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DRAFT

The Effects of the Right to Silence on the Innocent's Decision to Remain Silent[^]

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Abstract

This paper shows that innocent suspects benefit from exercising the right to silence in criminal proceedings. We study a model in which a suspect of a crime can make a statement or remain silent during police interrogation. We assume the evidence at trial is more likely to contradict the suspect's police statement if the suspect is guilty than if he is innocent. We further assume that the evidence at trial is more likely to directly implicate in the crime a guilty suspect than an innocent suspect. We show that a right to silence benefits innocent suspects by providing them with a safer alternative to speech, as well as by reducing the probability of conviction of innocent suspects who remain silent whether or not a right to silence exists. The paper thus provides a broad utilitarian justification for the argument that the right to silence helps the innocent.

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"… the privilege [against self-incrimination], while sometimes a 'shelter to the guilty,' is often 'a protection to the innocent.'"

Murphy v. Waterfront Commission (1964, p. 55)

1 Introduction

The Fifth Amendment's privilege against compelled self-incrimination provides criminal suspects with a right to silence. The right to silence prohibits a jury from drawing an adverse inference from a suspect's decision to remain silent in the face of questioning. In particular, if a suspect of a crime refuses to answer police questions, the jury must not consider the suspect's silence as evidence of guilt. Rather, the jury must reach its verdict based only on the other evidence presented at trial.[1] The right to silence is often described as one of the fundamental principles of criminal proceedings. Thus, the Supreme Court in *Miranda* v. *Arizona* (1966, p. 466) portrayed the right to silence as "the essential mainstay of our adversarial system."[2]

Notwithstanding the Supreme Court's endorsement of the right to silence, it is constantly debated among policy makers and academics (see, e.g., Coldrey 1991; Greer, 1990). Advocates of the right to silence concede that it may help the guilty to avoid conviction, but argue that it protects other values such as personal dignity, free will, and deterrence of government coercion (Murphy v. Waterfront Commission, 1964; Gerstein, 1970). Detractors of the right to silence maintain that it impedes the search for truth with no benefit to the innocent. Thus as early as the beginning of the eighteenth century, the philosopher Jeremy Bentham wrote in the context of silence at trial: "Innocence claims the right of speaking, as guilt invokes the privilege of silence." (Bentham, 1825; p. 241). Similarly, Justice Henry Friendly argued that no proof has been offered that the privilege indeed protects the innocent and that "on balance the privilege so much more often shelters the guilty and even harms the innocent that ... its occasional effect in protection of the innocent would be an altogether insufficient reason." (Friendly, 1968; p. 686).[3]

In this paper, we examine the effects of a right to silence on suspects' decisions to speak or to remain silent during police interrogations.[4] We show that, contrary to Bentham's factual assertion, a right to silence helps the innocent by providing them a refuge against self-incrimination. We also show that a right to silence benefits innocent suspects even if they would have chosen to remain silent in the absence of a right to silence. Specifically, we show that the probability of an innocent suspect who remains silent being wrongfully convicted is lower if suspects have a right to silence.

[1] See Dershowitz (2008, chapter 1) for a brief description of the right to silence.

[2] Most civil law countries have also adopted rules that require that suspects be informed of the right to silence prior to questioning.

[3] The argument that the right to silence lacks merit is common in the legal literature. See, e.g., Dolinko (1986).

[4] Out model applies equally to silence at trial. The decision to testify at trial, however, is also affected by the evidentiary rule which allows the prosecution to introduce the defendant's prior convictions as evidence if the defendant testified at trial.

To evaluate the effects of a right to silence on the decision to speak or to remain silent, we consider the following stylized model. A suspect is arrested for committing a crime. The suspect is either innocent or guilty. The suspect, but not the police or the jury, knows whether or not he committed the crime. The suspect is taken in for police interrogation, where he can make a statement (i.e., "speak"), remain silent, or confess the crime.

If the suspect does not confess the crime, the case goes to trial. At trial, circumstantial evidence is presented to a jury. The circumstantial evidence either corroborates or contradicts the suspect's police statement. We assume that the circumstantial evidence always corroborates statements made by *some* innocent suspects. With respect to other suspects, we assume that the probability that the circumstantial evidence contradicts the suspect's statement is higher if the suspect is guilty than if he is innocent. Thus the circumstantial evidence may contradict the suspect's statement even if the suspect is innocent and may corroborate the suspect's statement even if the suspect is guilty. This implies that innocent and guilty suspects alike face a dilemma of whether to speak or to remain silent, because the circumstantial evidence may contradict both innocent and guilty suspects' statements.

Apart from the circumstantial evidence, the evidence presented at trial may directly implicate the suspect in the crime. For example, direct evidence may include witness testimony or physical object that suggests the suspect committed the crime. The direct evidence is also not entirely accurate in that it may incriminate an innocent suspect and may fail to incriminate a guilty suspect. We assume, however, that the direct evidence is more likely to incriminate a guilty suspect than an innocent suspect.

In reaching its verdict, the jury consults both the circumstantial evidence and the direct evidence. We make a few assumptions about the jury's payoff-maximizing decision given the suspect's decision to speak or to remain silent and the type of evidence presented at trial. First, if only direct evidence is available to the jury, the jury convicts the suspect only if the evidence incriminates the suspect. Second, the jury always acquits the suspect if the circumstantial evidence corroborates the suspect's statement, even if the direct evidence incriminates the suspect. Thus, for example, if the circumstantial evidence corroborates the suspect's statement, even if the direct evidence incriminates the suspect, the jury will have a reasonable doubt about the suspect's guilt and thereby will not convict the suspect. The 'reasonable doubt' assumption implies that innocent suspects whose statement is always corroborated by the evidence always have incentives to make a statement and thereby exonerate themselves. Third, the fact that some innocent suspects always make a statement implies that a suspect's decision to remain silent might be considered as evidence of guilt in the absence of a right to silence.[5]

The analysis proceeds by identifying the conditions under which a right to silence alters the equilibrium strategies of innocent and guilty suspects as compared to a legal regime

[5] Davies (2007) proposes the following definition for an adverse inference from silence: "The law should permit an adverse inference to be drawn from silence either at police interview or in court when it would be reasonable to expect a denial, explanation or answer from an innocent defendant."

where suspects do not have a right to silence. We show that a right to silence *directly* benefits innocent suspects in two distinct circumstances. First, a right to silence provides innocent suspects, who are otherwise compelled to speak, with the alternative of silence, thereby reducing the frequency of wrongful conviction. Second, a right to silence benefits innocent suspects who would have remained silent even in the absence of a right to silence. Specifically, innocent suspects who always remain silent, regardless of whether a right to silence exists, are less likely to be wrongfully convicted in a legal regime that respects suspects' right to silence.

Our model also confirms the argument that innocent suspects *indirectly* benefit from the right to silence (Seidmann and Stein, 2000; Seidmann, 2005). Thus we show that a right to silence benefits innocent suspects who choose to speak because it induces guilty suspects to remain silent, thereby decreasing the probability that innocent suspects whose statements are contradicted by the evidence at trial are wrongfully convicted. In contrast to Seidmann and Stein's argument, however, the result here does not presuppose that the innocent always have incentives to speak.

Our results hold for low as well as for high premium for confession. When the premium for confession is low so that suspects do not find it profitable to confess the crime, a right to silence induces innocent and guilty suspects to shift from speech to silence. If the premium for confession is high so that guilty suspects find it profitable to confess the crime, a right to silence induces innocent suspects to shift from speech to silence and guilty suspects to shift from confession to silence. More generally, whenever a right to silence alters the equilibrium strategy of either guilty or innocent suspects, the innocent benefit from the right to silence.

Last, a right to silence is socially costly if juries' preferences are aligned with society's preferences. This is because a right to silence prevents the jury from considering information that would otherwise increase the accuracy of the jury's decision. A right to silence may nevertheless be justified as a means of enhancing the protection given to innocent suspects against wrongful conviction.

This paper is not the first to suggest that the innocent benefit from exercising the right to silence. The Supreme Court in *Ullmann v. United States* (1956, p. 426) notes that people "too readily assume that those who invoke [the right to silence] are either guilty of crime or commit perjury in claiming the privilege." Schulhofer (1991) suggests that the right to silence protects innocent defendants who cannot offer exonerating evidence from the risk involved in forced testimony. In particular, an innocent defendant might fear that he would appear guilty on the stand after skillful cross-examination: "if an innocent defendant chooses silence, it is because his judgment is that testifying will increases the chances of conviction." (p. 331). In a similar vein, Amar (1997) argues that the 'cruel trilemma' refers to innocent suspects who are forced to testify and concludes that "[a] desire to protect the innocent defendant from erroneous conviction … is wholly consistent with the deep structure of our Bill of Rights." However, the argument that the innocent directly benefit from the right to silence has not been studied and illustrated in a formal model.

1.2 Related literature

This paper is related to Seidmann and Stein (2000) and Stein (2005). Seidmann and Stein call to question the argument that the innocent do not benefit from the right to silence if only the guilty exercise it. They claim instead that the right to silence benefits the innocent *indirectly* by inducing the guilty to remain silent, which in turn bolsters the credibility of statements made by the innocent. In their analysis, Seidmann and Stein presuppose that innocent suspects always benefit from (or at least, are never harmed by) making an exculpatory statement, for the evidence at trial always corroborates an innocent suspect's statement.[6] They then go on to show that innocent suspects are less likely to be wrongfully convicted if suspects have a right to silence. They accordingly conclude that the main justification for the right to silence lies in the fact that it allows the jury to draw a *positive* inference from a suspect's decision *not* to remain silent.

The model here follows the basic framework proposed by Seidmann (2005), but relaxes the assumption that innocent suspects always have incentives to speak. Instead, it is assumed that innocent suspects might be reluctant to speak out of fear that the evidence presented at trial would contradict their police statements. We show that given the possibility that the evidence contradicts their police statements, innocent suspects may choose to remain silent in the presence of a right to silence. This result provides a broader utilitarian justification for the right to silence than is offered by Seidmann and Stein.

The justification proposed here to the right to silence also avoids the criticism leveled at the equilibrium proposed by Seidmann and Stein. According to this criticism, juries are not likely to respect the right to silence if *only* the guilty exercise it. But if innocent and guilty alike exercise the right to silence, then juries, if so instructed, can be expected to refrain from drawing an inference of guilt from silence.

