Court Delays and the Defendant Behaviour: An Economic Analysis

Andrew Torre* and Bharat R. Hazari**

Abstract
Court delays are consistently criticised as being inimical to social welfare. However, the theoretical basis for this assertion is not well established in the law and economics literature. As a first step, very little is known about the impact of court delay on the defendant’s optimal plea decision. If the defendant is rational in the sense of inter-temporally optimising, court delay may increase or decrease the probability of a trial depending on the defendant’s bail status. Some empirical support for this theoretical proposition is found using data on plea behaviour for a selection of cases heard in NSW Australia.

JEL Classification: K41.

Keywords: Static cost function, Time dependent cost function, Optimal plea.

1. Introduction

Court delays are a widely observed phenomenon. It is well documented that certain defendants have spent more time in jails awaiting a trial than what they would have spent if convicted for the original offence. This particular set of events has occurred in several cases in India. Trial delays are also quite common in many other countries, for example Australia, which are relatively rich compared to Third World Countries. These wealthier countries have the resources to expedite the trial process. There is a voluminous literature in law journals and books which analyse court delays from a legal perspective. Two hypotheses dominate this literature. Prior to the 1970’s, court delays were attributed to large case loads and understaffed courts adopting poor management practices which an economist would view as an inefficient system. Current literature postulates that long waits are the outcome of the voluntary actions of key actors in the legal process such as lawyers. Legal and popular thinking expresses various concerns about court delays. First, it exacerbates the mental, social and financial burdens already borne by accused persons, who are presumed innocent until proven guilty. Second, it may reduce the defendant’s probability of conviction due to deterioration in the quality of evidence. Third, it encourages guilty pleas and fourth it causes the erosion of public confidence in the judicial system, encouraging self-help as a remedy to address perceived wrongs. While we recognize the importance of these legal and public concerns we will be concentrating on the economic analysis of trial delays from the perspective of the defendant who voluntarily chooses the plea strategy.

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The object of this paper is to examine trial waiting time from the point of view of the defendants plea strategy. The prosecutor has been partially ignored from the analysis in the same spirit as is the separation in demand and supply analysis. In demand analysis the consumer maximizes utility subject to a budget constraint which takes the prices and income to be exogenously given. However, in a more sophisticated model the income variable is made endogenous by using a choice theoretic framework that incorporates labour-leisure choice. All these versions form building blocks to construct a general equilibrium model of an economy. An approach of going from simple to more complex frameworks does not invalidate the power and insight provided by ignoring some aspects of a particular problem. In this spirit our analysis concentrates solely on the defendant as an exceedingly important agent in the decision making process. The defendant’s behaviour is analysed by using a decision-theoretic approach. The defendant is confronted by the prosecutor to make a choice between a guilty or a not guilty plea. Only in the latter case the defendant goes to trial while in the former case there is no need for a trial. Hence, the defendant has to choose between a guilty and not guilty plea bearing in mind that a not guilty plea involves waiting for a trial. Our analysis focuses on the impact of waiting time on the choice between a guilty and not guilty plea - this is analysed in terms of decision theory using cost functions and the expected value framework.

By using a decision-theoretic framework to analyse trial delays we arrive at several interesting results. First, we find out the probability \( p^* \) which makes the defendant indifferent between a guilty plea and the decision to wait and go to a trial. It is then established that this \( p^* \) is increasing in sentence and legal costs and decreasing in expected costs of sentence, costs associated with waiting for a trial and the legal costs of a trial. An important implication of this finding is that a reduction in the costs of a guilty plea results in more defendants taking up the option of pleading guilty and a reduced sentence. This reduces trial delays as those who accept guilty pleas move out of the queuing system. This, of course, reduces the social costs of trial delays. These results are based on a static framework. We then proceed to dynamize the static model and obtain another two important results. For the defendant not on bail, it is shown that when the actual waiting time is greater than the time at which the defendant is indifferent between going (not going) to trial then the defendant opts for the guilty plea. Similar results have been obtained for the on bail case. These results suggest that in countries (jurisdictions, crimes) which have long court delays the court system will be characterised by a relatively large volume of guilty pleas by not on bail defendants. Similar remarks can be made for the on bail defendants. The dynamics also highlight the difference between on bail and not on bail defendants. This behaviour is exceedingly important for policy purposes - specifically for designing policies that reduce court delays. We also provide empirical support for our hypothesis that defendants on bail opt for a trial as the delay increases. This is tested by using a logit
model. The data used for this purpose is from the state of New South Wales in Australia and it does not reject the stated hypothesis regarding trial wait and defendant’s behaviour in the on bail case.

