

The Trouble with Innocent until Proven Guilty
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1. Introduction

In criminal cases, *innocent until proven guilty* is a hallmark of civil societies. It is a principle that is said to promote justice and protect freedom by safeguarding innocent citizens from arbitrary conviction and political persecution. The principle is encapsulated in Article 11.1 of the United Nations Declaration of Human Rights 1948¹, and Article 6.2 of the European Convention for the Protection of Human Rights 1953². The declaration represents culmination of a long movement, possibly running into millennia (see Pennington 2003).

The trouble is that, under the conditions specified in this paper, adherence to the principle aggravates the problem: it serves to enhance, not constrain, the power of the prosecutor. Indeed, an aggressive tough-on-crime prosecutor, wishing to convict defendants for the highest possible crime, would ardently support innocent until proven guilty as the default. Thus, this paper argues that innocent until proven guilty is open to question.

Reflecting the magnitude of the trouble in criminal justice system, the Washington Post (Feb 29, 2008) reports:³ “More than one in 100 adults in the United States is in jail or prison. ... With more than 2.3 million people behind bars, the United States leads the world in both the number and percentage of residents it incarcerates, leaving far-more-populous China a distant second, according to a study by the nonpartisan Pew Center on the States. ... Minorities have been particularly affected: One in nine black men ages 20 to 34 is behind bars. For black women

¹ Article 11.1 states: “Everyone charged with a penal offence has the right to be presumed innocent until proved guilty according to law in a public trial.” <http://www.un.org/en/universal-declaration-human-rights/>

² European Convention on Human Rights, Article 6.2 states: “Everyone charged with a criminal offence shall be presumed innocent until proved guilty according to law.” http://www.echr.coe.int/Documents/Convention_ENG.pdf

³ <http://www.washingtonpost.com/wp-dyn/content/story/2008/02/28/ST2008022803016.html>

ages 35 to 39, the figure is one in 100, compared with one in 355 for white women in the same age group.”

Several events may have combined to the above state of affairs. Among them separation of powers between the judge and the prosecutor, relatively unchecked powers of the prosecutor and the process of selection of the prosecutor. With respect to the separation of powers, many societies concluded that a person investigating a case is likely to become so committed to his own findings that he could not be trusted as a judge to deliver a fair verdict in the case. That it would not serve justice to empower one man with the authority to charge and then uphold it as a court decision. Such a person could, if he so wanted, ignore both the evidence and the laws. These societies responded by creating the office of a public prosecutor with the authority to investigate and charge suspects. The prosecutor thus restrained the judge. But the power of the prosecutors grew. Vorenberg (1981, p. 1522) observes that “as the powers of other criminal justice officials have contracted, those of prosecutors have expanded.” He adds (p. 1521): “Prosecutors exercise essentially unchecked power in making decisions about charging and plea bargaining. The decisions they make determine in large part who will be convicted and what punishment will be imposed.”

Adding to the problem posed by Vorenberg is the process of selection of the prosecutor. The Moritz School of Law at the Ohio State University states:^{4,5}

“According to the most recent Department of Justice survey, there are 2,341 local prosecutors' offices in this country, and together they handle over 2.3 million felony cases each year. This represents approximately 95 percent of all criminal prosecutions in the country. The policies and practices of each of these offices vary from state to state and even county to county, but nearly all of them share one common trait: the job of chief prosecutor, or district attorney, is almost always an elected position. ... The democratization of criminal justice policy has had a profound effect on elections for local prosecutors, and consequently on the conduct of prosecutors in office. Numerous scholars have commented on this effect, usually casting it in a negative light. ... Prosecutors frequently campaign on their conviction rate— or in some jurisdictions, on the number of people they have sent to death.”

⁴ http://moritzlaw.osu.edu/electionlaw/ebook/part7/elections_prosecutors.html#_edn1

⁵ For the latest statistics, see <http://www.ojp.usdoj.gov/bjs/pros.htm>

Vorenberg's intuition, that the prosecutor in large part controls the outcome in each case, seems correct. But it requires further analytical work to establish the extent of the control. Would not a public trial and judge's (jury's) role in the verdict check prosecutorial power? The point of this paper is to show that the check on the power of the prosecutor is rather weak, in large part because of the *requirement* that a defendant is innocent until proven guilty.