Mialon (2005) examines the effects of the right to silence at trial. He considers a model in which the evidence at trail either incriminates the defendant or exonerates him. The defendant, however, may not know the evidence. If the defendant does not present exonerating evidence, then the jury could rationally infer that the defendant is more likely to be guilty. A right to silence prevents the jury from convicting the defendant upon failure to present exonerating evidence, thus benefiting innocent suspects who cannot provide such evidence. In contrast to the model here, Mialon's model assumes that innocent suspects always have incentives to offer exculpatory evidence. In Mialon's model, therefore, the presence of a right to silence does not affect the innocent's equilibrium strategy, as it does here.

[6] As Seidmann and Stein explain: "The only things that the suspect knows are that silence and lies usually indicate guilt and that the law enforcement authorities -- the police and prosecutors -- will utilize any such indications to the fullest extent that the law allows. Only guilty suspects face this dilemma. In contrast, for innocent suspects, telling a truthful story to the police can only improve (or at least not worsen) their position. Once again, this observation may not apply to very special cases, which we ignore for lack of representativeness." (Seidman and Stein, 2000, p. 444). We believe, by contrast, that a more reasonable assumption is that innocent suspects might well be reluctant to tell a truthful story (or any story) if they have reasons to think that the police might distort their story or that the prosecution might present evidence to contradict it.

This paper builds on the literature on strategic communication. Specifically, the conflict of interest between the informed player (suspect) and the uninformed player (jury) is akin to that in cheap-talk games (Crawfard and Sobel, 1982). The ability of the uninformed player to verify the informed player's message is similar to that in communication models with verifiable messages (Milgrom and Roberts, 1986). Unlike the latter models, however, here the uninformed player's verification technology is imperfect in that it consists of informative but *imperfect* signals on the informed player's message (circumstantial evidence) and the informed player's type (direct evidence). That the verification technology consists of imperfect direct and indirect signals results in partial unraveling of information.

The rest of the paper proceeds as follows. Section 2 presents the model. Section 3 examines a no-right-to-silence regime and Section 4 a right-to-silence regime, given that the premium for confession is low.[7] Section 4 concludes by showing that innocent suspects benefit directly (if they remain silent) as well as indirectly (if they speak) from the presence of a right to silence. Section 5 examines the effects of a right to silence when the premium for confession is high so that guilty suspects confess in equilibrium. It shows that a right to silence benefits the innocent in similar ways when the premium for confession is high and when it is low. Section 6 concludes.

2 Model

- **Set up**

The model follows Seidmann's (2005) model, but modifies some of Seidmann's main assumptions. In period 0, a suspect is arrested for committing a crime. The suspect is one of three types: clearly innocent (type 0), innocent (type 1), or guilty (type 2). We will refer to the clearly innocent suspect and the innocent suspect jointly as 'the innocent suspects'; we will make clear below the difference between these suspect types. The suspect knows his type, but the police and the court cannot observe the suspect's type. The prior probability that the suspect is of type i, where $i \in \{0,1,2\}$, is P_i.

In period 1, the suspect can confess the crime, remain silent, or make a statement (the suspect's statement need not be true). If the suspect does not confess the crime, the game proceeds to period 2. In period 2, the case goes to trial and evidence is presented to a jury. The evidence at trail consists of direct evidence and circumstantial evidence. After consulting the evidence, the jury decides whether to convict or acquit the suspect. We assume the jury gives equal weight to both types of evidence.

The *direct evidence* is either incriminating or non-incriminating.[8] Incriminating evidence includes physical object or witness testimony that suggests the suspect committed the

[7] The fact that the premium for confession is low implies that no suspect confesses in equilibrium.
[8] We assume that non-incriminating evidence is simply lack of incriminating evidence. Our results would not change if we introduced a third type of evidence, exonerating evidence, which always leads to acquittal.

crime. Let θ_i, $i \in \{0,1,2\}$, denote the probability that the jury is presented with incriminating evidence, conditional on the suspect's type. We assume that $\theta_2 > \theta_1, \theta_0 > 0$; that is, (i) the probability that the direct evidence incriminates the suspect is higher for the guilty suspect than for the innocent suspects (left inequality), and (ii) there is positive probability that the evidence incriminates the innocent suspects (right inequality).

The *circumstantial evidence* either corroborates or contradicts the suspect's period-1 statement. For example, the circumstantial evidence and the suspect's police statement may concern the whereabouts of the suspect at the time the crime was committed or whether the suspect was previously acquainted with the crime victim. Let δ_i, $i = 0,1,2$, denote the probability that the circumstantial evidence contradicts the suspect's statement, conditional on the suspect's type. We assume that $1 \geq \delta_2 > \delta_1 > \delta_0 = 0$; that is (i) the circumstantial evidence always corroborates a statement made by the clearly innocent suspect (right equality), (ii) there is positive probability that the evidence contradicts a statement made by the innocent suspect (rightmost inequality), and (iii) the probability that the circumstantial evidence contradicts the suspect's statement is higher for the guilty suspect than for the innocent suspects (leftmost inequality). The circumstantial evidence might contradict the innocent suspect's statement either because the police distort the suspect's statement or because the evidence at trial is not accurate; for example, a prosecution witness might give false testimony. Since the evidence is more likely to contradict the guilty suspect's statement than the innocent suspects' statements, the jury can infer that the suspect is more likely to be guilty if the circumstantial evidence contradicted his period-1's statement.

Table 1 and Table 2 present likelihood matrices of the direct evidence and the circumstantial evidence.

Table 1
Likelihood matrix of direct evidence

	Clearly Innocent	Innocent	Guilty
Incriminating	θ_0	θ_1	θ_2
Non-incriminating	$1-\theta_0$	$1-\theta_1$	$1-\theta_2$

Table 2
Likelihood matrix of circumstantial evidence

	Clearly Innocent	Innocent	Guilty
Contradictory	0	δ_1	δ_2
Corroborating	1	$1-\delta_1$	$1-\delta_2$

- **Payoffs**

We normalize the suspect's payoff so that the suspect receives a payoff of 1 if acquitted, a payoff of 0 if convicted, and a payoff of $0 < u < 1$ if he confesses the crime. We will refer to u as the 'confession premium.'

We normalize the jury's payoff as follows. The jury obtains a payoff of 0 if it rightfully convicts or acquits the suspect, a payoff of $-D$ if it wrongfully acquits the suspect, and a payoff of $-(1-D)$ if it wrongfully convicts the suspect, where $D \in (0,1)$. The parameter D represents the standard of proof, or the minimum probability of guilt required for conviction.[9] It thus reflects the relative costs of Type I (wrongful conviction) versus Type II error (wrongful acquittal). We further assume that the jury's payoffs schedule reflects society's tradeoff between Type I and Type II errors. We thus rule out the case in which the jury's preferences diverge from society's.

- **Assumptions**

We make the following assumptions about the jury's payoff-maximizing decisions given different realizations of the evidence.

Assumption 1 (probative value of the direct evidence):

$$\frac{P_2\theta_2}{P_0\theta_0 + P_1\theta_1} > \frac{D}{1-D} > \frac{P_2(1-\theta_2)}{P_0(1-\theta_0) + P_1(1-\theta_1)}.$$

Assumption 1 implies that, conditional on all suspect types being silent, the jury maximizes its payoff by (i) always convicting the suspect if the direct evidence incriminates the suspect (left inequality), and (ii) always acquitting the suspect if the direct evidence does not incriminate the suspect (right inequality). The interpretation of Assumption 1 is that the direct evidence *by itself* has probative value.

Assumption 2 (reasonable doubt):

$$\frac{D}{1-D} > \frac{P_2\theta_2(1-\delta_2)}{P_0\theta_0}.$$

Assumption 2 implies that, conditional on the clearly innocent suspect always speaking, the jury maximizes its payoff by always acquitting the suspect if the circumstantial evidence corroborates the suspect's statement, even if the direct evidence incriminates the suspect. Assumption 2 reflects the notion that if the circumstantial evidence corroborates the suspect's statement, even if the direct evidence incriminates the suspect, the jury has a

[9] Note that if the probability that the suspect is guilty is D, the jury's expected payoff from either convicting or acquitting the suspect is equal to $D(1-D)$.

reasonable doubt about the suspect's guilt and therefore does not convict the suspect. It follows from Assumption 2 that the clearly innocent suspect can always exonerate himself by making a statement, as his statement is always corroborated by the circumstantial evidence.

Assumption 3 (adverse inference from silence):

$$\frac{P_2(1-\theta_2)}{P_1(1-\theta_1)} > \frac{D}{1-D}.$$

Assumption 3 implies that, conditional on the clearly innocent suspect always speaking, the jury infers from the suspect's silence that the suspect is guilty with probability greater than D, even if the direct evidence does not incriminate the suspect. It follows from Assumption 3 that in the absence of a right to silence, the jury may convict a silent suspect based solely on the suspect's silence, even if the direct evidence is not incriminating. We call this state of affairs "adverse inference from silence." In contrast, when suspects have a right to silence, the jury may not draw an adverse inference of guilt from the suspect's decision to remain silence.

We can now define the right to silence as follows.

Definition 1. *If suspects have a right to silence, then the jury may not convict a silent suspect in the absence of incriminating evidence.*

Assumption 4: $u \neq 1-\theta_2, 1-\delta_2.$

Assumption 4 is made for computational convenience and does not detract from the generality of our results. Following Assumption 4, we can restrict the analysis to the following cases:

(i) $u < \min\{1-\theta_2, 1-\delta_2\}$;
(ii) $1-\theta_2 > u > 1-\delta_2$;
(iii) $1-\delta_2 > u > 1-\theta_2$; or
(iv) $u > \max\{1-\theta_2, 1-\delta_2\}$.

- **Equilibrium**

To solve the game, we employ the concept of Perfect Bayesian Equilibrium. The suspect's strategy in period 1 is a function that maps his type, θ_i, and δ_i, to a probability distribution over speech, silence, and confession. The jury's strategy consists of a belief and a corresponding action. The jury's belief is a posterior probability that the suspect is guilty; the jury's action is a probability of conviction (acquittal). In equilibrium (i) the suspect maximizes its payoff given the jury's equilibrium strategy; (ii) the jury's probability of conviction maximizes its payoff given its posterior belief about the

suspect's type; and (ii) the jury's belief is consistent with the suspect's equilibrium strategy and Bayes rule along the equilibrium path.[10]

From Assumption 2 (reasonable doubt) and Assumption 3 (adverse inference from silence) it follows that there does not exists an equilibrium in which all suspect types remain silent, for the clearly innocent suspect can exonerate himself with certainty by speaking but is convicted with positive probability if he remains silent. We will accordingly restrict the analysis to equilibria in which the clearly innocent suspect always speaks and thereby is exonerated with certainty. We proceed by defining the conditions under which the right to silence affects the guilty suspect's or the innocent suspect's equilibrium strategy.

