Legal fees and delay in settlement

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Abstract

We develop a dynamic model of litigation under several fees schemes prevalent in England and Wales: hourly fees, conditional fees and legal aid. Our results differ from those produced by Gravelle and Waterson (1993)'s one-shot model of litigation under alternative fee schemes. We then test the predictions from this model using a unique set of data collected from individual case files specifically for this purpose. We analyse the role of fees in determining the timing of settlement and the amount paid by the defendant in settlement of the case. The results suggest that conditional fee agreements lead to higher payouts from defendants and lawyers, but lower net payouts to clients. Having controlled for case complexity (via estimated quantum and liability), there is no significant difference in case duration across the fee schemes.

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1 Introduction

An important contribution of economists' work on litigation has been to illuminate the roles played by legal costs and fees in the outcome of legal disputes. This work spans Posner (1973)'s early contribution on the necessary conditions for settlement, to more recent material on the role of the principal-agent relationship between lawyer and client (see Rickman (1994)). The importance of such analysis has been to help inform policy debate on, *inter alia*, the choice of cost allocation rules, and professional regulations on the fees that lawyers may charge. Moreover, the risk-sharing attributes of differing fee schemes can also have an impact on the demand for legal services and, for this reason, policymakers concerned with maintaining 'access to justice' are interested in the academic debate surrounding these issues.

The profusion of theory in these areas has encouraged some empirical work. The various roles played by legal costs are now reasonably well understood (starting with Danzon and Lillard (1983)). Yet, for understandable reasons of data availability, only Kritzer (1990) and Thomason (1991) provide empirical evidence on the role played by the remuneration arrangements that litigants may agree with their agents. Kritzer finds that contingent fee cases may settle before hourly fee ones (with little impact on settlement amounts), while Thomason finds that contingent fee lawyers produce worse outcomes for their clients than if no lawyer were used. the general limitation of evidence may hamper policy debate so that, for example, discussions about whether to introduce contingent fees in England and Wales received no empirical input (LCD (1989)), and the same was true of recent policies to withdraw legal aid from a large percentage of civil cases in this jurisdiction.

The aim of this paper is to improve this position by examining a unique set of data that allow us to compare the role of several different fee schemes in the England and Wales. Our starting point is the introduction, in 1995, of conditional fees, which allow lawyers to defray their hourly fees if the case is lost, but to receive these and a mark-up in the event of success. With the assistance of the (then) Lord Chancellor's Department (Fenn *et al.* (2002), we collected data from individual claimant case files run under this arrangement, as well as those run under more traditional hourly fees and legal aid (which conditional fees largely replaced in 1999; LCD (1998)). These data allow us to examine crucial case outcomes like settlement timing and settlement amount alongside case characteristics such as the claimant's loss and strength of evidence concerning causation and liability. While others have used limited (e.g. non-comparative) data to assess the role of conditional fees (see Yarrow (1990)), this is the first statistical comparison of its kind. At a time when conditional fees are being relied upon to replace legal aid, such analysis is of clear policy relevance.

Our work also has theoretical relevance, however. In order to derive predictions about the possible effects of the fee schemes covered, we extend Gravelle and Waterson's (1993) analysis of conditional and hourly fees to allow for a dynamic (as opposed to one-shot) bargaining framework. We show that their results on settlement timing and amounts do not carry over to this dynamic context. We then use our results to construct and derive predictions about the effects of fees on the conditional probability of settlement and on settlement amounts for the situation where the lawyer acts as perfect agent for his client. Accordingly, we provide new results on the dynamics of pre-trial negotiation (see Spier (1992)) and on the role of fees in litigation.[1] In turn, we then contribute to the empirical analysis of these dynamics (see Kessler (1996); Fournier and Zuehlke (1996); Kessler, 1996; Fournier and Zuelhke, 1996; Fenn and Rickman (1999), Fenn and Rickman (2001)), by considering the role of fees in settlement timing.

The paper is structured as follows: Section 2 briefly summarises the alternative fee schemes currently available to litigants in England and Wales (particularly those relevant to our data period), before Section 3 develops a model of settlement outcomes and delay. Section 4 presents our data while Section 5 outlines the methodology underlying our empirical work. Section 6 presents our empirical results on case outcomes and duration. A final section presents conclusions.

2 Legal fees in England and Wales

The financial arrangements available to lawyers and clients in England and Wales have long been subject to regulation, by statute and professional bodies. Thus, while varying contracts on the basis of inputs (e.g. billable hours) are available, lawyers in England and Wales are still unable to charge on the basis of outputs (e.g. damages won—as with US-style contingency fees). Payment on the basis of inputs, as embodied by 'hourly fees' (which allow the lawyer to reclaim for each hour billed) have been traditional in England and Wales. However, the fact that the client is liable for such costs whenever the case is lost has led to various means of helping to shift this risk. 'Legal aid' (introduced in 1949) allowed clients with suitable claims, but insufficient means, to shift this risk to the tax-payer by having the bill paid out of public funds. It is interesting to note that resulting expenditure increases have seen

[1]Specifically, our new results relate to our dynamic extension of Gravelle and Waterson (1993). Other theoretical models of related fees (and conditional fees, especially) also exclude a time element – see Emons (2007) and Emons and Garoupa (2006), for example.

significant cuts in legal aid, to the point where State support was almost totally removed from personal injury litigation in 2012. In 1995, 'conditional fees agreements' (CFAs) were introduced. These allow the lawyer to claim normal hourly fees (plus a pre-specified mark-up) when the case is won but nothing if the case is lost. Effectively, the lawyer insures the client against 'own costs' in return for a risk premium. The demise of legal aid has been complemented by the rise in use of CFAs so that, for most areas of personal injury litigation, this is now a principal means of litigation funding.

Our paper focuses on these three types of payment mechanism, looking in particular at how they influence settlement outcomes (i.e. timing and amounts).[2]

Our data were collected during the early/middle period of these changes and although we have seen that their relative importance has developed since then, there is considerable value in examining such data. Whatever the nature of the fees available to litigants, the different incentives and risk sharing they provide need to be understood in order to evaluate existing fees and reform proposals. To give an idea of the prevalence of these funding mechanisms, an initial postal questionnaire sent to a random sample of legal firms revealed that approximately 45% of present caseload involved hourly fees, 22% involved CFAs, and 32% involved legal aid. Thus, each of the mechanisms we cover appears well represented in the population of cases at large.

