): 453-517.

Fon, V. and F. Parisi (2007). “Judicial Precedents in Civil Law Systems: A Dynamic Analysis”, George Mason University School of Law, *University of Minnesota Law School Legal Studies Research Paper* 07-19 (http://ssrn.com/abstract=534504), forthcoming in *International Review of Law and Economics*.

Gravelle, H. S. E. (1990). “Rationing Trials by Waiting: Welfare Implications”, *International Review of Law and Economics* 10: 255-270.

Gravelle, H. S. E. (1995). “Regulating the Market for Civil Justice” in A. A. S. Zuckerman and R. Cranston (eds.) *Reforms of Civil Procedure. Essays on ‘Access to Justice’.* Oxford: Claredon Press.

Hadfield, G. K. (2007). “The Quality of Law: Judicial Incentives, Legal Human Capital and the Evolution of Law”, *USC Center in Law, Economics, and Organization Research Paper N.C07-3* (http://ssrn.com/abstract=967494).

Heise, M. (2000). “Justice Delayed? An Empirical Analysis of Civil Case Disposition Time”, *Case Western Law Review* 50: 813-49.

Kessler, D. P. (1996). “Institutional Causes of Delay in the Settlement of Legal Disputes”, *Journal of Law, Economics, and Organization* 12: 432-60.

Kessler, D. P. and D. L. Rubinfeld (2007). “Empirical Study of the Civil Justice System”, in A. M. Polinsky and S. Shavell (eds.), *Handbook of Law and Economics*. Elsevier.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A. (2008). “The Economic Consequences of Legal Origins.” *Journal of Economic Literature*, forthcoming.

Landes, W. and R. A. Posner (1976). “Legal Precedent: A Theoretical and Empirical Analysis”, *Journal of Law and Economics* 19: 249.

Miller, G. P. (1989). “Some Thoughts on the Equilibrium Hypothesis”, Boston University Law Review 69: 561-68.

Miller, G. P. (1989). “The Legal-economic Analysis of Comparative Civil Procedure”, *American Journal of Comparative Law* 45: 905-18.

P'ng, I. P. L. (1983). “Strategic Behavior in Suit, Settlement, and Trial” *Bell Journal of Economics* 14: 539-550.

Priest, G. L. (1989). “Private Litigants and the Court Congestion Problem”, Boston University Law Review 69: 527-59.

Shäfer, H.-B., and C. Ott (2004), *The Economic Analysis of Civil Law*. Cheltenham, UK: Edward Elgar.

Shavell, S. (1995). “The Appeals Process As a Means of Error Correction”, *Journal of Legal Studies* 24: 379-426.

Shavell, S. (2006). “The Appeals Process and Adjudicator Incentives”, *Journal of Legal Studies* 35: 1-29.

Spier, K. H. (1992). “The Dynamics of Pretrial Negotiation”, *Review of Economic Studies* 59: 93-108.

Spier, K. H. (2007). “Litigation”, in A. M. Polinsky and S. Shavell (eds.), *Handbook of Law and Economics*. Elsevier.

Vereeck, L. and M. Mühl (2000), “An Economic Theory of Court Delay”, *European Journal of Law and Economics* 10: 243-268.

Weiler, P. C., H. H. Hiatt et al. (1993), *A Measure of Malpractice: Medical Injury, Malpractice Litigation and Patient Compensation*, Cambridge, Harvard University Press.

World Bank (2001) “Enforcing contracts” in http://www.doingbusiness.org.