Definition 2. *Consider an equilibrium in which suspects have a right to silence. We say that the right to silence is 'effective' in equilibrium if the posterior probability that a silent suspect is guilty, given that the direct evidence is not incriminating, is greater than D.*

Definition 2 implies that suspects invoke their right to silence if, in equilibrium, the jury would convict a silent suspect in the absence of a right to silence. It follows from Definition 2 that when the right to silence is effective, the innocent suspect's equilibrium strategy, the guilty suspect's equilibrium strategy, or both suspects' equilibrium strategies depends on whether or not a right to silence exists.

Lemma 1. *If* $1-\theta_2 < \min\{1-\delta_2, u\}$*, then the right to silence is not effective.*

Proof. Suppose by contradiction that $1-\theta_2 < \min\{1-\delta_2, u\}$ and the right to silence is effective. That the right to silence is effective implies, by Definition 2, that the posterior probability that a silent suspect is guilty, given that the evidence is *not* incriminating, is equal to or greater than *D*. It follows that, if the right to silence is effective, the posterior probability that a silent suspect is guilty, given that the direct evidence *is* incriminating, is greater than *D*; the jury accordingly convicts the suspect if the direct evidence is incriminating. This implies that, if the right to silence is effective, the guilty suspect's payoff from remaining silence is $1-\theta_2$. But if $1-\theta_2 < \min\{1-\delta_2, u\}$, the guilty suspect could profitably deviate to speech or confession, thus contradicting the assumption that the posterior probability that the suspect is guilty, given that the direct evidence is not incriminating, is greater than *D*. ■

Following Lemma 1, we can restrict the analysis to two cases:

(i) $1-\theta_2 > 1-\delta_2 > u$; we will refer to this case as a 'low premium for confession;'

[10] For the jury's belief about the suspect type to be consistent with Bayes rule, the jury must base its belief on the realization of the direct evidence (i.e., whether or not the direct evidence incriminates the suspect), whether or not the suspect made a statement, and, if the suspect did make a statement, on the realization of the circumstantial evidence (i.e., whether the circumstantial evidence contradicts or corroborates the suspect's statement).

(ii) $1-\theta_2 > u > 1-\delta_2$; we will refer to this case as a 'high premium for confession.'

The assumption that the premium for confession is low implies that no suspect would confess in equilibrium. To see why, note that if the premium for confession is low, the guilty suspect's payoff from confession is lower than his payoff from speech. Since the innocent suspect's equilibrium payoff is always greater than the guilty suspect's equilibrium payoff, the innocent suspect never confesses as well. As we show in Section 5, when the premium for confession is high only the guilty suspect finds it profitable to confess in equilibrium.

- **Significance of setup**

Underlying the setup of this model is the notion that some innocent suspects might be reluctant to speak out of fear that the evidence at trial might erroneously contradicts their statements. For example, an innocent suspect may fear that the prosecution would fabricate evidence or that his police statement would be distorted. However, since an innocent suspects' statement is *more likely* to be consistent with the evidence than a guilty suspects' statement, the fact that the evidence at trial contradicts the suspect's statement increases the likelihood that the suspect is guilty.

3 No Right-to-Silence

In this section, we consider the case in which suspects do not have a right to silence and the premium for confession is low. Consider the innocent suspect's and the guilty suspect's decisions whether to speak or to remain silent. Since the clearly innocent suspect always speaks, by Assumption 3 (adverse inference from silence) the jury would draw an adverse inference of guilt from the suspect's silence if both the innocent suspect and the guilty suspects remained silent in equilibrium. The innocent suspect could then exonerate himself with positive probability by making a statement, because the probability that his statement is corroborated by the circumstantial evidence is greater than zero and by Assumption 2 (reasonable doubt) the jury always acquits the suspect if the evidence corroborates the suspect's statement. In the absence of a right to silence, therefore, there does not exist an equilibrium in which both the innocent suspect and the guilty suspect remain silent. Similarly, there does not exist an equilibrium in which the innocent suspect always speaks or mixes between silence and speech, but the guilty suspect always remains silent, for the jury would then always acquit a speaking suspect. Both the innocent suspect and the guilty suspect could then exonerate themselves with certainty by deviating to speech.[11]

Two equilibrium candidates are left. In one equilibrium, both the innocent suspect and the guilty suspect always speak. In this equilibrium, the jury always convicts a silent suspect off-equilibrium. In the other equilibrium, the innocent suspect always remains silent and the guilty suspect mixes between speech and silence. In this equilibrium, the

[11] Note that there does not exist an equilibrium in which both the innocent suspect and the guilty suspect mix between speech and silence, since there does not exist an equilibrium strategy for the jury under which both suspect types would be indifferent between speech and silence.

jury must convict a silent suspect with such probability so as to make the guilty suspect indifferent between speech and silence. The guilty suspect, in turn, must mix between speech and silence so as to make the jury indifferent between acquitting and convicting a silent suspect.

Proposition 1 presents the equilibrium strategies of the guilty suspect and the innocent suspect in the absence of a right to silence. As a tie-breaking rule, we assume that the innocent suspect always speaks if he is indifferent between speech and silence.

Proposition 1. *(equilibrium strategies with no right to silence and low confession premium)*

If suspects do not have a right to silence and the premium for confession is low, then the following strategy profiles constitute the only perfect Bayesian equilibria that survive the Universal Divinity refinement of Banks and Sobel (1987). (We relegate to the Appendix the jury's out-of-equilibrium beliefs and corresponding strategy).

(a) *If* $\frac{1-\theta_2}{1-\delta_2} \geq \frac{1-\theta_1}{1-\delta_1}$*, both the innocent suspect and the guilty suspect always speak. The jury always acquits the suspect if the evidence does not contradict the suspect's statement, and always convicts the suspect if the evidence contradicts the suspect's statement.*

(b) *If* $\frac{1-\theta_2}{1-\delta_2} < \frac{1-\theta_1}{1-\delta_1}$*, the innocent suspect always remains silent, and the guilty suspect remains silent with probability* $\frac{P_1(1-\theta_1)}{p_2(1-\theta_2)} \cdot \frac{D}{1-D}$ *and speaks with the complementary probability. The jury always convicts a silent suspect if the evidence is incriminating, convicts a silent suspect with probability* $\frac{\delta_2-\theta_2}{1-\theta_2}$ *if the evidence is not incriminating, and acquits a silent suspect with the complementary probability. The jury acquits the suspect if the evidence corroborates the suspect's statement, and convicts the suspect if the evidence contradicts the suspect's statement.*

Proof. See the Appendix.

Part (a) presents a *pooling equilibrium* in which both the innocent suspect and the guilty suspect always speak. In this equilibrium, if the circumstantial evidence corroborates the suspect's statement, then by Assumption 2 (reasonable doubt) the jury acquits the suspect even if the direct evidence incriminates the suspect; if the circumstantial evidence contradicts the suspect's statement, then by Assumption 3 (adverse inference from silence) the jury convicts the suspect, even if the direct evidence does not incriminate the suspect. The jury's decision thus depends solely on the realization of the circumstantial evidence.

Part (b) presents a *semi-pooling equilibrium* in which the innocent suspect always remains silent and the guilty suspect mixes between speech and silence. In this equilibrium, the jury convicts a silent suspect with positive probability if the direct evidence does not incriminate the suspect and always convicts a silent suspect if the

direct evidence incriminates the suspect. The jury's equilibrium probability of conviction of a silent suspect when the evidence is not incriminating is such the guilty suspect is indifferent between speech and silence. This probability is sufficiently low so that the innocent suspect prefers to always remain silent than to speak. The innocent suspect is thus able to partially signal his type to the jury by remaining silent, because the probability that the direct evidence is incriminating is lower for the innocent suspect than for the guilty suspect.

To illustrate the equilibrium outcomes in Proposition 1, consider the following examples.

Example 1: *if suspects do not have a right to silence and* $\theta_1 \approx \theta_2$ $(\Rightarrow \frac{1-\theta_2}{1-\delta_2} > \frac{1-\theta_1}{1-\delta_1})$*, then both the innocent suspect and the guilty suspect always speak.*

That $\theta_1 \approx \theta_2$ implies that the probabilities that the direct evidence incriminates the innocent suspect and the guilty suspect are roughly the same. As a result, the innocent suspect separates himself from the guilty suspect by speaking, since the probability that the circumstantial evidence contradicts the suspect's statement is lower for the innocent suspect than for the guilty suspect. The guilty suspect, in turn, must always speak, for the jury would always convict a silent suspect.

Example 2*: If suspects do not have a right to silence and* $\delta_1 \approx \delta_2$ $(\Rightarrow \frac{1-\theta_2}{1-\delta_2} < \frac{1-\theta_1}{1-\delta_1})$*, then the innocent suspect always speaks and the guilty suspect mixes between speech and silence*.

That $\delta_1 \approx \delta_2$ implies that the probabilities that the circumstantial evidence contradicts the innocent suspect's and the guilty suspect's statements are roughly the same. As a result, the innocent suspect separates himself from the guilty suspect by remaining silent, since the probability that the direct evidence incriminates the suspect is lower for the innocent suspect than for the guilty suspect. The guilty suspect, in turn, mixes between silence and speech, for the jury would always convict the suspect if both the innocent suspect and the guilty suspect remained silent and would always acquit a silent suspect if the guilty suspect always spoke.

Corollary 1. *When suspects do not have a right to silence and the premium for confession is low:*

(a) *The innocent suspect's equilibrium payoff is* $1-\delta_1$ *if he always speaks and is* $(1-\theta_1)\frac{\delta_2-\theta_2}{1-\theta_2} \in (1-\delta_1, 1)$ *if he always remains silent.*

(b) *The guilty suspect's equilibrium payoff is* $1-\delta_2$*, irrespective of his equilibrium strategy.*

The innocent suspect's equilibrium payoff is equal to or is higher than $1-\delta_2$, since the innocent suspect can always secure a payoff of $1-\delta_2$ by speaking. Thus, the innocent

suspect remains silent if and only if his payoff from silence is greater than $1-\delta_2$. The guilty suspect's equilibrium payoff is $1-\delta_2$ since in any equilibrium he speaks with positive probability.