3 Model

In order to think about the relationship between legal fees and the results of litigation, we develop a model of pre-trial negotiation between a plaintiff and defendant.[3] We model the litigation process under three different fee

[2]It should be noted that various alternative arrangements exist within the three broad classes we have mentioned. In particular, within the class of 'hourly fees', one may find circumstances where the the client pays directly, and others where a third party, such as an insurer or trade union, funds the lawyer (thereby shifting risk from the client). Further distinctions exist between policies purchased 'before the event' (as with traditional legal expenses insurance) and policies purchased 'after the event'. Although our data contain such distinctions, the current paper's scope does not extend beyond the three broad mechanisms outlined above. In addition, recent legislation has seen the approval of US-style contingency fees ("damage-based agreements"): our data collection pre-dates this development. (See Fenn and Rickman (2014a) for a discussion of possible implications.)

[3]Gravelle and Waterson (1993) assume that the plaintiff's lawyer bargains on his behalf and they allow for varying degrees of conflict between principal and agent by assuming the the lawyer's objective function is a weighted average of his client's and his own payoff. For reasons of tractability, we assume that the lawyer acts as a perfect agent ($\lambda = 1$ in Gravelle and Waterson (1993)).

schemes (hourly fees, conditional fees and legal aid) as a dynamic extension to Gravelle and Waterson (1993) (see Spier (1992), Fenn and Rickman (1999)); the dynamics here allow us to consider issues of settlement timing. Pre-trial bargaining can take place over T periods, in each of which the defendant can make an offer of settlement (S_t) to the plaintiff. Acceptance of any of these ends the game while rejection of every offer brings the case to trial, in Period $T+1$. Each period of pre-trial bargaining costs the defendant and the plaintiff's lawyer an amount c_d and c_p respectively; trial costs them k_d and k_p. The plaintiff pays the lawyer a fee depending in whether the case settles, or on the outcome at trial. Following Gravelle and Waterson (1993) we call the per-period settlement fee f^s, the successful trial fee f^w and the losing trial fee f^o. The probability with which the plaintiff wins at trial (i.e. the defendant's liability for the damages in question) is π. This is common knowledge amongst the parties, as is the common discount factor δ.

The potential for trial comes about because the plaintiff's side has private information about the true level of damages arising from the defendant's alleged negligence. In particular, we assume that the level of damages is $x \in [\gamma\underline{x}, \gamma\overline{x}]$, where $\gamma > 0$ is a 'severity parameter'. We assume that the defendant's priors over x are uniformly distributed; the cumulative distribution function is denoted $G(x)$ with associated density function $g(x)$. Thus, increases in γ imply a higher mean and variance of the anticipated damages (a reasonable assumption is most personal injury cases).

We assume that UK cost rules are in place, whereby the loser pays the winner's legal costs and denote the expected transfer from defendant to plaintiff at trial as

$$\tau_T^{\theta} = \pi\left(k_p + \sum_{i=0}^{T} \delta^{-i} c_p\right) - (1-\pi)\theta\left(k_d + \sum_{i=0}^{T} \delta^{-i} c_d\right) \tag{1}$$

The θ here captures the fact that the plaintiff may have legal expenses insurance that pays the defendant's costs if the case is lost (in which case $\theta = 0$). However, we assume that the defendant does not have such support, so that $\theta = 1$. Given this, the parties' current value payoffs at trial are

$$U^p(T+1) = \pi(x - f^w) - (1-\pi)f^o + \tau_T^0 \tag{2}$$

$$U^d(T+1) = \pi E(x|T+1) + k_d + \tau_T^1 \tag{3}$$

where $E(x|T+1)$ is the expected damage payout conditional on reaching trial.

We solve for the Perfect Bayesian Equilibrium (PBE) of the game, in which both parties' strategies must be best responses to the other, and beliefs are updated according to Bayes' rule. In particular, the defendant chooses a series of settlement offers to maximise his expected payoff. In Period t, the offer is accepted by all (remaining) plaintiffs with damages less than x_{t+1} (with this type being indifferent between accepting and rejecting), so the solution amounts to solving for these optimal 'cut-off' points. Once we have these, we can determine the probability of settlement in each period, $G(x_{t+1}) - G(x_t)$.

The defendant's expected payoff (in present value terms) at the start of the case is

$$U^d = G(x_2)S_1 + c_d + [1 - G(x_2)]\delta \left\{ \frac{G(x_3) - G(x_2)}{1 - G(x_2)} S_2 + c_d + \right. \\ \left. \ldots + [1 - G(x_{T+1})]\delta U^d(T+1) \right\}$$

The program is solved by $\max_{S_1} U^d$ subject to $S_1 = \delta(S_2 - f^s)$, and making use of the Envelope Theorem. We have the following result:

Proposition 1 *The PBE of the litigation game with* $2 \leq T \leq \infty$ *involves*

$$x_1 = \gamma \underline{x} \tag{4}$$

$$x_t = \gamma x_{t-1} + \frac{f^s + c_d}{\delta^{T-t+1}\pi}, \qquad t = 2, \ldots, T \tag{5}$$

$$x_{T+1} = \gamma \underline{x} + \sum_{i=1}^{T} \delta^{1-i} \frac{c_d}{\pi} - \frac{c_d}{\pi} + f^w + \left(\frac{1-\pi}{\pi} \right) f^o - \frac{f^s}{\delta^T \pi} - \frac{\tau_T^1 - \tau_T^0}{\pi} + \frac{k_d}{\pi} \tag{6}$$

$$S_1 = \delta^T (\pi \gamma \underline{x} + k_d + \tau_T^0) + \sum_{i=1}^{T-1} \delta^i c_d \tag{7}$$

$$S_t = \delta^{1-t} S_1 + \sum_{i=2}^{t} \delta^{2-i} f^s, \qquad t = 2, \ldots, T \tag{8}$$

Proof The proof is by induction on T and is contained in the Appendix. *Q.E.D.*

Using (4) and (5) we can compute the conditional probability of settling in any period $t = 1, \ldots T - 1$. Following Fenn and Rickman (1999), this hazard function can be shown to be

$$\lambda(t) = \frac{(1-\delta)\delta^{t-T}}{(1-\delta)\beta - \delta^{-T}(\delta - \delta^t)} \tag{9}$$

for $\beta \equiv \pi\gamma\Delta/(f^s + c_d), \Delta \equiv \overline{x} - \underline{x}$.