The model is presented in Section 2. It has two parts. Judicial preferences are the subject matter of Section 2.1. Proposition 1 establishes that preferences of the actors of the court (viz., the judge and the prosecutor) are single-peaked. Section 2.2 presents a model with a judge and a prosecutor, and offers the main results of this paper in Propositions 2 and 3. A remedy to the problem is offered in Propositions 4 and a partial remedy in Proposition 5. Indeed, the ancient Athenians followed the system contained in Proposition 4. Proposition 5 is about juries: it shows that unanimity rule is a better check on a prosecutor than majority rule (compare with Feddersen and Pesendorfer 1998).

2. The Model

2.1 Judicial Preferences

Consider a judge having to give a verdict on a defendant's crime. Denote the true crime by w , and the court verdict by k ; verdict k means that in the opinion of the Court, the defendant is guilty of crime k . The judge, being unsure, treats the defendant's crime as a random parameter W in $[0, 1]$ where 0 refers to innocence and 1 refers to the highest crime possible in the case. The judge's contentment from the verdict would depend on the magnitude of the deviation of the verdict from the true crime, and the direction of the deviation. To be precise, let $U(w, k | c)$ be the judge's utility arising from verdict k when the true crime is w . Let

$$U(w, k | c) = \begin{cases} -(1 - c)(w - k) & \text{if } k < w \text{ (underassessment)} \\ -c(k - w) & \text{if } k > w \text{ (overassessment)}. \end{cases} \quad (1)$$

where c in $(0, 1)$ is a judge-specific constant in the case. At $k = w$, the judge derives the maximum utility, which is normalized to 0. The discrepancy between the truth w and the verdict k is an underassessment if $k < w$, and overassessment if $k > w$. As per (1), the disutility increases as overassessment or underassessment increases. Observe that the decision maker(s) share a

common goal in the sense that if the truth of the matter, w , were known, each would maximize utility by adopting it, i.e., by setting $k = w$. Further, a decision maker's expected utility depends on the information and costs of errors.

The constant c represents the relative disutility (cost) of overassessment. For $c > 0.5$, a judge would be prone to underassessment (which is akin to an “erroneous acquittal”). At $c = 1$, the cost of underassessment would be 0, and the judge may pronounce the defendant innocent ($k = 0$). For $c < 0.5$, the judge would be prone to overassessment (which is akin to an “erroneous conviction”). At $c = 0$, the cost of overassessment would be 0, and the judge may pronounce the defendant guilty of the highest crime ($k = 1$).

Proposition 1 proves that the preferences of the actors of the court would be single-peaked over verdict k . Single-peakedness is required for Propositions 2 and 3 wherein the prosecutor acts as the agenda setter.

Proposition 1. Consider a judge with utility function (1) and a *posterior* distribution of a defendant's crime W that is absolutely continuous over interval $[a, b] \subseteq [0, 1]$. Then,

(a) the expected utility $EU(W, k)$ is maximized at verdict k^* that solves $P(W \leq k^*) = 1 - c$, see Figure 1;

(b) $E U(W, k_1) < E U(W, k_2)$ for any $k_1 < k_2 < k^*$, and $E U(W, k_3) > E U(W, k_4)$ for any $k^* < k_3 < k_4$, see Figure 2; and

(c) The optimum verdict declines as the cost of overassessment c rises: $dk^*/dc < 0$.

Proof. See Ladha (2016).

Part (a) of Proposition 1 states that a judge's *expected utility* is maximized at verdict k^* that solves $\Pr(W \leq k^*) = 1 - c$; see Figure 1. If $c = 1/2$, k^* would be the median of the distribution of W .

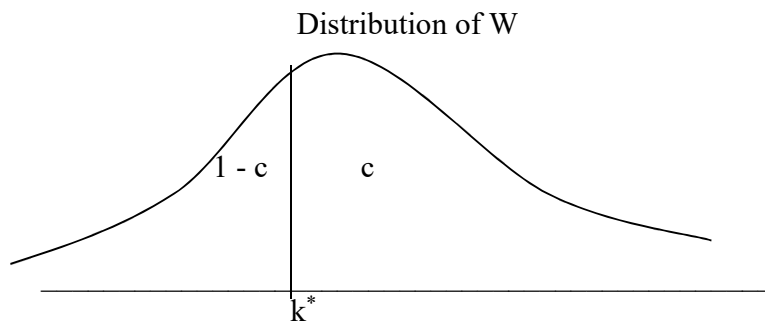


Figure 1

Part (b) states that for points on the same side of k^* , the one farther from k^* would offer lower expected utility.