4 Right to Silence

In this section, we consider the case in which suspects have a right to silence. We maintain the assumption that the premium for confession is low so that no suspect confesses in equilibrium. Recall that a right to silence prevents a jury from drawing an inference of guilt from the suspect's silence. Specifically, if the suspect remains silent, the jury must reach its verdict based solely on the presence or absence of incriminating evidence, rather than on the suspect's decision to remain silence.

Consider the innocent suspect's and guilty suspect's decisions whether to speak or to remain silent. The assumption that the right to silence is effective (i.e., $\delta_2 > \theta_2$), implies that the guilty suspect never finds it optimal to always speak, for he can profitably deviate to silence. Thus there does not exist a pooling equilibrium in which both the innocent and the guilty suspect speak (as in the case in which suspects do not have a right to silence). Similarly, there does not exist a semi-pooling equilibrium in which the innocent suspect remains silent and the guilty suspect mixes between speech and silence (as in the case in which suspects do not have a right to silence), because the guilty suspect could then profitably deviate to silence.

The presence of a right to silence, however, introduces two equilibrium candidates that are not present in the absence of a right to silence. In one equilibrium, both the innocent suspect and the guilty suspect remain silent. (Recall that in the absence of right to silence, such equilibrium does not exist for the jury would draw an inference of guilt from silence, thereby inducing the innocent suspect to profitably deviate to speech). In the other equilibrium, the innocent suspect speaks and the guilty suspect mixes between speech and silence. (Recall that in the absence of a right to silence such equilibrium does not exist for the jury would draw an inference of guilt from silence, thereby inducing the guilty suspect to profitably deviate to speech). The jury in turn mixes between acquitting and convicting a suspect whose statement is contradicted by the evidence so as to make the guilty suspect indifferent between speech and silence.

Proposition 2 presents the equilibrium strategies in the presence of a right to silence. As a tie-breaking rule, we assume that the innocent suspect always speaks if he is indifferent between speech and silence.

Proposition 2. *(equilibrium strategies with a right to silence and low confession premium)*

If suspects have a right to silence and the premium for confession is low, then the following strategy profiles constitute the only perfect Bayesian equilirbia that survive the Universal Divinity refinement (We relegate to the Appendix out-of-equilibrium beliefs and strategies).

(a) *if* $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$*, both the innocent suspect and the guilty suspect always remain silent. The jury acquits a silent suspect if the evidence does not incriminate the suspect and convicts a silent suspect if the evidence incriminates the suspect.*
(b) *if* $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} \geq \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$*, the innocent suspect always speaks, and the guilty suspect speaks with probability* $\frac{P_1\delta_1(1-\theta_1)}{P_2\delta_2(1-\theta_2)} \cdot \frac{D}{1-D}$ *and remains silent with the complementary probability. If the evidence corroborates the suspect's statement, the jury always acquits the suspect. If the evidence contradicts the suspect's statement and also incriminates the suspect, the jury always convicts the suspect. If the evidence contradicts the suspect's statement, but does not incriminate the suspect, then the jury convicts the suspect with probability* $\frac{(\theta_2/\delta_2)-\theta_2}{1-\theta_2}$ *and acquits the suspect with the complementary probability. The jury acquits a silent suspect if the evidence does not incriminate the suspect, and convicts a silent suspect if the evidence incriminates the suspect.*

Proof. See the Appendix.

Part (a) presents a *pooling equilibrium* in which both the innocent suspect and the guilty suspect always remain silent. Since suspects have a right to silence, the jury must acquit a silent suspect if the evidence does not incriminate the suspect, even though, by Assumption 3 (adverse inference from silence), the jury would maximize its payoff by convicting such suspect. If the suspect is silent and the evidence incriminates the suspect, then by Assumption 3 (adverse inference from silence) the jury maximizes its payoff by convicting the suspect. Note that in this equilibrium both the innocent suspect and the guilty suspect exercise the right so silence.

Part (b) presents a *semi-pooling equilibrium* in which the innocent suspect always speaks and the guilty suspect mixes between speech and silence. In this equilibrium, only the guilty suspect exercises his right to silence; in the absence of a right to silence, the jury would draw an adverse inference from silence and would always convict a silent suspect. The guilty suspect's equilibrium probability of speech is such that the jury is indifferent between acquitting and convicting the suspect if the evidence contradicts the suspect's statement and the evidence incriminates the suspect. The jury's equilibrium probability of conviction if the evidence contradicts the suspect's statement and the evidence incriminates the suspect is such that the guilty suspect is indifferent between speech and silence. Thus, in contrast to the case in which both the innocent suspect and the guilty suspect speak in equilibrium, the jury does not always convict a suspect whose statement is contradicted by the evidence.

To illustrate the equilibrium outcomes in the case in which suspect have a right to silence, consider the following examples.

Example 3: *If suspects have a right to silence and* $\theta_1 \approx \theta_2$ $(\Rightarrow \frac{1-(\theta_2/\delta_2)}{1-\theta_2} > \frac{1-(\theta_1/\delta_1)}{1-\theta_1})$*, then the innocent suspect always speaks and the guilty suspect mixes between speech and silence*.

That $\theta_1 \approx \theta_2$ implies that the probabilities that the evidence incriminates the innocent suspect and the guilty suspect are roughly the same. As a result, the innocent suspect separates himself from the guilty suspect by speaking, since the probability that the evidence contradicts the suspect's statement is lower for the innocent suspect than for the guilty suspect. Since $\theta_2 < \delta_2$, the guilty suspect does not find it optimal to *always* speak. But if the guilty suspect *never* speaks, the jury will always acquit a suspect who speaks. Thus the guilty suspect must mix between speech and silence.

Example 4: *If suspects have a right to silence and* $\delta_1 \approx \delta_2$ $(\Rightarrow \frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1})$*, then both the innocent suspect and the guilty suspect always remain silent*.

That $\delta_1 \approx \delta_2$ implies that the probabilities that the circumstantial evidence contradicts the innocent suspect's and the guilty suspect's statements are roughly the same. As a result, the innocent suspect separates himself from the guilty suspect by remaining silent, since the probability that the evidence incriminates the suspect is higher for the guilty suspect than for the innocent suspect. Since $\theta_2 < \delta_2$, the guilty suspect would rather always remain silent than always speaks. Thus, both the innocent suspect and the guilty suspect always remain silent.

Corollary 2. *When suspects have a right to silence and the premium for confession is low:*

(a) *The innocent suspect's equilibrium payoff is* $1-\delta_1\frac{(\theta_2/\delta_2)-\theta_2}{1-\theta_2} \in (\max\{1-\theta_1, 1-\delta_1\}, 1)$ *if he always speaks and is* $1-\theta_1$ *if he always remains silent.*
(b) *The guilty suspect's equilibrium payoff is* $1-\theta_2$ *irrespective of the equilibrium outcome.*

The innocent suspect's equilibrium payoff is equal to or is greater than $1-\theta_1$, since the innocent suspect can always secure a payoff of $1-\theta_1$ by exercising his right to silence. Thus, the innocent suspect speaks if and only if his payoff from speech is greater than $1-\theta_1$.[12] The guilty suspect's equilibrium payoff is $1-\theta_2$, since in any equilibrium in which the right to silence is effective the guilty suspect remains silent with positive probability.

[12] If the innocent suspect speaks and the guilty suspect does not always speak (thereby exercising his right to silence), then the innocent suspect obtains a payoff greater than $1-\delta_1$ since the jury does not always convict the suspect if the evidence contradicts the suspect's statement.

Proposition 3 considers the effect of a right to silence on the equilibrium strategies of the guilty suspect and/or the innocent suspect.

Proposition 3. *(effects of a right to silence on the equilibrium strategies with low confession premium)*

Assume that the premium for confession is low. Then:
(a) *if* $\frac{1-\theta_2}{1-\delta_2} \geq \frac{1-\theta_1}{1-\delta_1}$ *and* $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} \geq \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$*, the innocent suspect always speaks in the absence as well as in the presence of a right to silence; the guilty suspect always speaks in the absence of a right to silence and mixes between speech and silence in the presence of a right to silence.*
(b) *if* $\frac{1-\theta_2}{1-\delta_2} \geq \frac{1-\theta_1}{1-\delta_1}$ *and* $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$*, both the innocent suspect and the guilty suspect always speak in the absence of a right to silence, and always remain silent in the presence of a right to silence.*
(c) *if* $\frac{1-\theta_2}{1-\delta_2} < \frac{1-\theta_1}{1-\delta_1}$*, the innocent suspect always remains silent in the absence and in the presence of a right to silence; the guilty suspect mixes between speech and silence in the absence of a right to silence and always remains silent in the presence of a right to silence.*[13]
(d) *if the innocent suspect always remains silent in the absence of a right to silence, then he also always remains silent in the presence of a right to silence (i.e., if* $\frac{1-\theta_2}{1-\delta_2} < \frac{1-\theta_1}{1-\delta_1}$ *then* $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$*).*

Proof. Parts (a) – (c) follow directly from Proposition 1 and Proposition 2. To prove Part (d), note that $\frac{1-\theta_2}{1-\delta_2} < \frac{1-\theta_1}{1-\delta_1}$ implies that $1-\frac{1-\delta_1}{1-\theta_1} > 1-\frac{1-\delta_2}{1-\theta_2}$. Rearranging terms we get $\frac{\delta_1-\theta_1}{1-\theta_1} > \frac{\delta_2-\theta_2}{1-\theta_2}$. Since $\frac{1}{\delta_1} > \frac{1}{\delta_2}$, it follows that $\frac{1}{\delta_1} \cdot \frac{\delta_1-\theta_1}{1-\theta_1} > \frac{1}{\delta_2} \cdot \frac{\delta_2-\theta_2}{1-\theta_2}$. This, in turn, implies that $\frac{1-(\theta_1/\delta_1)}{1-\theta_1} > \frac{1-(\theta_2/\delta_2)}{1-\theta_2}$.

Part (a) presents the case in which a right to silence causes the guilty suspect to shift from always speaking to mixing between speech and silence, but does not alter the innocent suspect's equilibrium strategy of always speaking. This effect of the right to silence is the one identified by Seidmann and Stein (2000). Here the innocent suspect *indirectly* benefits from a right to silence, because the jury does not always convict a suspect whose statement is contradicted by the evidence, as it does if suspects do not have a right to silence.