2. The Defendant’s Static Cost Function

We begin our analysis by constructing a cost function of the defendant in a static framework. The defendant faces the following choices: the sure option of a negotiated guilty plea with a discount in the punishment and a gamble of a not guilty plea which may result in a conviction or an acquittal. Let the defendant’s costs of a guilty plea be denoted as:

\[ dC_p^g = dC_p^g[s, l] \quad \text{where} \quad \frac{\partial dC_p^g}{\partial s} > 0 \quad \text{and} \quad \frac{\partial dC_p^g}{\partial l} > 0 \]  

(1)

where \( s \) denotes sentence costs and \( l \) the legal costs of a guilty plea respectively. The function is increasing in both variables.

The expected cost function of the defendant for a not guilty plea is given below:


(2)

where the term \( PS \) denotes the expected costs of the sentence (as \( P \) denotes the probability of conviction)\(^s\), \( W \) the waiting costs of a trial and \( L \) the legal costs of the trial. Note that the value of \( P \) lies in the closed interval \([0, 1]\). If \( P \) equals one then the defendant is certain to be sentenced (similarly if \( P \) equals zero the defendant is certain to be not sentenced). The defendant faces the following choice: plead guilty, not face a trial and obtain some discount on the punishment; or plead not guilty and face a trial with an uncertain outcome. It is assumed that the defendant has to choose on the basis of the cost functions specified in equations (1) and (2). An examination of these functions shows that the function in equation (1) represents the certain option as it does not involve any random variables. The cost function for a trial has a random component denoted by \( PS \). Hence, we have a situation in which the defendant has to choose between a certain and an uncertain option. Such a situation can be analysed by using expected utility theory and applying it to the defendant’s problem.

Our first task is to identify a probability that will make the defendant indifferent between the cost of a guilty plea and the cost of going to a trial – in other words find \( P \) such that \( dC_p^gIE^dC_D^T \) (where \( I \) denotes indifferences). Formally, we require that:

\[ dC_p^g(s, l)IE^dC_D^T = (PS, W, L) \]

(3)

The left hand side of this is not a function of \( P \) but only \( s \) and \( l \). As this is not a function of \( P \) it can be drawn as a straight line in the cost probability space as shown by line \( AB \) in Figure 1. The intercept \( A \) depends on \( s \) and \( l \). The right hand side of equation (3) is a function of \( PS \), \( W \) and \( L \). Given \( W \) and \( L \) we can draw the line \( CD \)
which is a function of $P$. Note that it is drawn for a fixed value of $W$ and $L$. The intercept $C$ depends on $W$ and $L$ and is derived by setting $P=0$. The intersection of the two curves $AB$ and $CD$ at point $e$ gives us, $P^*$, the probability at which the defendant becomes indifferent between pleading guilty and going to trial. From equations (1) to (3) it is clear that:

$$P^* = f(s, l; S, W, L)$$  \hspace{1cm} (4)

The probability $P^*$ is an exceedingly important variable in our analysis. Let us determine its behaviour with respect to variations in $s, l, S, W,$ and $L$. Changes in $s$ and $l$ shift the curve $AB$ while changes in $W$ and $L$ shift the curve $CD$. A change in $S$ pivots the curve. We arrive at the following proposition:

**Proposition 1:** The probability $P^*$ (the probability at which the defendant becomes indifferent) is an increasing function of $s$ and $l$ and a decreasing function of $W$, $L$ and $S$.