In order to examine the effects of alternative fee schemes on settlement timing and amounts we must first specify f^s, f^w and f^o. Adapting Gravelle and Waterson (1993), calling the conditional fee mark-up μ, and letting 'H' denote hourly fees, 'C' denote conditional fees and 'L' denote legal aid, we have

$$f_H^s = c_p, \qquad f_H^w = f_H^o = k_p + \sum_{i=0}^{T} \delta^{-i} c_p \tag{10}$$

$$f_C^s = (1+\mu)c_p, \qquad f_C^w = (1+\mu)\left(k_p + \sum_{i=0}^{T} \delta^{-i} c_p\right), \qquad f_C^o = 0 \tag{11}$$

$$f_L^s = f_L^w = f_L^o = 0 \tag{12}$$

Since the only fee to enter (8) and (9) is f^s, and since $f_C^s > f_H^s > f_L^s$, we have an immediate result:

Proposition 2 *Conditional fees lead to higher settlement amounts and faster settlements than hourly fees which, in turn, lead to higher settlement amounts and faster settlements than legal aid.*

Both of these results are interesting because they apparently differ from those found by Gravelle and Waterson (1993). However, setting $T = 1$ in Proposition 1 returns their results, indicating that a genuine difference is introduced by the dynamic model. The reason is that settlement timing and settlement amounts over time are influenced by the costs and benefits of settling in Period t and carrying on to $t+1$. This is exactly what the settlement fees represent and, therefore, differences in these across fee schemes influence the temporal aspects of the game.

We have other comparative static propositions. Defining $\Omega \equiv (1-\delta)\beta - \delta^{1-T}$, we begin with

Proposition 3

$$\frac{\partial \lambda}{\partial t} \gtreqless 0 \Leftrightarrow \Omega \lesseqgtr 0; \qquad \frac{\partial \lambda}{\partial k_i} > 0; \qquad \frac{\partial \lambda}{\partial c_d} > 0 \qquad \frac{\partial \lambda}{\partial \gamma\Delta} < 0; \qquad \frac{\partial \lambda}{\partial \pi} < 0$$

Proof Straightforward differentiation of (9). *Q.E.D.*

These results follow those in Fenn and Rickman (1999). Further (again for both fee schemes), we have

Proposition 4

$$\frac{\partial S_t}{\partial t} > 0; \qquad \frac{\partial S_t}{\partial \gamma \underline{x}} > 0; \qquad \frac{\partial S_t}{\partial k_i} > 0; \qquad \frac{\partial S_t}{\partial c_d} \gtreqless 0; \qquad \frac{\partial S_t}{\partial \pi} > 0$$

Proof Straightforward differentiation of (8). *Q.E.D.*

Thus, cases with higher trial costs are predicted to settle earlier, for higher sums; higher defence pre-trial costs are expected to speed the case but we cannot predict their effect on settlement amounts. Cases with severe injuries and higher plaintiff liability should take longer to be resolved but should end up with higher sums paid to the plaintiff. These sums should increase over time. We now proceed to testing of the predictions in Propositions 2–4. First, however, we describe our data in a little more detail.

4 Data

In order to examine the effects of fees on litigation outcomes, it is important to have data from individual cases. These were obtained via a two-stage process. First, we contacted all members (roughly 1,200 in total) of the Law Society's Accident Line Protect scheme seeking information about the relative numbers of cases currently being run under our three fee schemes.[4] We also asked whether they would be willing to open case files for data collection on a confidential basis. In particular, we asked for a random sample of personal injury (non-clinical negligence) cases closed between June 1999 and June 2000, and run under CFAs, hourly fees and legal aid. The final sample consisted of 19 firms, of various sizes and geographical locations, who were visited between January and August 2001.[5] In turn, this produced a sample of 635 cases, with observations on a variety of case-level details (see Section 6), as well as outcome and fee scheme. In order to focus on cases that closely reflect those modeled on Section 3, the current paper excludes cases which were run under hourly fees but funded by a third party.

[4]Accident Line Protect was used because it guaranteed that the firms in question had access to the types of insurance policies used under CFAs and, hence, may be offering clients CFAs.

[5]The types of firms ranged from sole-partnerships to multi-partner/multi-branch practices. The regional locations involved the North, Midlands, Home Counties, South East, South West and Wales.

5 Methodology

5.1 Loglinear regression accounting for sample design

The outcomes from personal injury cases are characteristically distributed asymmetrically, with a large number of 'small' cases and a small number of very large cases. For this reason, multiple regression analyses to test for the impact of fee schemes on the financial outcomes of litigation are appropriately estimated in loglinear form. Moreover, this aids the interpretation of the results in terms of proportionate changes attributable to fee scheme differences. Consequently, in this study we estimate a series of regressions with the following form:

$$\ln(y_j) = \rho_j' X + \sigma_j' Z + \epsilon_j$$

where y_j indicates one of five measures of outcome:

1. *Damages*: the award agreed to cover the client's losses.

2. *Claimed*: the legal costs claimed against the losing party for work done.

3. *Costs*: the total cost incurred, including any success fee.

4. *Settlement*: the total settlement paid by the defendant (i.e. damages plus costs claimed and recovered from the losing party).

5. *Payment*: the total paid to the client (i.e. damages minus unrecovered costs—including any success fee and insurance premium).

The variable 'Settlement' is most closely related to S_t from Section 3.

X represents a vector of case characteristics which are known to influence outcome, such as the estimated extent of the client's losses, and the strength of the client's case. Z is a vector of indicator (dummy) variables for each of the fee schemes we consider here: *conditional fees*, *hourly fees*, and *legal aid.* The ρ_j and σ_j are corresponding vectors of coefficients. Finally, ϵ is an error term with assumed zero mean and constant variance.

Consistent estimation of these five regressions requires that we take account of the sample design by which the data were generated. As explained above, our data on claims were drawn from a clustered sample of law firms, and the sample was weighted in order to increase the proportion of CFA cases, and to reduce the proportion of legal aid cases. Consequently, it is necessary to take into account the fact that observations on claims from within a given firm are not independent of each other, and also to incorporate sampling weights. This was done using STATA's **svyreg** command, and these corrections are incorporated in the results reported below.

5.2 Discrete time proportional hazards regression

In addition to the outcomes on settlement amounts and costs considered above, it is also possible that the choice of fee scheme affects the duration of a given claim, from its initiation to its closure, as predicted in Proposition 1. In principle a regression of settlement durations against case characteristics and fee scheme indicators as outlined in the previous section could be undertaken. However, given the presence of some cases which were either withdrawn or went to judgement in court, the sample of cases which went to a settled conclusion is incomplete, leading to so-called 'censored' duration data. For this reason, and to facilitate the testing of our dynamic bargaining model, it is necessary to model the conditional probability of settlement, using data on settlement timings together with information on each case's disposition at conclusion.