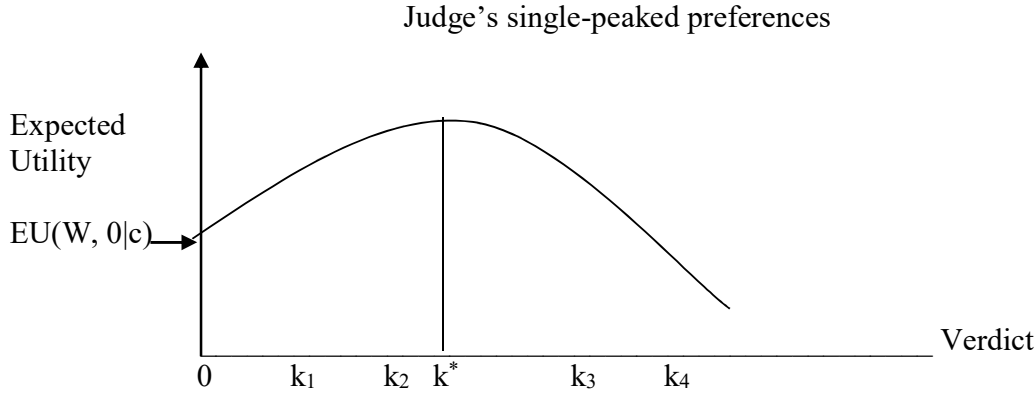


Figure 2: Expected utility of varying verdicts

Parts (a) and (b) together establish that the judge would have *single-peaked preferences* over verdict k with “ideal point” k^* ; see Figure 2. Under the assumptions of Proposition 1, the ideal point, or the point of maximum utility, would be unique.⁶

Part (c) of Proposition 1 implies that two judges (or a judge and a prosecutor) with identical information but $c_1 > c_2$ would have $k_1^* < k_2^*$, respectively. Finally, the judge’s ideal point, obtained from $\Pr(W \leq k^*) = 1 - c$, would change as new information alters the posterior distribution of W . If the truth were known, two or more judges, with different costs of errors, and thereby different posterior preferences, would unanimously adopt the truth because the truth is utility maximizing for each.

2.2. The model with a judge and a prosecutor

Proposition 1 showed that an expected-utility maximizing judge, possessing utility function (1), would deliver verdict k^* that solves posterior $\Pr(W \leq k^*) = 1 - c$, where \Pr refers to the judge’s posterior probability of the unknown crime W and c is the individual-specific cost of

⁶ For a discrete or a mixed distribution, k^* must satisfy $P(W \leq k^*) \geq 1 - c$ and $P(W \geq k^*) \geq c$. When $c = 1/2$ the two conditions imply that k^* is a median of the distribution of W , with the possibility of multiple medians. The assumed continuity of W yields a unique $(1-c)$ fractile.

overassessment of the crime. In other words, the judge, if empowered, would charge the defendant with k^* and then uphold it as the verdict of the court.

In the sequential game shown in Figure 3, the prosecutor serves as an *agenda setter* who can refuse to prosecute a case and can charge a suspect at will. Moving first, the prosecutor could charge the defendant with crime k_p . With no move allowed for the defendant (the case of Plea bargaining is not considered in this paper), the case goes to trial.⁷ After the trial during which the evidence in the case is presented, the judge either convicts or acquits the defendant. As per the discussion in the preceding paragraph, the judge operates under closed agenda: the judge must either uphold or dismiss the prosecutor's charge k_p .