This is demonstrated in Figure 1 by dashed lines. We will only provide an interpretation for one of these shifts. Let us suppose that $s$ and $l$ both increase, that is, the cost of sentence and the legal cost of a guilty plea. Such an increase shifts the curve $AB$ to $A'B'$ and for a given $CD$ curve $P^*$ moves to $P^{++}$, that is, the probability at which the defendant will be indifferent between a guilty plea and a not guilty plea increases. This probability has to rise as the cost gap between a sure choice and the not sure choice increases, and this implies that the $P$ that makes the defendant indifferent must increase. Proposition 1 clearly shows the impact of costs on the probability of making the defendant indifferent between the guilty and not guilty pleas. An important implication of this comparative static result would be that a reduction in court delays could be reduced by lowering the cost of guilty pleas as more defendants would take up this option and move out of the queuing system.

**Proposition 2:** A reduction in the cost of guilty pleas results in more defendants taking up this option, hence, reducing trial delays by opting out of the system.

This is an exceedingly important result for policy makers who are concerned with the social costs of long delays in the delivery of justice.

3. Introducing Time in the Defendant's Cost Functions

In the previous section we have taken the important step of identifying the probability which makes the defendant indifferent between a guilty and not guilty plea. Equation (1) which shows the cost of a guilty plea is independent of time as it is assumed that guilty pleas are heard immediately by the court while a not guilty plea is time dependent (equation (2)). The time dependent cost function is given below:

$$EC^T_{Dt} = EC^T_{Di} [PS(t), W(t), L(t)]$$  \hspace{1cm} (5)
This is a general function which can be reduced to take account of the defendant who is on bail by setting \( W(t) = 0 \), hence in the case of a defendant on bail equation (5) becomes:

\[
EC_{Dt}^{T'} = EC_{Dt}^{T'}[PS(t), L(T)]
\]  

(5')

The distinguishing feature of the above costs is that they are time dependant and require present value calculations. A specific formulation is given below:

\[
S = \int_{0}^{\tau_1} ye^{-\eta} dt + \alpha P \int_{t=\tau_1}^{\tau_1+L\lambda} ye^{-\eta} dt - (1-\alpha P) \int_{t=\tau_1}^{\tau_1+L\lambda} ye^{-\eta} dt
\]

(6)

where:

\( T_1 \) = time at which trial begins

\( L \) = length of the sentence.

The above opportunity cost expression is (term by term): the present value of lost income due to being incarcerated while waiting for a trial; plus the present value of expected lost income due to being in jail if and when the defendant is convicted; minus the present value of income earned if the defendant is not convicted. Note that all costs are captured in \( y \) to keep the analysis as simple as possible.
It is easy to derive an expression for the defendant out on bail. It is a subset of the expression in equation (6) and is given below:

\[ S' = \alpha P \int_{t=T_1}^{T_1+L} ye^{-\eta t} dt - (1-\alpha P) \int_{t=T_1}^{T_1+L} ye^{-\eta t} dt \]  

(7)

The first term is absent as the defendant does not surrender any income while out on bail. By carrying out the integration in equations (6) and (7) we can obtain the cost functions for the defendant in both cases, i.e., not on bail (on bail). These are given below:

\[ G = \frac{Y}{r} e^{-\eta T_1} \left[ (1-\alpha P)(e^{-\eta L} - 1) - \alpha Pe^{-\eta L} \right] + \frac{Y}{r} \]  

(8)

and

\[ G' = \frac{Y}{r} e^{-\eta T_1} (1-e^{-\eta L}) \left( 2\alpha P - 1 \right) \]  

(9)

It is shown in the Appendix that \( G \) is increasing and \( G' \) decreasing in time provided that \( 2\alpha P - 1 > 0 \). This is a surprising result as it shows that for those not on bail costs of waiting are falling over time. Hence they would make their choice in a different manner to those in jail waiting for a trial. It is important for policy makers to treat these groups differently to reduce trial delays and associated costs.

The point \( T_0^* \) which makes the defendant indifferent between going to trial and accepting plea bargaining is shown below. By differentiating \( G \) with respect to \( T \) and setting it equal to \( C_g^d \) and solving we obtain:

\[ T_1^* = \frac{1}{r} \log \left( \frac{(1-\alpha P)(1-e^{-\eta L}) + \alpha Pe^{-\eta L}}{C_g^d} \right) \]  

(10)

It is clear that \( T_1^* \) is falling in \( C_g^d \) - so the cheaper the guilty plea is more defendants will accept it (can be easily seen from the diagram).