A conventional proportional hazards regression approach is adopted here, where the settlement hazard for case i at a point in continuous time t is given by

$$\lambda_{it} = \lambda_0(t) \exp(\rho_\lambda' X_{it} + \sigma_\lambda' Z)$$

where $\lambda_0(t)$ is the baseline hazard, and X and Z are defined as above, and ρ_λ and σ_λ are corresponding vectors of coefficients. Consequently it is assumed that different fee schemes may have a proportional effect on the baseline hazard, which itself summarises the behaviour of the settlement hazard over time. While it is possible to choose a parametric form for the function $\lambda_0(t)$, it seems preferable to allow for as much flexibility as possible when estimating the baseline hazard. One way of achieving this was initially suggested by Prentice and Gloeckler (1978), who developed a method for estimating a piecewise linear hazard function, in which continuous time was divided up into discrete intervals, within which the hazard of "failure" (settlement in this context) was assumed to be constant. For example, if all intervals are assumed to be of unit length, so that individuals are recorded as settling or not during the interval $[t-1, t]$, it can be shown that the settlement hazard for the i'th case in the k'th interval is given by

$$\lambda_k(X_{ik}) = 1 - \exp[-\exp(\rho_\lambda' X_{it} + \sigma_\lambda' Z + \eta_k)]$$

where η_k is a parameter to be estimated for each interval, interpretable as the logarithm of the baseline hazard over the interval. Moreover, Meyer (1990) extended this model by incorporating a gamma distributed random variable which varies across all cases reflecting unobserved heterogeneity. In this case the discrete time hazard is now given by

$$\lambda_k(X_{ik}) = 1 - \exp[-\exp(\rho_\lambda' X_{it} + \sigma_\lambda' Z + \eta_k + \ln(\nu_i))]$$

where ν_i is the heterogeneity component which is assumed to be distributed as $\Gamma(1, \upsilon)$. The parameters ρ_λ, σ_λ, and η_k can be estimated by maximum likelihood methods using STATA's **pgmhaz** command (Jenkins (1995)), and the parameter υ can likewise be estimated for the gamma heterogeneity. We are particularly interested in the estimates for σ_λ as these will reflect the impact of fee schemes on the settlement hazard and consequently on the duration of the claim.

6 Empirical results

6.1 Case outcomes

Table 1 gives a summary of the key results from the case outcome regressions, which are shown in detail in Tables 3 to 7 (Table 3 gives definitions for the variables used in the regressions). Apart from the effect of fee schemes, the most important factors affecting outcomes in Tables 3 to 7 were as follows:

1. *Damages*: estimated quantum (+ve); proportion of liability admitted (+ve).
2. *Claimed*: case duration (+ve); estimated quantum (+ve); proportion of liability admitted (-ve).
3. *Costs*: case duration (+ve); estimated quantum (+ve); proportion of liability admitted (-ve).
4. *Settlement*: case duration (+ve); estimated quantum (+ve).
5. *Payment*: estimated quantum (+ve); proportion of liability admitted (+ve); temporary injury (+ve).

It is evident therefore that 'easier' cases (i.e. those where liability is fully admitted) lead to higher awards relative to what was estimated, and to lower costs, and consequently to higher amounts paid to clients. Cases with high estimates of quantum are understandably associated with both higher awards and costs. The length of case seems to significantly increase costs, but, perhaps surprisingly, not the amount of damages awarded (after controlling for the estimated quantum). As mentioned above, 'Settlement' reflects most accurately the theoretical variable modeled in Section 3. Accordingly, the results for quantum and case duration are in line with Proposition 4.[6]

[6]The result on how payment varies with time would not be consistent with the proposition if δ could be thought of as being close to 1. However, in this case, we would not get the increasing hazard function reported below.

After controlling for the effect of all these factors on outcomes, the effects of fee schemes are separated out in Table 2. The rows in the Table give for hourly fees and legal aid respectively the estimated percentage change in the outcomes relative to the outcomes obtained under CFAs. Hence it is evident that cases run under CFAs achieve approximately 10% higher damage awards than both hourly fee cases or legal aid cases, after controlling for case complexity. However, this benefit comes at some cost: CFAs appear to cost lawyers some 33% more than hourly fee cases, and 15% more than legal aid cases, again controlling for case complexity. These additional costs do not include the success fee, and consequently must reflect additional work charged (some of which could relate to the necessary administration involved with insurance against costs). Once the success fees have been added to the costs claimed, CFA costs are seen to be 52% higher than hourly fee cases and 41% higher than legal aid cases, so that the average return for taking risk seems to be around 20-25% of costs. Because CFA cases yield higher damage awards as well as incurring higher costs, the overall settlements paid by defendants are some 18% higher than other fee schemes. However, because in most of our cases the success fee and insurance premium have not been recovered from the defendant, but are instead deducted from the client's award, the amount actually received by the client is lower under CFAs than under the other fee schemes (although the difference is not statistically significant in the case of hourly fees). Proposition 2 also suggests that CFAs will lead to more being paid by the defendant relevant to other fee schemes.

To summarise the distributional impact of CFAs, then, it appears that defendants pay more, plaintiffs get less, and lawyers receive more income. This is presumably an inevitable consequence of reforms which are explicitly designed to allocate risk away from the taxpayer towards the lawyer. Whether this is an efficient policy or not in a second best world depends on the cost of risk to the parties concerned and also the wider impact on defendant care levels (including any effect of low income plaintiffs finding it harder to bring cases) and government bureaucracy.

6.2 Case durations

Table 8 shows the results from the Prentice-Gloeckler-Meyer discrete time proportional hazards regression described above. Part (1) of the table shows the results for the basic Prentice-Gloecker model; Part (2) shows the results with inclusion of a gamma mixture distribution to capture the effect of unobserved heterogeneity. In practice, the second set of results are of little consequence here because the estimate of the variance of the gamma distribution is very close to zero, such that model (1) cannot be rejected.

The results confirm the evidence we have found elsewhere with other datasets that settlement timing is highly sensitive to the parties' prior estimates about the likely outcome in court, both with respect to quantum and liability. Cases with higher estimated quantum have lower settlement hazards and therefore longer durations, other things being equal—as in Proposition 3. Cases where liability is more fully admitted by the defendant have higher settlement hazards and therefore shorter durations, other things being equal—in contrast to the prediction in Proposition 3. This latter finding is reinforced by the coefficient on the indicator variable for "significant causational problems". Such cases have significantly lower settlement hazards and consequently last longer, showing that clients with weak cases can expect to wait longer for an outcome.