The Prosecutor-Judge Game

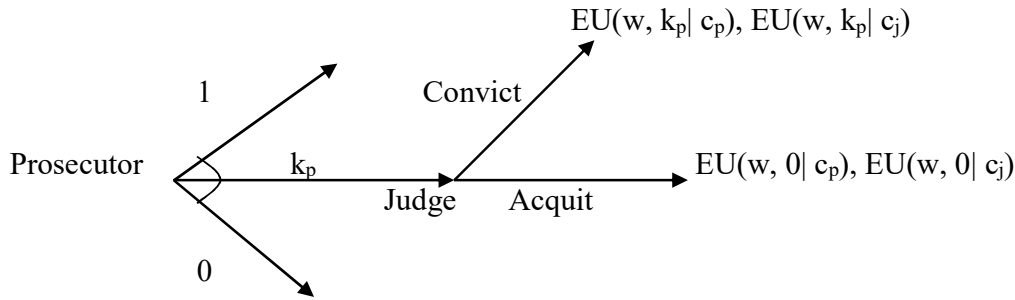


Figure 3

The court decision to convict for a crime k_p means that in the opinion of the judge the defendant has committed a crime k_p or greater. But if convicted, the defendant is treated *as if* the crime is k_p and not greater, thus, yielding expected utilities $EU(w, k_p | c_p)$ and $EU(w, k_p | c_j)$ for the prosecutor and judge, respectively; c_p is prosecutor's cost of overassessment of the crime and c_j is that of the judge. The decision to acquit of crime k_p means that the defendant has committed a crime less than k_p including possibly zero (meaning innocent). But if acquitted, the defendant goes free: the defendant is treated *as if* innocent yielding expected utilities $EU(w, 0 | c_p)$ and $EU(w, 0 | c_j)$ for the prosecutor and judge, respectively. Note that the underlying utility function of both players is given by (1); the players differ only in their costs of overassessment. As a result, both the judge and the prosecutor, even a tough-on-crime prosecutor, is assumed to obtain the highest utility from the truth.

⁷ India disallowed plea bargaining prior to the passage of Criminal Law (Amendment) Act, 2005. The Act still prohibits plea bargaining when the potential sentence exceeds seven years.

Assume that (a) each player knows his or her own cost of overassessment of the crime and the prosecutor knows the judge's cost of overassessment c_j as well, (b) the judge and prosecutor start with the same prior assessment of W , (c) the prosecutor knows the information that the defense will present at the trial, (d) the prosecutor will submit his or her entire evidence in the case to the judge, and (e) a double jeopardy clause prohibits the prosecutor from re-trying the case if it ends in a conviction or an acquittal.⁸ By (b) to (d), the prosecutor knows the judge's posterior assessment of W : it will be the same as that of the prosecutor. Moreover, with the knowledge of c_j , the prosecutor can compute the judge's preferences over various levels of crime.

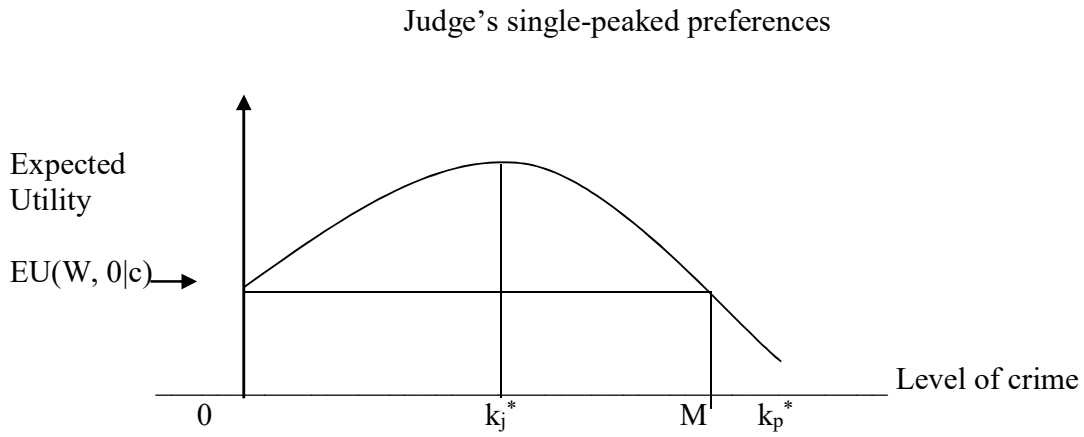


Figure 4: Expected utility at various levels of crime

In a given case, let k_j^* and k_p^* be the ideal points of the judge and prosecutor, respectively. Let M be the level of crime at which the judge is indifferent between acquitting and convicting the defendant; see Figure 4. Assume, without loss of generality, that when the prosecutor proposes $k_p = M$, the judge being indifferent between 0 and M , would convict the defendant.⁹ Note that M is the maximum crime the judge would approve against the status quo of $k = 0$ or “presumed innocence.”

⁸ In the U.S. the Fifth Amendment states “nor shall any person be subject for the same offense to be twice put in jeopardy of life or limb.” In India protection against double jeopardy is guaranteed by Article 20 of the Constitution.

⁹ If it is assumed that a judge indifferent between 0 and M would acquit, then the prosecutor would propose $M - \varepsilon$ where ε is arbitrarily small. The assumption made in the text helps avoid the ε term without any substantive consequence.