Part (b) presents the case in which a right to silence causes *both* the innocent suspect and the guilty suspect to shift from always speaking to always remaining silent. Here the innocent suspect *directly* benefits from a right to silence, because his equilibrium payoff

[13] Observe that if $\frac{1-\theta_2}{1-\delta_2} < \frac{1-\theta_1}{1-\delta_1}$, then $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$.

if he remains silent in the presence of a right to silence is higher than his equilibrium payoff when he speaks in the absence of a right to silence.

Part (c) presents the case in which a right to silence causes the guilty suspect to shift from mixing between silence and speech to always remaining silent, but does not alter the innocent suspect's equilibrium strategy of always remaining silent. Although the innocent suspect always remains silent irrespective of whether a right to silence exists, the innocent suspect *directly* benefits from a right to silence, because the right prohibits the jury from convicting a silent suspect if the evidence is not incriminating. In the absence of a right to silence, by contrast, the innocent suspect is convicted with positive probability when he remains silent if the evidence is not incriminating.

Part (d) implies that a right to silence never causes suspects to shift from silence to speech, but may cause them to shift from speech to silence. Thus, the introduction of a right to silence lowers the incidence of police statements.

To illustrate the effects of a right to silence on the equilibrium strategies, consider the following examples.

Example 5: *If* $\theta_1 \approx \theta_2$ $(\Rightarrow \frac{1-\theta_2}{1-\delta_2} > \frac{1-\theta_1}{1-\delta_1}$ *and* $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} > \frac{1-(\theta_1/\delta_1)}{1-\theta_1})$*, then the innocent suspect always speaks, irrespective of whether suspects have a right so silence; the guilty suspect always speaks if suspects do not have a right to silence and mixes between speech and silence if suspects have a right to silence.*

Example 6: if $\delta_1 \approx \delta_2$ $(\Rightarrow \frac{1-\theta_2}{1-\delta_2} < \frac{1-\theta_1}{1-\delta_1}, \frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}, \frac{\theta_1}{\delta_1} < 1)$*, then the innocent suspect always remains silent irrespective of whether suspects have a right so silence; the guilty suspect mixes between speech and silence if suspects do not have a right to silence and always remains silent if suspects have a right to silence*.[14]

Example 7: if $\delta_1 = 0.2$, $\delta_2 = 0.3$, $\theta_1 = 0.1$, and $\theta_2 = 0.2$ $(=> \frac{0.8}{0.7} = \frac{1-\theta_2}{1-\delta_2} > \frac{1-\theta_1}{1-\delta_1} = \frac{0.9}{0.8}$, and $\frac{0.333}{0.8} = \frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1} = \frac{0.5}{0.9})$*, then both the innocent suspect and the guilty suspect always speak in the absence of a right to silence and always remain silent in the presence of a right to silence*.

The next corollary considers the increase in suspect's expected equilibrium payoff ("gain") that results from the introduction of a right to silence.

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[14] To see that $\delta_2 \approx \delta_3$ implies $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$, let $\delta \equiv \delta_1 = \delta_2$. Then, since $\theta_1 < \theta_2$, $\theta_1(1-\delta) < \theta_2(1-\delta)$. It follows that $-\theta_2 - \delta\theta_1 < -\theta_1 - \delta\theta_2$. Adding $\delta + \theta_2\theta_1$ to both sides we get $\delta - \theta_2 - \delta\theta_1 + \theta_2\theta_1 < \delta - \theta_1 - \delta\theta_2 + \theta_2\theta_1$. This can be rewritten as $(\delta - \theta_2)(1-\theta_1) < (\delta - \theta_1)(1-\theta_2)$. Dividing both sides by $(1-\theta_1)(1-\theta_2)$ gives $\frac{\delta-\theta_2}{1-\theta_2} < \frac{\delta-\theta_1}{1-\theta_1}$. Finally, multiplying both sides by $1/\delta$ we get $\frac{1-(\theta_2/\delta)}{1-\theta_2} < \frac{1-(\theta_1/\delta)}{1-\theta_1}$.

Corollary 3.

(a) *If the innocent suspect always speaks irrespective of whether suspects have a right to silence, then his gain from a right to silence is* $\frac{\delta_1}{\delta_2}\frac{\delta_2-\theta_2}{1-\theta_2}$.

(b) *If the innocent suspect always speaks in the presence of a right to silence, but always remains silent in the absence of a right to silence, then his gain from a right to silence is* $\delta_1-\theta_1$.

(c) *If the innocent suspect always remains silent irrespective of whether suspects have a right to silence, then his gain from a right to silence is* $(1-\theta_1)\frac{1-\delta_2}{1-\theta_2}$.

(d) *Irrespective of the equilibrium outcome, the guilty suspect's gain from a right to silence is* $\delta_2-\theta_2$.

5 High premium for confession

In this section, we consider the case in which the premium for confession is sufficiently high so that the guilty suspect may confess in equilibrium. We maintain the assumption that the right to silence is effective. Specifically, we assume that $1-\delta_2 > u > 1-\theta_2$.

Proposition 4(1) presents the equilibrium outcomes when suspects do not have a right to silence and the premium for confession is high. As a tiebreaker rule, we assume that the innocent suspect speaks if he is indifferent between speech and silence.

Proposition 4(1). *(equilibrium strategies with no right to silence and a high confession premium)*

Assume that the premium for confession is high. Then if suspects do not have a right to silence, the following strategy profiles constitute the only Perfect Bayesian equilibria that survive the Universal Divinity refinement. (We relegate to the Appendix out-of-equilibrium beliefs and strategy):

(a) *If* $\frac{1-\theta_1}{1-\delta_1} \le \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$, *the innocent suspect always speaks, and the guilty suspect speaks with probability* $\frac{P_1\delta_1(1-\theta_1)}{P_2\delta_2(1-\theta_2)}\cdot\frac{D}{1-D}$ *and otherwise confesses. The jury convicts the suspect if the evidence contradicts the suspect's statement and the evidence is not incriminating with probability* $1-\frac{u-(1-\delta_2)}{\delta_2(1-\theta_2)}$ *and otherwise acquits the suspect.*

(b) *If* $\frac{1-\theta_1}{1-\delta_1} > \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$, *the innocent suspect always remains silent, and the guilty suspect remains silent with probability* $\frac{P_1(1-\theta_1)}{P_2(1-\theta_2)}\cdot\frac{D}{1-D}$ *and otherwise confesses. The jury convicts a silent suspect if the evidence is incriminating, convicts a silent suspect if the evidence is not incriminating with probability* $1-\frac{u}{1-\theta_2}$ *and otherwise acquits a silent suspect.*

Proof. See the Appendix.

When the premium for confession is high, the guilty suspect always confesses with positive probability. Whether the guilty suspect speaks or remains silent depends on the innocent's suspect equilibrium strategy. Thus, the equilibrium in part (a) is a semi-pooling equilibrium in which the innocent suspect always speaks and the guilty suspect mixes between speech and confession. The equilibrium in Part (b) is a semi-pooling equilibrium in which the innocent suspect always remains silent and the guilty suspect mixes between silence and confession.

Proposition 4(2). *(equilibrium strategies with a right to silence and a high confession premium)*

Assume the premium for confession is high. Then if suspects have a right to silence, the equilibrium outcomes are identical to the case in which the premium for confession is low.

The rationale for Proposition 4(2) is straightforward. If the premium for confession is high and the right to silence is effective ($1-\theta_2 > u > 1-\delta_2$), the guilty suspect obtains a higher payoff from exercising his right to silence and remaining silent than from confessing. Accordingly, the guilty suspect never has incentives to confess the crime. The equilibrium outcomes are thus identical to the case in which the premium for confession is low ($1-\theta_2 > 1-\delta_2 > u$).

Proposition 4(3). *(effects of the right to silence on the equilibrium strategies with high confession premium)*

Assume that the premium for confession is high. Then:
(a) *if* $\frac{1-\theta_1}{1-\delta_1} \leq \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$ *and* $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} \geq \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$*: the innocent suspect always speaks in the absence of a right to silence as well as in the presence of a right to silence; the guilty suspect mixes between speech and confession in the absence of a right to silence and mixes between speech and silence in the presence of a right to silence.*
(b) *if* $\frac{1-\theta_1}{1-\delta_1} \leq \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$ *and* $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$*: the innocent suspects always speaks in the absence of a right to silence and always remains silent in the presence of a right to silence; the guilty suspect mixes between confession and speech in the absence of a right to silence and always remains silent in the presence of a right to silence.*
(c) *if* $\frac{1-\theta_1}{1-\delta_1} > \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$*, the innocent suspects always remains silent in the absence of a right to silence as well as in the presence of a right to silence; the guilty suspect mixes between confession and silence in the absence of a right to silence and always remains silent in the presence of a right to silence.*[15]

[15] *If* $\frac{1-\theta_1}{1-\delta_1} > \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$, then $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$.

(d) *if the innocent suspect always remains silent in a no-right-to-silence regime, then he also always remains silent in a right-to-silence regime (i.e., if* $\frac{1-\theta_1}{1-\delta_1} > \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$ *then* $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$*).*

Proof. Parts (a) - (c) follow directly from Proposition 4(1) and Proposition 4(2). To prove part (d), note that $\frac{1-\theta_1}{1-\delta_1} > \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$ implies that $\frac{1-\delta_1}{1-\theta_1} < \frac{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}{\delta_2(1-\theta_2)}$. The latter inequality can be written as $\frac{1-\delta_1}{1-\theta_1} - \frac{u}{(1-\theta_2)} < \frac{\delta_1(1-\delta_2)}{\delta_2(1-\theta_2)} - \frac{u\delta_1}{\delta_2(1-\theta_2)}$. Multiplying the right-hand side of the latter inequality by $\frac{\delta_2}{\delta_1}(>1)$ yields $\frac{1-\delta_1}{1-\theta_1} - \frac{u}{(1-\theta_2)} < \frac{1-\delta_2}{1-\theta_2} - \frac{u}{(1-\theta_2)}$. The last inequality simplifies to $\frac{1-\delta_1}{1-\theta_1} < \frac{1-\delta_2}{1-\theta_2}$, which implies $\frac{1-\theta_1}{1-\delta_1} > \frac{1-\theta_2}{1-\delta_2}$. Now, recall from Proposition 3(d) that $\frac{1-\theta_1}{1-\delta_1} > \frac{1-\theta_2}{1-\delta_2}$ entails $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$. Thus, if $\frac{1-\theta_1}{1-\delta_1} > \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$, then $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$.