After controlling for these factors which determine the size and complexity of a case, the impact of fee schemes are revealed by the coefficients of the indicator variables for hourly fees and legal aid. It appears that hourly fees have higher hazards (shorter durations) and legal aided cases have lower hazards (longer durations), but it should be emphasised that neither coefficient is statistically significant. Figure 1 confirms this by showing the baseline discrete time hazard functions for each fee scheme derived from the results of Table 8. It can be seen that the settlement hazard functions increase (more or less) monotonically as litigation time elapses, and that the differences attributable to fee schemes are relatively small. We are unable therefore to confirm whether the fee scheme adopted for different personal injury cases has an impact on their expected durations and we are, therefore, unable to adjudicate on this part of Proposition 2. Taking this result together with those from the previous section, it would appear that the higher costs of CFA cases (before the addition of success fees) must result from more intensive work rather than longer cases.

7 Conclusions

The past two decades have witnessed some important developments in the ways that clients can pay their lawyers in England and Wales. Some of these have been the result of policy decisions (e.g. the introduction of CFAs and the 'downsizing' of legal aid). Others, such as the growing influence of insurers, have been market responses to these. It is important that the distributional and efficiency implications of these changes are understood, both to evaluate present policy and to inform future decisions. At the same time, more general conclusions are made possible if our empirical understanding of such matters can be linked with theoretical models. The present paper seeks to contribute on both fronts. By extending Gravelle and Waterson (1993)'s analysis of pre-trial bargaining with various fee schemes to a dynamic context we have indicated several new results and developed their framework for considering the relationship between fees and litigation. Further, by collecting new data, we have been able to test this framework and shed light on some of the effects of recent policy in this area.

We have found, relative to hourly fees and legal aid, CFAs pose some interesting distributional questions. They appear to produce higher payouts from defendants, and to lawyers, but at the expense of the plaintiff's net award. This partly reflects the intended shifting of risk to lawyers that underlies these schemes. Moreover, it is hard to draw clear welfare conclusions from such results: for instance, we need to know whether plaintiffs are willing *ex ante* to trade off lower sums if successful with reduced costs if not. We have also found that the additional costs of such cases cannot be explained by higher net awards or longer case duration, leaving the precise nature of lawyers' work on CFAs (their 'production functions') as important future research. Our model predicts these results on the financial result of litigation quite well (and the extra results from our dynamic setting are supported), but we cannot confirm our predictions on the timing of settlement. Other influences (such as those estimated damages, and the effect of time and liability on settlement amounts) receive support from the model, while our prediction on the link between liability and settlement timing is rejected. We have suggested elsewhere (e.g. Fenn and Rickman (1999)) that this may be the result of assuming the defendant's view on liability to be common knowledge amongst the parties, suggesting that future work should take account of more general information structures. (See Fenn and Rickman (2014b) for analysis of how information affects settlement hazards in clinical negligence litigation.)

The richness of this research area inevitably means that numerous topics for future study have emerged. Apart from those mentioned above, we suggest three here; each involves related developments that our model could be adapted to address. The first is that experience with CFAs has gradually 'opened the door' to US-style contingency fee arrangements – see footnote 2 earlier. As a result, our data may reflect some such cases and this may explain some differences between our predictions and results. Second, we have not explicitly allowed for any principal-agent conflict between (in particular) plaintiff and client. This may also have influenced some of our predictions.[7]

[7] For example, Gravelle and Waterson (1993) show settlement outcomes do not vary between CFAs andL hourly fees when the plaintiff's lawyer weights client and own payoff equally. This would be consistent with our empirical result on settlementL timing.

In a second best world, it is hard to now which of the fee schemes we have considered best address this issue (arguably, contingency fees would be more appropriate here), and there is obvious need to consider this point further. Finally, we have not considered the increasingly influential role of insurers and other third parties (such as trade unions) in this context. These will have a variety of impacts on litigation including risk transfer from plaintiffs, alternative monitoring technologies to address principal-agent issues and, perhaps, reputational effects on bargaining processes (see Swanson and Mason (1998)).

A better theoretical and empirical understanding of these issues will enable more informed policy debate on questions of access to justice and legal reform more generally. We hope that the current paper has contributed in this area and sketched out a research agenda on which future work can proceed.

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Appendix

A Proof of Proposition 1

We begin with the $T = 1$ game. P accepts S iff

$$S - f^s \geq \delta[\pi(x_2 - f^w) - (1 - \pi)f^o + \tau_1^0]$$

which defines the cut-off

$$x_2 = \frac{S}{\delta\pi} - \frac{f^s}{\delta\pi} + \left(\frac{1 - \pi}{\pi}\right) f^o - \frac{\tau_1^0}{\pi} + f^w \tag{A.1}$$

The defendant solves

$$\max_S \quad G(x_2)S + \delta\pi \int_{x_2}^{\gamma\overline{x}} xg(x)dx + [1 - F(x_2)]\delta(k_d + \tau_1^1)$$

yielding the FOC

$$G + gx_2'S - \delta\pi x_2 gx_2' - gx_2'\delta(k_d + \tau_1^1) = 0$$

When G is uniform on $[\gamma\underline{x}, \gamma\overline{x}]$, this becomes

$$x_2 - \gamma\underline{x} + \frac{S}{\delta\pi} - x_2 - = 0$$

Substituting for S from (A.1) and rearranging gives

$$x_2 = \gamma\underline{x} - \frac{f^s}{\delta\pi} + \left(\frac{1 - \pi}{\pi}\right) f^o - \frac{\tau_1^0}{\pi} + f^w + \frac{k_d + \tau_1^1}{\pi} \tag{A.2}$$

and substitution back into (A.1) then gives (again following rearrangement)

$$S = \delta\pi\gamma\underline{x} + \delta k_d + \delta\tau_1^1 \tag{A.3}$$

This final result has two features. First, as Gravelle and Waterson (1993) show in their analysis of the one-shot game (with a more general $G(x)$), when G is uniform, all fee schemes give the same settlement offer (regardless of the degree of lawyer self-interest). Second, the settlement offer here is the same as that in Fenn and Rickman (1999), where hourly fees are (implicitly) examined.