Proposition 2. In a given case, suppose a judge and prosecutor possess single-peaked preferences with ideal points $k_j^* > 0$ and $k_p^* > k_j^*$, respectively. Let M be the level of crime at which the judge is indifferent between acquitting and convicting the defendant; see Figure 4. Suppose the prosecutor moving first can charge the defendant with any crime k_p in $[0, 1]$ and the judge moving next can uphold (convict) or dismiss (acquit) the prosecutor's charge. Then the strategy pair (for the prosecutor: $k_p = k_p^*$ if $k_p^* \leq M$ and $k_p = M$ if $k_p^* > M$; for the judge: Convict if $k_p \leq M$, and Acquit if $k_p > M$) would constitute the unique subgame perfect Nash equilibrium of the game.

Proof. See Appendix 1.

Simply put, Proposition 2 states that the judge would uphold any proposal that does not exceed M and the prosecutor would propose his or her ideal point k_p^* when $k_p^* \leq M$, and M when $k_p^* > M$. Of course, when $k_p^* > M$, the judge could try to threaten the prosecutor to play something less than M , possibly k_j^* . But the threat would not be credible because of the *double jeopardy* clause. Both the judge and the prosecutor know that if the judge were to acquit the defendant, the defendant would go free and cannot be tried again. And therefore the judge when put on the move would convict the defendant at M .

Proposition 2, being valid for any cost of error c , implies that both liberal and conservative judges have systematically convicted people of crimes greater than their best estimates whenever the ideal point of the prosecutor is to the right of the judge.

For the next few propositions it would be convenient to introduce the idea of a fair judge. A *fair judge* implements all the high principles of the criminal justice system. Thus, a fair judge is objective, recognizes the rights of the defendants, possesses a cost of overassessment such that the ratio of erroneous convictions to erroneous acquittals is sufficiently low, and more generally, implements the law. One person's conception of fair judge need not coincide with that of another. In the prosecutor-judge game, it is the distance between the ideal points of the judge and the prosecutor that is the source of the agenda-setting power of the prosecutor. Thus, the idea of a fair judge helps interpret results, not their derivation.

Proposition 3. In the setting of Proposition 2, unless the judge's ideal point $k_j^* = 0$ or prosecutor's ideal point $k_p^* = 0$, the “presumption of innocence” ($k = 0$) makes the defendant worse off than the presumption of guilty at any k in $(0, k_j^*]$.

Proof. See Appendix 1.

Proposition 3 states that if, in the *opinions* of both the judge and prosecutor, a defendant is guilty of some crime, no matter how small, the “presumption of innocence” is the worst that can happen to the defendant. The requirement to plead either guilty or not guilty to a prosecutor's charge sets the stage for an aggressive prosecutor to convict the defendant for a crime greater than what a fair judge would consider optimal; by aggressive prosecutor I mean one whose ideal point is greater than the ideal point of a fair judge. When the prosecutor is not aggressive, the presumption of innocence is irrelevant because the defendant will be charged and convicted for a crime of k_p^* . Finally, when either the judge or the prosecutor believes that the defendant is not guilty, it does not matter what is presumed: any proposal to convict the defendant for a crime greater than 0 would be vetoed by either the prosecutor or the judge. It follows that the presumption of innocence is either irrelevant or enables conviction for a crime higher than the one a fair judge would administer.

The presumption of innocence makes the prosecutor's task of proving guilt easier. That is because for any given evidence, an alternate hypothesis is more likely to be upheld against a null hypothesis farther removed. The null hypothesis of presumed innocence is the farthest null hypothesis from any alternate hypothesis. In terms of Figure 4, presumed innocence allows conviction as high as M whereas any k in $(0, k_j^*)$ chosen by the defendant as the reversion point would bring down the maximum possible conviction closer to the ideal point k_j^* of a fair judge.

3. Remedies

3.1 Arbitration

An alternative would be to allow the defendant to voluntarily plead guilty of whatever charge the defendant wishes including innocence, rather than constrain the defendant to plead either guilty or not guilty to the prosecutor's charge.

Suppose there is no plea bargaining, but the defendant is free to plead guilty of whatever charge the defendant deems fit. The simplest way to think about is that the prosecutor and the defendant simultaneously make proposals k_d and k_p , respectively. It is easy to see that both would propose k_j^* . Making the game sequential with either the prosecutor or the defendant moving first is not going to change the outcome so long as the judge has to pick either k_d or k_p .