Part (a) presents the case in which a right to silence causes the guilty suspect to shift from mixing between speech and confession to mixing between speech and silence, but does not alter the innocent suspect's strategy of always speaking. Although the innocent suspect's strategy is not affected by the presence of a right to silence (i.e., the innocent suspect always speaks irrespective of whether or not a right to silence exists), the innocent suspect *directly* benefits from a right to silence because the jury convicts a suspect whose statement is contradicted by the evidence with lower probability if suspects have a right to silence. The introduction of a right to silence thus reduces the equilibrium probability of confession.

Part (b) presents the case in which a right to silence induces the innocent suspect to shift from always speaking to always remaining silent and induces the guilty suspect to shift from mixing between speech and confession to always remaining silent. In this equilibrium, the innocent suspect *directly* benefits from a right to silence because his equilibrium payoff when he remains silent in the presence of a right to silence is higher than his equilibrium payoff when he speaks in the absence of a right to silence.

Part (c) presents the case in which a right to silence induces the guilty suspect to shift from mixing between silence and confession to always remaining silent, but does not alter the innocent suspect's strategy of always remaining silent. Although the innocent suspect's strategy is not affected by the presence of a right to silence (i.e., the innocent suspect always remains silent whether or not a right to silence exists), the innocent suspect *directly* benefits from a right to silence because the right prohibits the jury from convicting a silent suspect if the evidence is not incriminating. In the absence of a right to silence, by contrast, the innocent suspect is convicted with positive probability when he remains silent even if the evidence is not incriminating.

Part (d) states that if the innocent suspect always remains silent in the absence of a right to silence, he also always remains silent in the presence of a right to silence (the reverse is not true). Thus, as in the case in which the premium for confession is low, a right to

silence never causes suspects to shift from silence to speech. A right to silence may only cause suspects to shift from speech to silence or from confession to silence.

6 Conclusion

This paper proposes a model that examines the effects of a right to silence on innocent and guilty suspects' decisions to speak or to remain silent. We show that a right to silence benefits innocent suspects by inducing them to shift from speech to silence, thereby providing them with a safer alternative to speech. In addition, a right to silence benefits innocent suspects even if it does not alter their decision to speak or to remain silent. Specifically, a right to silence decreases the probability of wrongful conviction of innocent suspects who always remain silent or always speak irrespective of whether a right to silence exists. The paper thus provides a broad utilitarian basis for the argument that the right to silence helps the innocent.

Appendix

Proposition 1(a).
Assume that $1-\theta_2 > 1-\delta_2 > u$ *and that suspects do not have a right to silence. Then if* $\frac{1-\theta_2}{1-\delta_2} \geq \frac{1-\theta_1}{1-\delta_1}$, *the following strategy profile constitutes the unique perfect Bayesian equilibrium of the game. Both the innocent suspect and the guilty suspect always speak. The jury's acquits the suspect if the evidence corroborates the suspect's statement, and convicts the suspect if the evidence contradicts the suspect's statement. The jury's out-of-equilibrium beliefs are that a silent suspect is guilty with probability greater than D; accordingly, the jury always convicts a silent suspect off-equilibrium.*

Proof. We will proceed by showing that the innocent suspect, the guilty suspect, and the jury cannot profitably deviate from their equilibrium strategies. We will then show that this equilibrium outcome is unique.

Given that the jury always convicts a silent suspect, neither the innocent suspect nor the guilty suspect can profitably deviate to silence. Given that both the innocent suspect and the guilty suspect speak, by Assumption A2 the jury maximizes its payoff by convicting the suspect if the evidence contradicts the suspect's statement and by acquitting the suspect if the evidence corroborates the suspect's statement.

To show uniqueness, observe that the only other equilibrium candidate is one in which the innocent suspect always remains silent and the guilty suspect mixes between speech and silence. To make the guilty suspect indifferent between speech and silence, the jury must acquit a silent suspect if the evidence is not incriminating with probability $\frac{1-\delta_2}{1-\theta_2}$ and convict such suspect with the complementary probability. To see this, note that if the jury acquits a silent suspect with probability $1-\frac{1-\delta_2}{1-\theta_2}$ when the evidence is incriminating, then the guilty suspect's payoff from silence is $(1-\theta_2)(\frac{1-\delta_2}{1-\theta_2}) = 1-\delta_2$.

Now, the innocent suspect's payoff under this putative equilibrium is $(1-\theta_2)\frac{1-\delta_3}{1-\theta_3}$, since the innocent suspect always remains silent. But $\frac{1-\theta_2}{1-\delta_2} \geq \frac{1-\theta_1}{1-\delta_1}$ implies $1-\delta_1 \geq (1-\theta_1)\frac{1-\delta_2}{1-\theta_2}$. Thus, the innocent suspect can profitably deviate to speech[16]. This, in turn, upsets the proposed equilibrium. ■

Proposition 1(b).
Assume that $1-\theta_2 > 1-\delta_2 > u$ *and that suspects do not have a right to silence. Then if* $\frac{1-\theta_2}{1-\delta_2} < \frac{1-\theta_1}{1-\delta_1}$, *the following strategy profiles constitute the only perfect Bayesian equilibrium of the game that survives the Universal Divinity refinement. The innocent suspect always*

[16] Recall the tie-breaking rule whereby if the innocent suspect speaks if he is indifferent between speech and silence.

remains silent and the guilty suspect remains silent with probability $\frac{P_1(1-\theta_1)}{p_2(1-\theta_2)} \cdot \frac{D}{1-D}$ *and speaks with the complementary probability. The jury convicts a silent suspect if the evidence is incriminating, convicts a silent suspect with probability* $\frac{\delta_2-\theta_2}{1-\theta_2}$ *if the evidence is not incriminating and otherwise acquits a silent suspect. The jury acquits the suspect if the evidence corroborates the suspect's statement and convicts the suspect if the evidence contradicts the suspect's statement.*

Proof. We will proceed by showing that the innocent suspect, the guilty suspect, and the jury cannot profitably deviate from their equilibrium strategies. Then, using the Universal Divinity refinement, we will show that this equilibrium outcome is unique.

First, consider the innocent suspect's equilibrium strategy. The innocent suspect's equilibrium payoff is $(1-\theta_1)(1-\frac{\delta_2-\theta_2}{1-\theta_2})$, which simplifies to $(1-\theta_1)(\frac{1-\delta_2}{1-\theta_2})$ (recall that a silent suspect is always convicted if the evidence is incriminating and is convicted with probability $\frac{\delta_2-\theta_2}{1-\theta_2}$ if the evidence is not incriminating). If the innocent suspect speaks, he is acquitted with probability $1-\delta_2$. Thus the innocent suspect's payoff from speech is $1-\delta_2$. But $\frac{1-\theta_2}{1-\delta_2} < \frac{1-\theta_1}{1-\delta_1}$ implies $(1-\theta_1)\frac{1-\delta_2}{1-\theta_2} > 1-\delta_1$. Thus, the innocent suspect cannot profitably deviate to speech.

Next, consider the guilty suspect's strategy. If the guilty suspect always speaks, he is acquitted with probability $1-\delta_2$. The guilty suspect's payoff if he always speaks is therefore $1-\delta_2$. The guilty suspect's payoff if he always remains silent is $(1-\theta_2)(1-\frac{\delta_2-\theta_2}{1-\theta_2})$ (since the guilty suspect is always convicted if the evidence is incriminating and is convicted with probability $\frac{\delta_2-\theta_2}{1-\theta_2}$ if the evidence is not incriminating). Simplifying we get that the guilty suspect's payoff from always remaining silent is $1-\delta_2$. Thus, the guilty suspect is indifferent between speech and silence. In particular, remaining silent with probability $\frac{P_1(1-\theta_1)}{p_2(1-\theta_2)} \cdot \frac{D}{1-D}$ is a best response (although not uniquely).

Now, by Bayes' rule, the probability that the suspect is guilty given that the suspect is silent and the evidence is *not* incriminating is $\left(P_2 \frac{P_1(1-\theta_1)}{p_2(1-\theta_2)} \cdot \frac{D}{1-D}(1-\theta_2)\right) \Big/ \left(P_2 \frac{P_1(1-\theta_1)}{p_2(1-\theta_2)} \cdot \frac{D}{1-D}(1-\theta_2) + P_1(1-\theta_1)\right)$, which is equal D. It follows that the jury is indifferent between acquitting and convicting a silent suspect if the evidence is not incriminating. In particular, convicting a silent suspect if the evidence is not incriminating with probability $\frac{\delta_2-\theta_2}{1-\theta_2}$ is a best response (although not uniquely).

To show uniqueness, observe that the only other equilibrium candidate is one in which both the innocent suspect and the guilty suspect speak. Under this equilibrium, the jury acquits the suspect if the evidence does not contradict the suspect's statement, and convicts the suspect if the evidence contradicts the suspect's statement. To support this equilibrium, the jury's out-of-equilibrium beliefs must be that a silent suspect is guilty

with probability higher than or equal to D. We will show, however, that the jury's out-of-equilibrium beliefs do not survive the Universal Divinity refinement.

First, note that $\theta_2 < \delta_2$ together with $\frac{1-\theta_2}{1-\delta_2} < \frac{1-\theta_1}{1-\delta_1}$ imply that $\theta_1 < \delta_1$. Let q_i denote the probability with which the jury must convict a silent suspect if the evidence is not incriminating so as to make suspect i, $i = \{1,2\}$, indifferent between speech and silence. q_i must therefore satisfy the equality $(1-\theta_i)(1-q_i) = 1-\delta_i$; hence, $q_i = \frac{\delta_i - \theta_i}{1-\theta_i}$.

Now, from $\frac{1-\theta_2}{1-\delta_2} < \frac{1-\theta_1}{1-\delta_1}$, it follow that $\frac{1-\delta_1}{1-\theta_1} < \frac{1-\delta_2}{1-\theta_2}$. Therefore, $q_1 = 1 - \frac{1-\delta_1}{1-\theta_1} > \frac{1-\delta_2}{1-\theta_2} = q_2$. It follows that the set of jury's responses for which the innocent suspect would find deviation to silence profitable is larger than the set of jury's responses for which the guilty suspect would find such deviation profitable. The jury must therefore believe that deviation to silence comes from the innocent suspect and accordingly acquit a silent suspect. This, in turn, upsets the proposed equilibrium. ■

Proposition 2(a).

Assume $1-\theta_2 > 1-\delta_2 > u$ and suspects have a right to silence. Then if $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$, the following strategy profile constitutes the unique perfect Bayesian equilibrium of the game: Suspect 2 and suspect 3 remain silent. The jury acquits a silent suspect if the evidence is not incriminating and convicts a silent suspect if the evidence is incriminating. The jury's out-of-equilibrium beliefs are that the suspect is guilty with probability higher than D if the evidence contradicts the suspect's statement.