Now consider the $T = 2$ game. We begin by setting out the continuation game at $t = 2$. Based on (A.2) we have

$$x_3 = x_2 - \frac{f^s}{\delta\pi} - \frac{f^s}{\delta^2\pi} + f^w + \left(\frac{1-\pi}{\pi}\right) f^o - \frac{\tau_2^0}{\pi} + \frac{k_d + \tau_2^1}{\pi} \tag{A.4}$$

(Notice that we have introduced a second-period settlement fee, f^s/δ.) Also

$$S_2 - f^s - \frac{f^s}{\delta} = \delta[\pi(x_3 - f^w) - (1-\pi)f^o + \tau_2^0] \tag{A.5}$$

P's indifference between periods 1 and 2 requires $S_1 - f^s = \delta(S_2 - f^s) - f^s \Rightarrow S_1 = \delta(S_2 - f^s)$

$$\Rightarrow S_2 = \frac{S_1}{\delta} + f^s \tag{A.6}$$

Using this in (A.5) gives

$$\frac{S_1}{\delta} - \frac{f^s}{\delta} = \delta[\pi(x_3 - f^w) - (1-\pi)f^o + \tau_2^0]$$

$$\Rightarrow x_3 = \frac{S_1}{\delta^2\pi} - \frac{f^s}{\delta^2\pi} + f^w + \left(\frac{1-\pi}{\pi}\right) f^o - \frac{\tau_2^0}{\pi} \tag{A.7}$$

Hence, (A.4) gives

$$x_2 = \frac{S_1}{\delta^2\pi} - \frac{f^s}{\delta^2\pi} + \frac{f^s}{\delta\pi} - \frac{k_d}{\pi} - \frac{\tau_2^1}{\pi} \tag{A.8}$$

Equations (A.4), (A.6), (A.7) and (A.8) form the continuation game.

The defendant solves

$$\max_{S_1,S_2} \quad G(x_2)S_1 + c_d + [1-G(x_2)]\delta \left\{ \frac{G(x_3) - G(x_2)}{1 - G(x_2)} S_2 + c_d + \frac{1 - G(x_3)}{1 - G(x_2)} \delta U^d(T+1) \right\}$$

The FOC (using the Envelope theorem) is

$$G + g x_2' S_1 - \delta g x_2' (S_2 + c_d) = 0$$

given that $G(x)$ is uniform, and substituting for S_2 from (A.6), this becomes

$$x_2 - \gamma \underline{x} + \frac{S_1}{\delta^2\pi} - \frac{1}{\delta\pi}\left(\frac{S_1}{\delta} + f^s + c_d\right) = 0$$

$$\Rightarrow x_2 = \gamma \underline{x} + \frac{f^s + c_d}{\delta \pi} \tag{A.9}$$

Using (A.9) in (A.4) gives

$$x_3 = \gamma \underline{x} + \frac{c_d}{\delta \pi} - \frac{f^s}{\delta^2 \pi} + f^w + \left(\frac{1-\pi}{\pi}\right) f^o - \frac{\tau_2^1 - \tau_2^0}{\pi} + \frac{k_d}{\pi} \tag{A.10}$$

Substituting this into (A.7) yields

$$S_1 = \delta^2(\pi \gamma \underline{x} + k_d + \tau_2^1) + \delta c_d \tag{A.11}$$

so that (A.6) gives

$$S_2 = \delta(\pi \gamma \underline{x} + k_d + \tau_2^1) + c_d + f^s \tag{A.12}$$

We now complete the proof of Proposition 1 by induction on T. Specifically, we assume that the proposition holds for T pre-trial periods and show that, if so, it holds for $\tilde{T} = T + 1$ pre-trial periods. Having already shown that it holds for $T = 2$, we will therefore have shown that it holds for all finite T.

From Proposition 1, letting S_1 for the $T + 1$-period game be S_2 for the $\tilde{T} + 1$-period game (i.e. set $t = 2, T = \tilde{T}$), we have

$$S_2 = \delta^{\tilde{T}-1}(\pi x_2 + k_d + \tau_{\tilde{T}}^1) + \sum_{i=1}^{\tilde{T}-1} \delta^i c_d \tag{A.13}$$

$$\Rightarrow x_2 = \frac{S_2}{\delta^{\tilde{T}-1}\pi} - \frac{k_d + \tau_{\tilde{T}}^1}{\pi} - \frac{\sum_{i=1}^{\tilde{T}-1} \delta^i c_d}{\delta^{\tilde{T}-1}\pi} \tag{A.14}$$

Using $S_2 = S_1/\delta + f^s$ in (A.14) allows us to express x_2 as a function of S_1:

$$x_2 = \frac{S_1}{\delta^{\tilde{T}}\pi} + \frac{f^s}{\delta^{\tilde{T}-1}\pi} - \frac{k_d + \tau_{\tilde{T}}^0}{\pi} - \frac{\sum_{i=1}^{\tilde{T}-1} \delta^i c_d}{\delta^{\tilde{T}-1}\pi} \tag{A.15}$$

The defendant maximises

$$U^d = G(x_2)S_1 + c_d + [1 - G(x_2)]\delta \left\{ \frac{G(x_3) - G(x_2)}{1 - G(x_2)} S_2 + c_d + \ldots + [1 - G(x_{\tilde{T}+1})]\delta U^d(\tilde{T}+1) \right\}$$

and the FOC (using the Envelope Theorem) and the uniformity of $G(x)$ is

$$x_2 - \gamma \underline{x} + \frac{S_1}{\delta^{\tilde{T}}\pi} - \frac{\delta}{\delta^{\tilde{T}}\pi}(S_2 + c_d) = 0$$

Using $S_2 = S_1/\delta + f^s$ this yields

$$x_2 = \gamma \underline{x} + \frac{f^s + c_d}{\delta^{\tilde{T}-1}\pi} \tag{A.16}$$

Substitution in (A.15) gives

$$\begin{aligned} S_1 &= \delta^{\tilde{T}}(\pi\gamma\underline{x} + k_d + \tau^1_{\tilde{T}}) + \delta c_d + \delta \sum_{i=1}^{\tilde{T}-1} \delta^i c_d \\ &= \delta^{\tilde{T}}(\pi\gamma\underline{x} + k_d + \tau^1_{\tilde{T}}) + \sum_{i=1}^{\tilde{T}} \delta^i c_d \end{aligned} \tag{A.17}$$

Equations (A.16) and (A.17) are as predicted in Proposition 1. Thus, we have shown that the proposition holds for $T = 2$ and that, if it holds for T, it holds for $T + 1$. *QED*

Table 1: Impact of fee schemes on outcomes, controlling for case characteristics

	Percentage change relative to CFAs				
	damages	**costs claimed**	**total costs, inc lift**	**settlement**	**payment**
Hourly fee, private client	**-10.0**	**-33.5**	**-52.2**	**-18.0**	6.3
Legal aid	**-11.1**	**-15.3**	**-41.2**	**-17.6**	**13.1**

Figures in bold are significant at 5% level

Table 2: Variable names

Variable name	Variable description
cofact	Fee scheme
cf	1=Conditional fee arrangement
hf	2=Hourly fee, private client
la	3=Legal aid
injpt	Effect of injury
	1=permanent
	2=temporary
opli	Opinion about liability
	1=full liability
	2=probable liability
	3=doubtful liability
opcau	Opinion about causation
	1=no causational problems
	2=insignificant causational problems
	3=significant causational problems
admit	Proportion liability admitted
lopeclo	Ln(case duration)
lclaimed	Ln(costs claimed)
lcost	Ln(total costs including lift)
lpayment	Ln(payment to client)
ldamages	Ln(award agreed, net of costs)
lsettlement	Ln(total settlement, including costs)
lestqu	Ln(estimated quantum)
q1-q20	Elapsed settlement time (quarters)