4. The Defendant’s Optimal Solution in the Not On Bail Case

We now proceed to derive a decision making procedure for the defendant not on bail. The defendant has two choices. First, the defendant may be offered a reduction in punishment in exchange for a guilty plea. Second, the defendant has to wait for a trial. Given these two choices we demonstrate a procedure for arriving at a solution for the defendant in Figure 2. The horizontal axis shows time and the vertical axis costs as derived from the cost function \( G' \). Let the curve EC denote the expected cost for the defendant derived for a given value of \( P^* \) and \( r \). The prosecutor’s offer is
shown by the line PP'. This shows the cost incurred by the defendant of accepting plea bargaining which reduces his sentence. The intersection of EC and PP' at e provides a solution for the waiting time which makes the defendant indifferent between accepting the prosecutor’s offer and going to trial. This is the point $T^*_i$ derived in equation (10). Let $\bar{T}$ denote the actual trial wait. Since $T > T^*_i$ the defendant accepts the prosecutor’s offer. Hence, we obtain the following proposition:

**Proposition 3:** The defendant not on bail accepts (rejects) the prosecutor’s offer for $T > T^*_i$ ($\bar{T} < T^*_i$).

Some comments are in order regarding the implications of Proposition 2. Let us assume that Figure 2 is based on a representative criminal, hence, it can be interpreted as an analysis of society as a whole. Proposition 2 then suggests that societies in which $T > T^*_i$ will be characterised by a large volume of guilty pleas. Similarly, for societies in which $T < T^*_i$ there will be relatively more trials. Note that this framework can be applied to each type of offence and for each court jurisdiction. For example, the analysis may be applied to sexual assaults, burglaries, murders and so on. If it is known that $T^*_i < \bar{T}$ then a guilty plea provides a way of reducing long waiting lines for a trial to occur.

**5. The Defendant’s Optimal Solution in the On Bail Case**

In discussing the on bail case it is important to first draw the expected cost curve. This is associated with equation (5') which does not contain $W(i)$ by definition. As
shown earlier this changes the shape of the cost curve which now becomes downward sloping. In Figure 3 the curve $EC'$ shows the expected costs of the trial for the on bail case drawn for a given $P'$ and $r$. The line $PP'$ shows the prosecutor's offer giving rise to the indifference point $T_0^*$. If the actual trial wait $T > T_0^*$ then the defendant goes to trial. The following proposition follows:

**Proposition 4:** The defendant on bail case rejects (accepts) the prosecutor's offer for $T > T_0^*$ ($T < T_0^*$).

Proposition 3 is the mirror image of Proposition 2. Comments made on Proposition 2 also apply to this Proposition with suitable adjustment towards its interpretation.

![Figure 3](image.png)

6. An Empirical Analysis of the Court Delays

In the previous sections of this paper we have established two Propositions. It is appropriate now to examine these Propositions empirically. We test these Propositions by using data from the criminal courts in New South Wales, Australia. We utilize a sequential logit model to explain plea behaviour and the factors which explain a defendant's acquittal and conviction after a trial and assume that each decision is
independent of the other in order to simplify the resulting statistical analysis. This is a reasonable assumption to make, as at each decision stage different decision makers are involved. Conditional independence between the two decisions ensures that the cases that go to trial, as opposed to guilty pleas, constitute a random or representative sample of the set of all cases processed in the criminal courts.

A test of our model requires that we can observe each defendant’s $T^*$, i.e., the point of indifference between going to trial and not going to trial. It is difficult to obtain information about $T^*$ for each defendant. Nevertheless, our model suggests that we can proceed by postulating an equivalent hypothesis that states increases in the trial wait increases the probability of a guilty plea for a defendant not on bail. This can be seen from Figure 3. If $T$ is increased then the probability of accepting a guilty plea increases as $T_0^*$ is further away from the new $T$. A similar hypothesis can be derived for the defendant on bail.

Our model of the defendant’s plea choice suggests that defendants not on bail will respond differently to increases in trial waiting time compared with defendants who are on bail. In this section of the study we use logit regression to empirically test this model for the on bail case. The data set is for defendants on bail, which comprises a sample of 363 defendants across six District Court areas in NSW for cases concluded in 1993, and two different offences, robbery and assault.