Proof. We will show that the innocent suspect, the guilty suspect, and the jury cannot profitably deviate from their equilibrium strategies. We will then show that this equilibrium is unique.

Both the innocent suspect and the guilty suspect would not find it profitable to deviate to speech if the jury convicts a suspect whose statement is contradicted. To see this, note that $\delta_2 > \theta_2$ together with $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$ implies $\delta_1 > \theta_1$; hence, $1-\theta_1 > 1-\delta_1$. Now, the innocent suspect's equilibrium payoff is $1-\theta_1$. By deviating, the innocent suspect obtains $1-\delta_1$ (the probability the evidence does not contradict his statement). Since $1-\theta_1 > 1-\delta_1$, the innocent suspect cannot profitably deviate from his equilibrium strategy.

Next, consider the guilty suspect's equilibrium strategy. The guilty suspect's equilibrium payoff is $1-\theta_2$. If he deviates to speech, he obtains $1-\delta_2$ (the probability the evidence does not contradict his statement). But since $1-\theta_2 > 1-\delta_2$, the guilty suspect cannot profitably deviate from his equilibrium strategy.

To show uniqueness, observe that there are only two other equilibrium candidates. In one equilibrium, both the innocent suspect and the guilty suspect speak; in the other, the innocent suspect speaks and the guilty suspect mixes between speech and silence. The

former equilibrium is ruled out because $\delta_2 > \theta_2$ together with $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$ implies $\delta_1 > \theta_1$; this, in turn, implies that $1-\delta_1 < 1-\theta_1$. Thus, the innocent suspect can profitably deviate to silence, which in turn upsets the proposed equilibrium.

Next, consider an equilibrium in which the innocent suspect speaks and the guilty suspect mixes between speech and silence. In such an equilibrium, the jury must convict a suspect whose statement is contradicted by the evidence if the evidence is not incriminating with probability q so as to make the guilty suspect indifferent between speech and silence. q must therefore satisfy the equality $1-\theta_2 = 1-\delta_2 + \delta_2[(1-\theta_2)(1-q)]$. Solving for q we have $q = 1-\frac{\delta_2-\theta_2}{\delta_2(1-\theta_2)}$. It follows that the innocent suspect equilibrium payoff under this putative equilibrium is $1-\delta_1+\delta_1(1-\theta_1)\frac{\delta_2-\theta_2}{\delta_2(1-\theta_2)}$. But $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} < \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$ implies $1-\delta_1+\delta_1(1-\theta_1)\frac{\delta_2-\theta_2}{\delta_2(1-\theta_2)} < 1-\theta_1$. Thus, suspect 2 can profitably deviate to silence. This, in turn, upsets the proposed equilibrium. ■

Proposition 2(b).
Assume $1-\theta_2 > 1-\delta_2 > u$ *and that suspects have a right to silence. Then if* $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} \geq \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$, *the following strategy profile constitutes the unique perfect Bayesian equilibrium that survives the Universal Divinity refinement. The innocent suspect speaks, and the guilty suspect speaks with probability* $\frac{P_1\delta_1(1-\theta_1)}{P_2\delta_2(1-\theta_2)} \cdot \frac{D}{1-D}$ *and otherwise remains silent. The jury convicts the suspect if the evidence contradicts the suspect's statement and the evidence is incriminating, convicts the suspect with probability* $\frac{(\theta_2/\delta_2)-\theta_2}{1-\theta_2}$ *if the evidence contradicts the suspect's statement but the evidence is non-incriminating, and otherwise acquits the suspect. The jury acquits a silent suspect if the evidence is non-incriminating, and convicts a silent suspect if the evidence is incriminating.*

Proof. We will show that the innocent suspect, the guilty suspect, and the jury cannot profitably deviate from their equilibrium strategies. We will then show that this equilibrium is unique.

Consider first the innocent suspect. The innocent suspect's equilibrium payoff is $1-\delta_1+\delta_1(1-\theta_1)(1-\frac{(\theta_2/\delta_2)-\theta_2}{1-\theta_2})$, which simplifies to $1-\delta_1\theta_1(\frac{1-(\theta_2/\delta_2)}{1-\theta_2})$. By deviating to silence, the innocent suspect obtain $1-\theta_1$. But $\frac{1-(\theta_2/\delta_2)}{1-\theta_2} \geq \frac{1-(\theta_1/\delta_1)}{1-\theta_1}$ implies $(1-\theta_1)\frac{1-(\theta_2/\delta_2)}{1-\theta_2} \geq 1-(\theta_1/\delta_1)$, which, in turn, implies $\delta_1(1-\theta_1)\frac{1-(\theta_2/\delta_2)}{1-\theta_2} \geq \delta_1-\theta_1$, or, $-\delta_1+\delta_1(1-\theta_1)\frac{1-(\theta_2/\delta_2)}{1-\theta_2} \geq -\theta_1$. It follows that $1-\delta_1+\delta_1(1-\theta_1)\frac{1-(\theta_2/\delta_2)}{1-\theta_2} \geq 1-\theta_1$. Thus, the innocent suspect cannot profitably deviate to silence.

The guilty suspect's payoff from speech in equilibrium is $1-\delta_2+\delta_2(1-\theta_2)(1-\frac{(\theta_2/\delta_2)-\theta_2}{1-\theta_2})$, which simplifies to $1-\delta_2+\delta_2(1-\theta_2)(\frac{\delta_2-\theta_2)}{\delta_2(1-\theta_2)})$, and thus to $1-\theta_2$. Accordingly, the guilty

suspect is indifferent between speech and silence. In particular, speaking with probability $\frac{P_1\delta_1(1-\theta_1)}{P_2\delta_2(1-\theta_2)}\cdot\frac{D}{1-D}$ is a best response (although not uniquely).

Finally, consider the jury's equilibrium strategy. The probability that the suspect is guilty given that the evidence contradicts the suspect's statement *and* the evidence is *not* incriminating is $\left(P_2\frac{P_1\delta_1(1-\theta_1)}{P_2\delta_2(1-\theta_2)}\cdot\frac{D}{1-D}\delta_2(1-\theta_2)\right)\Big/\left(P_2\frac{P_1\delta_1(1-\theta_1)}{P_2\delta_2(1-\theta_2)}\cdot\frac{D}{1-D}(1-\theta_2)+P_1\delta_1(1-\theta_1)\right)$, which is equal to D. It follows that the jury is indifferent between acquitting and convicting a silent suspect if the evidence is not incriminating. In particular, convicting a silent suspect if the evidence is not incriminating with probability $\frac{(\theta_2/\delta_2)-\theta_2}{1-\theta_2}$ is a best response (although not uniquely).

To show uniqueness, observe that there are only two other equilibrium candidates. In one equilibrium, the innocent suspect and the guilty suspect speak; in the other, the innocent suspect and the guilty suspect remain silent. Now, if the innocent suspect and the guilty suspect speak, the guilty suspect's equilibrium payoff is $1-\delta_2$. But since $1-\theta_2>1-\delta_2$, the guilty suspect can profitably deviate to silence, which in turn upsets this equilibrium. Next, consider an equilibrium in which both the innocent suspect and the guilty suspect remain silent. To support this equilibrium, the jury's out-of-equilibrium beliefs must be that a suspect whose statement is contradicted by the evidence is guilty with probability higher than D. We will show, however, that the jury's out-of-equilibrium beliefs do not survive the Universal Divinity refinement.

First, assume that $\theta_1>\delta_1$. Then even if the jury *always* convicts a suspect whose statement is contradicted, the innocent suspect will find it profitable to deviate. By contrast, the guilty suspect would not find it profitable to deviate to speech if the jury always convicted a suspect whose statement is contradicted (since $\theta_2<\delta_2$). Thus, the jury must believe that deviation to speech comes from the innocent suspect and therefore always acquit a suspect who speaks.

Next, assume that $\theta_2\le\delta_2$. Let q_i denote the probability with which the jury convict a suspect whose statement is contradicted by the evidence if the evidence is not incriminating so that suspect i, $i=1,2$, is indifferent between silence and speech. Then q_i satisfies $1-\theta_i=1-\delta_i+\delta_i(1-\theta_i)(1-q_i)$. Solving for q_i we get $q_i=1-\frac{\delta_i-\theta_i}{\delta_i(1-\theta_i)}$. But the assumption $\frac{1-(\theta_3/\delta_3)}{1-\theta_3}\ge\frac{1-(\theta_2/\delta_2)}{1-\theta_2}$ implies $q_2=1-\frac{1-(\theta_2/\delta_2)}{1-\theta_2}\ge1-\frac{1-(\theta_3/\delta_3)}{1-\theta_3}=q_3$. It follows that the set of jury's responses for which the innocent suspect would find deviation to speech profitable is larger than the set of jury's responses for which the guilty suspect would find such deviation profitable. The jury must therefore believe that deviation to speech comes from the innocent suspect and therefore always acquit a suspect who speaks. This, in turn, upsets the proposed equilibrium. ■

Proposition 4.1(a).
Assume that $1-\theta_2 > u > 1-\delta_2$ *and that suspects do not have a right to silence. Then if* $\frac{1-\theta_1}{1-\delta_1} \leq \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$, *the following strategy profile constitutes the only Perfect Baysian equilibrium that survives the Universal Divinity refinement: The innocent suspect speaks, and the guilty suspect speaks with probability* $\frac{P_1\delta_1(1-\theta_1)}{P_2\delta_2(1-\theta_3)} \cdot \frac{D}{1-D}$ *and otherwise confesses. The jury convicts the suspect if the evidence contradicts the suspect's statement and the evidence is not incriminating with probability* $1-\frac{u-(1-\delta_2)}{\delta_2(1-\theta_2)}$ *and otherwise acquits the suspect. The jury's out-of-equilibrium beliefs are that a silent suspect is guilty with probability greater than or equal to D; accordingly the jury always convicts a silent suspect off-equilibrium.*

Proof. We first prove that the innocent suspect, the guilty suspect, and the jury cannot profitably deviate from their equilibrium strategies. We then show that this equilibrium outcome is unique. Let us begin by showing that the innocent suspect cannot profitably deviate to confession. Given the jury's equilibrium strategy, the innocent suspect's equilibrium payoff is $1-\delta_1+\delta_1(1-\theta_1)\frac{u-(1-\delta_2)}{\delta_2(1-\theta 2)}$. Observe that $1-\delta_1+\delta_1(1-\theta_1)\frac{u-(1-\delta_2)}{\delta_2(1-\theta_2)} > 1-\delta_1+\delta_1(1-\theta_2)\frac{u-(1-\delta_2)}{\delta_2(1-\theta 2)}$ (since $\theta_2 > \theta_1$). Now, the right-hand side simplifies to $1-\delta_1+\delta_1\frac{u-(1-\delta_2)}{\delta_2}$. Factoring out δ_1 gives $1-\delta_1(1-\frac{u-(1-\delta_2)}{\delta_2})$, which is equal to $1-\frac{\delta_1}{\delta 2}(1-u),$ which is strictly greater than u (since $1-u-\frac{\delta_1}{\delta_2}(1-u)>0$). Thus, $1-\delta_1+\delta_1(1-\theta_1)\frac{u-(1-\delta_2)}{\delta_2(1-\theta_2)} > u,$ as required.