Table 3: Damages against fee schemes (OLS regression with standard errors adjusted for sample design)

pweight:	pwt	Number of obs =	363
Strata:	<one>	Number of strata =	1
PSU:	location	Number of PSUs =	18
		Population size =	323
		F(10, 8) =	144.48
		Prob > F =	0.0000
		R-squared =	0.8023

ldamages	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lopeclo	.0023194	.050378	0.05	0.964	-.1039689	.1086076
lestqu	.8591112	.0492373	17.45	0.000	.7552295	.9629929
admit	.1600821	.04023	3.98	0.001	.0752043	.2449599
_Iinjpt_2	.1307837	.0751093	1.74	0.100	-.0276831	.2892505
_Iopli_2	.016761	.0563301	0.30	0.770	-.1020851	.1356071
_Iopli_3	-.0511735	.045988	-1.11	0.281	-.1481996	.0458527
_Iopcau_2	.0368538	.0631854	0.58	0.567	-.0964558	.1701634
_Iopcau_3	-.0435652	.1437997	-0.30	0.766	-.346956	.2598256
hf	-.1002101	.0507372	-1.98	0.065	-.2072563	.0068362
la	-.1105149	.0268546	-4.12	0.001	-.1671731	-.0538567
_cons	.9687701	.3548663	2.73	0.014	.2200676	1.717473

Table 4: Costs claimed against fee schemes (OLS regression with standard errors adjusted for sample design)

pweight:	pwt	Number of obs =	335
Strata:	<one>	Number of strata =	1
PSU:	location	Number of PSUs =	15
		Population size =	288.5
		F(10, 5) =	17.48
		Prob > F =	0.0028
		R-squared =	0.5202

lclaimed	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lopeclo	.1888722	.0888203	2.13	0.052	-.0016285	.3793729
lestqu	.443634	.0659949	6.72	0.000	.302089	.5851789
admit	-.3252997	.047792	-6.81	0.000	-.4278032	-.2227961
_Iinjpt_2	.059033	.0934609	0.63	0.538	-.1414206	.2594867
_Iopli_2	-.0513814	.0924927	-0.56	0.587	-.2497584	.1469956
_Iopli_3	-.028389	.1172579	-0.24	0.812	-.2798822	.2231041
_Iopcau_2	.1939005	.1143148	1.70	0.112	-.0512804	.4390814
_Iopcau_3	.2135486	.1622384	1.32	0.209	-.1344181	.5615153
hf	-.3364923	.0974887	-3.45	0.004	-.5455847	-.1273998
la	-.1626921	.0714748	-2.28	0.039	-.3159903	-.0093939
_cons	3.800062	.3658884	10.39	0.000	3.015309	4.584814

Table 5: Total costs against fee schemes (OLS regression with standard errors adjusted for sample design)

```
pweight:  pwt                                     Number of obs    =        336
Strata:   &lt;one&gt;                                   Number of strata =          1
PSU:      location                                Number of PSUs   =         15
                                                  Population size  =      289.5
                                                  F(  10,      5)  =       9.64
                                                  Prob > F         =     0.0110
                                                  R-squared        =     0.6085
```

lcost	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lopeclo	.1965685	.0857095	2.29	0.038	.0127399	.3803971
lestqu	.4648001	.0681266	6.82	0.000	.318683	.6109171
admit	-.3220852	.0478061	-6.74	0.000	-.4246192	-.2195513
_Iinjpt_2	.0645696	.0986681	0.65	0.523	-.1470523	.2761915
_Iopli_2	-.0299263	.1011988	-0.30	0.772	-.2469761	.1871235
_Iopli_3	.0176678	.0992058	0.18	0.861	-.1951076	.2304432
_Iopcau_2	.2072431	.1265576	1.64	0.124	-.0641958	.4786821
_Iopcau_3	.1639623	.135341	1.21	0.246	-.1263152	.4542398
hf	-.5218864	.0979255	-5.33	0.000	-.7319158	-.311857
la	-.4118471	.083678	-4.92	0.000	-.5913185	-.2323756
_cons	3.838655	.4395047	8.73	0.000	2.896011	4.781299

Table 6: Settlements against fee schemes (OLS regression with standard errors adjusted for sample design)

```
pweight:  pwt                                     Number of obs    =        336
Strata:   &lt;one&gt;                                   Number of strata =          1
PSU:      location                                Number of PSUs   =         15
                                                  Population size  =      289.5
                                                  F(  10,      5)  =      61.89
                                                  Prob > F         =     0.0001
                                                  R-squared        =     0.7333
```

lsettlement	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lopeclo	.1138958	.0607605	1.87	0.082	-.0164224	.244214
lestqu	.6778995	.0469484	14.44	0.000	.5772051	.7785939
admit	-.0551717	.0492532	-1.12	0.281	-.1608093	.0504659
_Iinjpt_2	.0572624	.0795418	0.72	0.483	-.1133379	.2278627
_Iopli_2	.005077	.0620419	0.08	0.936	-.1279897	.1381436
_Iopli_3	-.0261056	.0736847	-0.35	0.728	-.1841435	.1319324
_Iopcau_2	.1480475	.098574	1.50	0.155	-.0633727	.3594678
_Iopcau_3	.0776304	.1674343	0.46	0.650	-.2814805	.4367414
hf	-.1802419	.0597019	-3.02	0.009	-.3082897	-.052194
la	-.1769226	.0522521	-3.39	0.004	-.2889923	-.0648529
_cons	2.868267	.2332806	12.30	0.000	2.36793	3.368605

Table 7: Payments made against fee schemes (OLS regression with standard errors adjusted for sample design)

pweight:	pwt	Number of obs =	336
Strata:	<one>	Number of strata =	1
PSU:	location	Number of PSUs =	15
		Population size =	285
		F(10, 5) =	596.94
		Prob > F =	0.0000
		R-squared =	0.8115

lpayment	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lopeclo	.0332937	.0568866	0.59	0.568	-.0887159	.1553033
lestqu	.8893206	.043101	20.63	0.000	.7968782	.981763
admit	.210623	.0600823	3.51	0.003	.0817594	.3394866
_Iinjpt_2	.2078021	.0668644	3.11	0.008	.0643922	.351212
_Iopli_2	-.0122339	.0710206	-0.17	0.866	-.164558	.1400902
_Iopli_3	-.0745684	.0517613	-1.44	0.172	-.1855854	.0364485
_Iopcau_2	.0104054	.0656444	0.16	0.876	-.1303878	.1511986
_Iopcau_3	-.1381924	.1849321	-0.75	0.467	-.5348324	.2584475
hf	.0627265	.0633537	0.99	0.339	-.0731538	.1986067
la	.131303	.0449138	2.92	0.011	.0349726	.2276335
_cons	.3207768	.2158346	1.49	0.159	-.1421423	.783696