The estimating equations is given below:

$$
\ln \left( \frac{P(D_i = 1)}{1 - P(D_i = 1)} \right) = \alpha_0 + \alpha_1 LAID + \alpha_2 PCONV + \alpha_3 EJAIL + \alpha_4 DELAY
$$

(11)

This is estimated for each data set for the on bail case. The dependent variables used in the above equation are defined as follows; Dependent = 0, if defendant pleads guilty and 1 if the defendant went to trial and C is a constant. No court district or offence dummies are employed as average statistically significant effects suffice for the subsequent empirical work in this study. The remaining variables are defined below:

- **LAID** = A binary variable which = 1 if the defendant was legally aided, = 0 otherwise
- **PCONV** = A binary variable which = 1 if the defendant has prior convictions, = 0 otherwise
- **EJAIL** = Mean expected jail sentence for offence in 1993
- **DELAY** = Defendant’s actual wait in years for trial
The legal aid variable is a proxy for legal costs in the plea choice model and requires no further comment. The defendant’s prior conviction and bail status are used as proxy for sentence costs. Monetary and psychic imprisonment costs are proxied by the mean expected jail sentence in months handed down by the District Court in 1993 in a particular area and for a particular offence. We assume that defendants and their legal representatives make independent unbiased estimates of the likely jail sentence and its probability of occurrence which on average equal true mean expected jail sentence.

Since the imprisonment costs cannot be precisely observed and measured, particularly the psychic component, the logit regression results must be treated carefully. The results from estimating the logit regression for the bail case are given in Table 1. Results have also been obtained for the case in which the statistically insignificant variable has been dropped. These are presented in Table 2.

We now perform a likelihood ratio test to ascertain the statistical significance of the coefficients. The log of the likelihood for the unrestricted model is $-129.0081$ and for the restricted model $-241.0846$. The test statistic for the null hypothesis that the unrestricted model adds nothing to our knowledge about the determinants of the plea choice by defendants on bail charged with robbery and assault whose cases were completed in the NSW District Court in 1993 is 224.15. The critical chi-square value for the three degrees of freedom is 11.30 at the 0.01 probability level. Quite clearly the null hypothesis must be rejected so that the equation is statistically significant at the one percent level. The legal aid variable is not statistically significant in explaining plea choice, which stands in sharp contrast to popular perceptions in this matter. In general communities that have increased availability of legal aid are expected to be characterised by relatively more not guilty pleas by defendants. The hypothesis is not supported by our results. We now proceed to discuss other variables.

The predicted probabilities from the estimated equations are as follows. A defendant on bail with no prior convictions has a predicted probability of 0.69 of pleading not guilty and 0.31 of pleading guilty; which a similar defendant with prior convictions has a predicted probability of 0.39 of pleading not guilty and 0.62 of pleading guilty. If the trial was heard immediately the respective probabilities of going to trial would be 0.33 and 0.12 respectively. Consequently, it is clear that trial delays have a considerable impact on the decision to go to trial.

**Conclusion**

This paper by using a decision theoretic model analyses the behaviour of a defendant with regard to the impact of court delays. Two symmetrical propositions are established which relate to the behaviour of the defendants behaviours regarding the choice of a guilty plea or a trial. This choice is shown to depend on the expected
cost function of the defendant, which is based on the expected value framework. The two propositions show that depending on the prosecutor’s offer how the defendant decides whether to go to trial or not. It is shown that for the not on bail case the defendant accepts (rejects) the prosecutor’s offer for same $\bar{T} > T_0^*$ ($\bar{T} < T_0^*$). This highlights the importance of time delays for the court system and defendant’s decisions regarding trials. It shows that for societies with $\bar{T} > T^*$ there will be relatively more cases of acceptance of prosecutor’s offer. Other propositions can be interpreted in a similar manner. We have also established that some of our theoretical results are not contradicted by the empirical results.