Proposition 4. Suppose $k_p^* \geq k_j^*$. The prosecutor and the defendant make proposals simultaneously. The judge after observing both proposals picks one or the other proposal as the court verdict. Then at equilibrium the prosecutor and the defendant would both propose the judge's ideal point k_j^* and the judge would approve it.

Proposition 4 can be easily extended to the case of uncertainty; see Gibbon (1992). Propositions 2 and 4 also identify the sharp difference between the American and the ancient Athenian systems. In ancient Athens, the defendant could plead guilty of whatever charge he deemed fit. Under the assumption that a judge should convict a defendant of the best estimate of crime, it appears that the Athenians got it right. In the Trial of Socrates, its infamy aside, Socrates himself proposed the fine to be applied to him (one can think of the fine being proportional to the level of crime). The jury voted on the prosecutor's proposal against the proposal that Socrates made, which was close to being innocent; Socrates actually sought reward – meals for himself at the public expense.

3.2 The Jury system: Unanimity v. Majority Rule

The final vote of a jury is cast after the jury is presented the evidence and has deliberated upon it. Probably the jurors would arrive at the same posterior distribution of crime W . But the jurors differ in their costs of error rendering their ideal points k_j^* $j = 1, \dots, n$ different. With the juror preferences known, let $k_1^* < \dots < k_m^* < \dots < k_n^*$, and let n be odd, and $m = (n+1)/2$.

Under majority-rule voting with open agenda, the *Median Voter Theorem* would obtain: no proposal can beat the ideal point of the median juror. Under unanimity-rule voting with open agenda, the ideal point of the leftmost juror (juror 1) would obtain: no proposal can beat the ideal point of the left most juror.

Under majority-rule voting with closed agenda, the prosecutor would choose that level of guilt at which the median would slightly favor the prosecutor's proposal than 0 (innocent). Under unanimity rule with closed agenda, the prosecutor would have to obtain approval of juror 1, the left-most juror. Therefore, unanimity rule can control the prosecutor's chosen level of guilt better and thereby the cost of Type I error. For any given evidence, unanimity restrains a prosecutor more than the majority rule. Indeed, it is not permissible to compare the probabilities of jury accuracy under the two rules because the jury would not be comparing the same two alternatives against a strategic prosecutor.

(Note. State it as a Proposition.)

5. Conclusion

The paper derived single-peaked preferences of judicial actors when preferences differ based on information and costs of Type I and II errors. Single-peakedness leads to the agenda setter model where the prosecutor acts as the setter. The paper shows that in the presence of an aggressive (tough-on-crime) prosecutor operating under closed agenda, the presumption of innocence is the worst for the defendant. Arbitration, a system used by the ancient Athenians, would serve the defendant better. Finally, the paper shows that the unanimity rule is better for the defendant than majority rule.

Appendix 1

Proof of Proposition 2.

This is the Romer-Rosenthal (1979) result expressed in game-theoretic language in the case of two players. When the ideal point of the prosecutor $k_p^* \leq M$, the prosecutor would play k_p^* , and the judge would convict so as to obtain a higher expected utility. And given that the judge convicts when $k_p \leq M$, and acquits when $k_p > M$, the prosecutor would not unilaterally deviate from k_p^* . The judge's strategy is trivially Nash in the only subgame that begins with the judge. Similarly, when $k_p^* > M$, neither the prosecutor nor the judge would deviate from $(M; \text{Convict if } k_p \leq M, \text{ and Acquit if } k_p > M)$; the prosecutor attains the best possible given the judge's strategy, and given M , the judge would not acquit so as to attain the highest utility under the assumption that when indifferent the judge would side with the prosecutor. Finally, the judge's strategy is trivially Nash in the only subgame that begins with the judge. This completes the proof.

Proof of Proposition 3.

From Figure 4, the higher the presumed level of guilt k in $(0, k_j^*]$, the lower the maximum crime M that the judge would uphold. In other words, treating M as a function of k , we have $dM(k)/dk < 0$ for k in $(0, k_j^*]$ with M attaining its lowest value at k_j^* . For any presumed level of guilt k , if k_p^* is greater than $M(k)$ the defendant is better off at $k > 0$ than at $k = 0$ and if k_p^* is less than or equal to $M(k)$ the defendant is no worse off at $k > 0$ than at $k = 0$. Thus, with the presumption of guilt at k in $(0, k_j^*]$, the defendant is either better off in all cases where $k_p^* > M(k)$ and no worse off in the remaining cases. This completes the proof.

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