Table 8: Settlement hazard against fee schemes (PGM hazard model)

(1) PGM hazard model without unobserved heterogeneity

Residual df	= 8136	No. of obs	= 8165
Pearson X2	= 8508.556	Deviance	= 2592.163
Dispersion	= 1.045791	Dispersion	= .3186041

Bernoulli distribution, cloglog link

sett	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
q2	-.3965636	.9128334	-0.43	0.664	-2.185684	1.392557
q3	1.884713	.6212773	3.03	0.002	.6670323	3.102395
q4	2.597958	.6015598	4.32	0.000	1.418923	3.776994
q5	2.980049	.596779	4.99	0.000	1.810384	4.149714
q6	3.332739	.5942095	5.61	0.000	2.168109	4.497368
q7	3.392364	.5974026	5.68	0.000	2.221476	4.563251
q8	3.329615	.6049034	5.50	0.000	2.144026	4.515203
q9	3.680094	.6025805	6.11	0.000	2.499058	4.86113
q10	3.77165	.6093265	6.19	0.000	2.577392	4.965908
q11	3.380911	.6414411	5.27	0.000	2.12371	4.638113
q12	3.934199	.6272156	6.27	0.000	2.704879	5.163519
q13	3.823534	.6679474	5.72	0.000	2.514381	5.132687
q14	3.762949	.7087985	5.31	0.000	2.373729	5.152168
q15	3.744254	.7650015	4.89	0.000	2.244878	5.243629
q16	4.374402	.7115706	6.15	0.000	2.979749	5.769055
q17	4.096698	.8202114	4.99	0.000	2.489113	5.704283
q18	4.795896	.8223991	5.83	0.000	3.184024	6.407769
q19	5.287965	.9259992	5.71	0.000	3.47304	7.10289
q20	5.35962	1.176051	4.56	0.000	3.054603	7.664637
estqu	-.000026	.000012	-2.17	0.030	-.0000494	-2.53e-06
admit	.4425292	.1588336	2.79	0.005	.1312212	.7538373
_Iinjpt_2	.0927146	.1686878	0.55	0.583	-.2379075	.4233367
_Iopli_2	-.0009387	.1234457	-0.01	0.994	-.2428878	.2410103
_Iopli_3	-.1428578	.1930064	-0.74	0.459	-.5211434	.2354277
_Iopcau_2	-.0158086	.1603821	-0.10	0.921	-.3301519	.2985346
_Iopcau_3	-.5347148	.1868855	-2.86	0.004	-.9010036	-.168426
hf	.1809231	.1381694	1.31	0.190	-.089884	.4517302
la	-.120372	.1812282	-0.66	0.507	-.4755727	.2348286
_cons	-6.21096	.6299758	-9.86	0.000	-7.44569	-4.97623

Log likelihood (-0.5*Deviance) = -1296.0815
Cf. log likelihood for intercept-only model (Model 0) = -1454.0807
Chi-squared statistic for Model (1) vs. Model (0) = 315.99836
Prob. > chi2(28) = 1.611e-50

Table 8 (cont'd)

(2) PGM hazard model with Gamma distributed unobserved heterogeneity

PGM hazard model with Gamma heterogeneity

Number of obs = 8165
Model chi2(28) = .
Prob > chi2 = .

Log Likelihood = -1296.0815911

sett	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
hazard						
q2	-.396296	.9135208	-0.43	0.664	-2.186764	1.394172
q3	1.885234	.6220854	3.03	0.002	.6659694	3.104499
q4	2.598495	.602515	4.31	0.000	1.417588	3.779403
q5	2.980611	.5978329	4.99	0.000	1.80888	4.152342
q6	3.333334	.5955457	5.60	0.000	2.166086	4.500582
q7	3.39299	.5990359	5.66	0.000	2.218901	4.567079
q8	3.330274	.6071781	5.48	0.000	2.140227	4.520322
q9	3.680788	.6055737	6.08	0.000	2.493886	4.867691
q10	3.772383	.613047	6.15	0.000	2.570833	4.973933
q11	3.381684	.6458503	5.24	0.000	2.11584	4.647527
q12	3.935	.6326512	6.22	0.000	2.695027	5.174974
q13	3.824438	.6746096	5.67	0.000	2.502228	5.146649
q14	3.763975	.7162267	5.26	0.000	2.360197	5.167754
q15	3.745432	.7740288	4.84	0.000	2.228363	5.2625
q16	4.37554	.7190099	6.09	0.000	2.966306	5.784773
q17	4.098155	.8285623	4.95	0.000	2.474203	5.722108
q18	4.797582	.8340894	5.75	0.000	3.162797	6.432367
q19	5.290017	.9445143	5.60	0.000	3.438803	7.141231
q20	5.362267	1.18758	4.52	0.000	3.034654	7.689881
estqu	-.000026	.000012	-2.16	0.031	-.0000495	-2.39e-06
admit	.4426312	.1595841	2.77	0.006	.129852	.7554103
_Iinjpt_2	.0925052	.1685929	0.55	0.583	-.2379308	.4229412
_Iopli_2	-.0009501	.1235518	-0.01	0.994	-.2431072	.241207
_Iopli_3	-.1428544	.1928992	-0.74	0.459	-.5209298	.2352211
_Iopcau_2	-.0158336	.1602999	-0.10	0.921	-.3300156	.2983484
_Iopcau_3	-.5349189	.1878117	-2.85	0.004	-.9030231	-.1668146
hf	.1809106	.1382355	1.31	0.191	-.090026	.4518472
la	-.1204217	.181421	-0.66	0.507	-.4760003	.2351568
_cons	-6.211271	.6312261	-9.84	0.000	-7.448451	-4.97409
ln_varg						
_cons	-8.884793	8.476671	-1.05	0.295	-25.49876	7.729177

Gamma variance, exp(ln_varg) = .00013848; Std. Err. = .00117384; z = .11797084

Likelihood ratio statistic for testing models (1) vs (2) = -.0000877
Prob. test statistic > chi2(1) = .

Figure 1: Discrete time hazard functions, varying fee schemes