**TABLE 1**

Initial Logit Regression Results. Choice Of Plea By Defendants On Bail Charged With Robbery And Assault Whose Cases Were Concluded In The NSW District Court In 1993

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-5.255654</td>
<td>0.734180</td>
<td>-7.158536</td>
<td>0.0000</td>
</tr>
<tr>
<td>LAID</td>
<td>0.179021</td>
<td>0.326151</td>
<td>0.548888</td>
<td>0.5834</td>
</tr>
<tr>
<td>PCONV</td>
<td>-1.330764</td>
<td>0.325256</td>
<td>-4.091431</td>
<td>0.0001</td>
</tr>
<tr>
<td>DELAY</td>
<td>0.896609</td>
<td>0.229976</td>
<td>3.898710</td>
<td>0.0001</td>
</tr>
<tr>
<td>EJAIL</td>
<td>0.379718</td>
<td>0.052465</td>
<td>7.237598</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Log likelihood: -128.8577
Obs with Dep = 1138
Obs with Dep = 0225
TABLE 2

Final Logit Regression Results. Choice Of Plea By Defendants On Bail Charged With Robbery And Assault In The NSW District Court In 1993

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>T-Statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-5.1817132</td>
<td>0.719533</td>
<td>-7.201491</td>
<td>0.0000</td>
</tr>
<tr>
<td>LAID</td>
<td>-1.308104</td>
<td>0.321895</td>
<td>-4.063765</td>
<td>0.0001</td>
</tr>
<tr>
<td>PCONV</td>
<td>0.895645</td>
<td>0.230069</td>
<td>3.892935</td>
<td>0.0001</td>
</tr>
<tr>
<td>DELAY</td>
<td>0.896609</td>
<td>0.229976</td>
<td>3.898710</td>
<td>0.0001</td>
</tr>
<tr>
<td>EJAIL</td>
<td>0.379718</td>
<td>0.052465</td>
<td>7.237598</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Log likelihood = -128.8577
Obs with Dep = 1138
Obs with Dep = 0225

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean All</th>
<th>Mean D = 1</th>
<th>Mean D = 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1.0000</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>PCONV</td>
<td>0.490358</td>
<td>0.246377</td>
<td>0.64000</td>
</tr>
<tr>
<td>DELAY</td>
<td>1.681074</td>
<td>1.9572</td>
<td>1.511689</td>
</tr>
<tr>
<td>EJAIL</td>
<td>11.844</td>
<td>19.551</td>
<td>7.1177</td>
</tr>
</tbody>
</table>

Notes

1. Ms Kiran Bedi was given an award by UN for obtaining the release of several foreigners in India who had spent more time in jail than the original offence warranted as these alleged offenders could not obtain a hearing due to court delays.

2. The criminal court waiting time in Australia can be put into perspective by considering Table 1, which shows the median wait in days for defendants not on bail and on bail, from the defendant's arrest until the final outcome of the case, for all offences across all higher courts in NSW in 1992. Guilty plea dispositions are dealt with more quickly by the courts than trials, although for both disposition modes not
on bail defendants secure quicker hearings than their on bail counterparts for obvious reasons as shown in the following Table.

**TABLE 1** Median Wait in Days For All Offences Concluded In The NSW Higher Criminal Courts In 1992

<table>
<thead>
<tr>
<th>Bail Status</th>
<th>On Bail</th>
<th>Not on Bail</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>$NG_p$</td>
<td>685 days</td>
<td>347.5 days</td>
<td>652 days</td>
</tr>
<tr>
<td>$G_p$</td>
<td>357 days</td>
<td>168 days</td>
<td>277 days</td>
</tr>
</tbody>
</table>


Where $NG_p = $ Not Guilty and $G_p = $ Guilty

As we can see from the Table above in the state of NSW the average waiting time for a trial is approximately 652 days in 1992. Of course, without proper analysis it is not possible to ascertain whether 652 days of waiting are optimal or otherwise.

As a first step in this direction we must understand how the critical decision makers, the prosecutor and the defendant reach their decisions. A recent NSW study on District Criminal Court time found that although more than 70 per cent of the criminal cases which go to hearing time consumed by guilty pleas is less than 5% of that of trials (NSW Bureau of Crime Statistics and Research 1992). Consequently, slight changes in the proportion of persons pleading not guilty are clearly capable of exerting major effects on the overall demand for District Court hearing time (NSW Bureau of Crime Statistics and Research 1992).


4. An idea regarding the extent of court delays can be found in the case of Australia from the documents of NSW courts.

5. For analytical convenience it is assured without loss of generality that $P$ is independent of $t$. A relaxation of this assumption will not result in altering the main thrust of the analysis contained in this paper.