Next, we prove that the guilty suspect is indifferent between speech and confession. Given the jury's equilibrium strategy, the guilty suspect's payoff from speech is $1-\delta_2+\delta_2(1-\theta_2)\frac{u-(1-\delta_2)}{\delta_2(1-\theta_2)}$, which is equal to u, as required.

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Finally, we show that the jury is indifferent between acquitting and convicting the suspect if the evidence contradicts the suspect's statement and the evidence is not incriminating. The probability that the suspect is guilty given that the evidence contradicts the suspect's statement *and* the evidence is incriminating is $\left(P_2\delta_2(1-\theta_2)\frac{P_1\delta_1(1-\theta_1)}{P_2\delta_2(1-\theta_2)}\cdot\frac{D}{1-D}\right)\Big/\left(P_2\delta_2(1-\theta_2)\frac{P_1\delta_1(1-\theta_1)}{P_2\delta_2(1-\theta_2)}\cdot\frac{D}{1-D}+P_1\delta_1(1-\theta_1)\right),$ which is equal to D. The jury is thus indifferent between acquitting and convicting the suspect if the evidence contradicts the suspect's statement and the evidence is incriminating. In particular, convicting the suspect with probability $1-\frac{u-(1-\delta_2)}{\delta_2(1-\theta_2)}$ is a best response (although not uniquely).

To show uniqueness, observe that there are only two other equilibrium candidates. In one equilibrium, the innocent suspect always remains silent and the guilty suspect mixes between confession and silence; in the other, both the innocent suspect and the guilty suspect speak. The latter equilibrium is ruled out because the guilty suspect can profitably

deviates to confession, given $u > 1-\delta_2$. To sustain an equilibrium in which the innocent suspect always remains silent and the guilty suspect mixes between confession and silence, the jury's out-of-equilibrium beliefs must be that a suspect whose statement is contradicted by the evidence is guilty with probability greater than *D*. We will show that the jury's out-of-equilibrium beliefs do not survive the Universal Divinity refinement.

Let q_i denote the probability with which the jury convicts a suspect whose statement is contradicted if the evidence is not incriminating so that suspect i, $i \in \{1,2\}$, is indifferent between his equilibrium strategy and silence. Notice that (i) $q_2 > 0$ since $\delta_2 > \theta_2$, and that (ii) if $\delta_1 < \theta_1$ then $q_1 = 0$. Thus, if $\delta_1 < \theta_1$, then $q_2 > q_1$. Now, if $\delta_1 > \theta_1$, then q_1 satisfies the equality $(1-\theta_1)\frac{u}{1-\theta_2} = 1-\delta_1+\delta_1(1-\theta_1)(1-q_1)$. Solving for q_1 we get $q_1 = \frac{1-\delta_1}{(1-\theta_1)\delta_1} + 1 - \frac{u}{\delta_1(1-\theta_2)}$. q_2 satisfies the equality $1-\delta_2+\delta_2(1-\theta_2)(1-q_2) = u$. Solving for q_2 gives $q_2 = \frac{1-\delta_2}{\delta_2(1-\theta_2)} + 1 - \frac{u}{\delta_2(1-\theta_2)}$.

If $\frac{1-\theta_1}{1-\delta_1} \le \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$, then $\frac{1-\delta_1}{1-\theta_1} \ge \frac{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}{\delta_2(1-\theta_2)}$, which in turn implies $\frac{1-\delta_1}{1-\theta_1} - \frac{u}{(1-\theta_2)} \ge \frac{\delta_1(1-\delta_2)-u\delta_1}{\delta_2(1-\theta_2)}$. Dividing both sides by δ_1 gives $\frac{1-\delta_1}{(1-\theta_1)\delta_1} - \frac{u}{\delta_1(1-\theta_2)} \ge \frac{(1-\delta_2)-u}{\delta_2(1-\theta_2)}$. Adding 1 to both sides gives $q_2 = \frac{1-\delta_1}{(1-\theta_1)\delta_1} + 1 - \frac{u}{\delta_1(1-\theta_2)} \ge \frac{(1-\delta_2)}{\delta_2(1-\theta_2)} + 1 - \frac{u}{\delta_2(1-\theta_2)} = q_2$. It follows that the set of jury's responses for which the innocent suspect would find deviation to speech profitable is larger than the set of jury's responses for which the guilty suspect would find such deviation profitable. It follows that deviation to speech is more likely to come from the innocent suspect than from the guilty suspect. The jury must therefore always acquit a suspect who speaks. This, in turn, upsets the proposed equilibrium. ■

Proposition 4.1(b).
Assume $1-\theta_2 > u > 1-\delta_2$ *and that suspects do not have a right to silence. Then if* $\frac{1-\theta_1}{1-\delta_1} > \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$, *the following strategy profile constitutes the only Perfect Bayesian equilibrium that survives the Universal Divinity refinement. The innocent suspect remains silent, and the guilty suspect remains silent with probability* $\frac{P_2(1-\theta_2)}{P_3(1-\theta_3)} \cdot \frac{D}{1-D}$ *and otherwise confesses. The jury convicts a silent suspect if the evidence is incriminating, convicts a silent suspect if the evidence is not incriminating with probability* $1-\frac{u}{1-\theta_2}$ *and otherwise acquits a silent suspect. The jury's out-of-equilibrium beliefs are that the suspect is guilty if the evidence contradicts the suspect's statement; accordingly the jury's convicts the suspect if the evidence contradicts the suspect's statement.*

Proof. We first prove that the innocent suspect, the guilty suspect, and the jury cannot profitably deviate from their equilibrium strategies. We then show that this equilibrium outcome is unique.

Let us begin by showing that the innocent suspect cannot profitably deviate to confession. Given the jury's equilibrium strategy, the innocent suspect's equilibrium payoff is

$(1-\theta_1)\frac{u}{(1-\theta_2)}$. Since $\theta_1 < \theta_2$, it follows that $\frac{1-\theta_1}{1-\theta_2} > 1$, and therefore $(1-\theta_1)\frac{u}{(1-\theta_2)} > u$, as required.

We prove next that the guilty suspect is indifferent between silence and confession. Given the jury's equilibrium strategy, the guilty suspect's payoff from silence is $(1-\theta_2)\frac{u}{1-\theta 2}$, which is equal to u, as required.

Finally, let us show that the jury is indifferent between acquitting and convicting a silent suspect if the evidence is not incriminating. The probability that a silent suspect is guilty given that the evidence is not incriminating is $\left(P_2(1-\theta_2)\frac{P_1(1-\theta_1)}{P_2(1-\theta_2)}\cdot\frac{D}{1-D}\right)\Big/\left(P_2(1-\theta_2)\frac{P_1(1-\theta_1)}{P_2(1-\theta_2)}\cdot\frac{D}{1-D}+P_1(1-\theta_1)\right)$, which is equal to *D*. The jury is thus indifferent between acquitting and convicting the suspect if the evidence contradicts the suspect's statement and the evidence is incriminating. In particular, convicting the suspect with probability $1-\frac{u}{1-\theta 2}$ is a best response (although not uniquely).

To show uniqueness, observe that there are only two other equilibrium candidates. In one equilibrium, all suspects speak. This equilibrium cannot be sustained because the guilty suspect can profitably deviate to confession. In the other equilibrium, the innocent suspect speaks and the guilty suspect mixes between speech and confession. To support this equilibrium, the jury's out-of-equilibrium beliefs must be that a silent suspect is guilty with probability greater than *D*. We will show, however, that the jury's out-of-equilibrium beliefs do not survive the Universal Divinity refinement.

Let q_i denote the probability with which the jury convicts a silent suspect if the evidence is not incriminating so that suspect i, $i \in \{1,2\}$, is indifferent between his equilibrium strategy and silence. Notice that (i) $q_2 > 0$ since $\delta_2 > \theta_2$, and that (ii) if $\delta_1 < \theta_1$, then $q_1 = 0$. Thus, if $\delta_1 < \theta_1$, then $q_2 > q_1$.

Now, if $\delta_1 > \theta_1$, then q_1 satisfies the equality $(1-\theta_1)(1-q_1) = 1-\delta_1+\delta_1(1-\theta_1)\frac{u-(1-\delta_2)}{\delta_2(1-\theta_2)}$. Solving for q_1 gives $q_1 = \frac{\delta_1-\theta_1}{1-\theta_1} - \delta_1\frac{u-(1-\delta_2)}{\delta_2(1-\theta_2)}$. q_2 must satisfy the equality $(1-\theta_2)(1-q_2) = u$. Solving for q_2 gives $q_2 = 1-\frac{u}{1-\theta_2}$. Now, if $\frac{1-\theta_1}{1-\delta_1} > \frac{\delta_2(1-\theta_2)}{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}$ then $\frac{1-\delta_1}{1-\theta_1} < \frac{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}{\delta_2(1-\theta_2)}$, which in turn implies $1-\frac{1-\delta_2}{1-\theta_2} > 1-\frac{u(\delta_2-\delta_1)+\delta_1(1-\delta_2)}{\delta_2(1-\theta_2)}$, or, equivalently, $q_1 = \frac{\delta_1-\theta_1}{1-\theta_1} - \delta_1\frac{u-(1-\delta_2)}{\delta_2(1-\theta_2)} > 1-\frac{u}{(1-\theta_2)} = q_2$. It follows that the set of jury's responses for which the innocent suspect would find deviation to silence profitable is larger than the set of jury's responses for which the guilty suspect would find such deviation profitable. The jury must therefore believe that deviation to silence comes from the innocent suspect; accordingly, the jury must always acquit a silent suspect. This, in turn, upsets the proposed equilibrium. ■

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