6. This is a standard procedure which is used in economic analysis of uncertainty. See any standard text book in Microeconomic Theory for example, Mas-Colell, A., Whinston, M.D. and Green, J.R., (1995).

Appendix

Shows the integration procedure and establishes the signs of the derivatives of the functions $G$ and :
\[ S = \int_{t=0}^{T_1} ye^{-\gamma t} dt + \alpha P \int_{t=T_1}^{T_1+L} ye^{-\gamma t} dt - (1 - \alpha P) \int_{t=T_1}^{T_1+L} ye^{-\gamma t} dt \]

Hence

\[ G = -y e^{-\gamma r_{T_1}} \bigg| _{r=0}^{r_{T_1}+L} - \frac{\alpha Py e^{-\gamma r_{T_1}}}{r} \bigg| _{t=T_1}^{T_1+L} + (1 - \alpha P) y e^{-\gamma r_{T_1}} \bigg| _{t=T_1}^{T_1+L} \]

\[ = -\frac{ye^{-\gamma T_1}}{r} + \frac{y}{r} - \frac{\alpha Py e^{-\gamma (T_1+L)}}{r} + \frac{\alpha Py e^{-\gamma T_1}}{r} + (1 - \alpha P) \frac{ye^{-\gamma (T_1+L)}}{r} - (1 - \alpha P) \frac{ye^{-\gamma T_1}}{r} \]

\[ = -\frac{ye^{-\gamma T_1}}{r} + \frac{y}{r} - \frac{\alpha Py e^{-\gamma r_{T_1}} e^{r_{T_1}}}{r} + \frac{\alpha Py e^{-\gamma T_1}}{r} + (1 - \alpha P) \frac{ye^{-\gamma r_{T_1}} e^{r_{T_1}}}{r} - (1 - \alpha P) \frac{ye^{-\gamma T_1}}{r} \]

\[ = \frac{y}{r} e^{-\gamma T_1} \left[ -\alpha Pe^{-r_{T_1}} + (1 - \alpha P)e^{-T_1} - (1 - \alpha P) \right] + \frac{y}{r} \]

\[ = \frac{y}{r} e^{-\gamma T_1} \left[ (1 - \alpha P)e^{-r_{T_1}} - \alpha Pe^{-r_{T_1}} - (1 - \alpha P) \right] + \frac{y}{r} \]

\[ = \frac{y}{r} e^{-\gamma T_1} \left[ (1 - \alpha P)(e^{-r_{T_1}} - 1) - \alpha Pe^{-r_{T_1}} \right] + \frac{y}{r} \]

It is easy to establish that this function is increasing in \( T_1 \):

\[ \frac{\partial G}{\partial T_1} = -ye^{-\gamma T_1} \left[ (1 - \alpha P)(e^{-r_{T_1}} - 1) - \alpha Pe^{-r_{T_1}} \right] > 0 \]

as \((1 - \alpha P)(e^{-r_{T_1}} - 1) - \alpha Pe^{-r_{T_1}} < 0\).

For the defendant on bail the integrated function is

\[ G' = -\frac{\alpha Py}{r} e^{-\gamma r_{T_1}} \bigg| _{t=T_1}^{T_1+L} + (1 - \alpha P) \frac{y e^{-\gamma r_{T_1}}}{r} \bigg| _{t=T_1}^{T_1+L} \]

\[ = -\frac{\alpha Py}{r} e^{-r(T_1+L)} + \frac{\alpha Py}{r} e^{-\gamma T_1} + \frac{(1 - \alpha P)y}{r} e^{-r(T_1+L)} - (1 - \alpha P) \frac{y}{r} e^{-\gamma T_1} \]

\[ = \frac{y}{r} e^{-\gamma T_1} \left[ -\alpha Pe^{-r_{T_1}} + \alpha P + (1 - \alpha P)e^{-r_{T_1}} - (1 - \alpha P) \right] \]
\[
\frac{\partial G'}{\partial T_i} = -ye^{-\tau_i} \left(1 - e^{-\tau_i} \right) [2\alpha P - 1] \text{ is negative as long as } (2\alpha P - 1) > 0.
\]

References


