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Why Pro-Defendant Criminal Procedure Might Hurt the Innocent*

Nuno Garoupa** & Matteo Rizzolli***

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Abstract

Mandatory disclosure of evidence and double jeopardy are considered to be among the most important bulwarks against prosecutorial misconducts. While protecting the generality of defendants in the criminal process, we show that under certain reasonable assumptions, these procedural mechanisms hurt innocent defendants by inducing prosecutors to adjust their behavior and thus triggering adverse practices.

JEL Class: K14, K41, K42

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Introduction

In modern legal systems criminal procedure is usually biased towards the interests of defendants¹. The mechanisms of criminal procedure are multiple and encompass, *inter alia*, the determination of factual evidence, the interpretation of substantive law, the role of the judge vis-à-vis the prosecutor and the defendant, and the possibility of appealing till the highest court. These mechanisms enrich a menu of tools that each legal system can deploy in order to tilt to different degrees the procedure towards the interests of defendants. Most of the legal literature justifies the pro-defendant bias of procedure with the disproportionate and powerful role that the public prosecutor plays vis-à-vis the defendant in front of a court. In the first part of the present work we review the literature on the behavior of prosecutors. In the second section we discuss some of the more important pro-defendant mechanisms and we focus on the kind of errors they generate. In the third section we lay down our model that puts together pro-defendant procedures with self-interested prosecutors. We focus particularly on two features that were traditionally considered unique to common law countries, but are now making their way into civil law countries, namely double jeopardy and mandatory disclosure of evidence. Our goal is to show that these very same safeguards that are supposed to be in place in order to protect defendants may end up hurting the subset of accused that are in fact innocents. In the fourth section we assess some possible limitations of the model and legal policy implications. Section five concludes the paper.

I. What the prosecutor is up to

Early works in law & economics assumed the judiciary to pursue the general interest of society. In his accounts of courts, William Landes² modeled prosecutors as individuals who maximize expected number of convictions weighted by the length of conviction. This objective function -Landes argued then- coincides with the social optimum as long as one assumes that sentences correspond to the expected prices society charges for the related crimes. Most of the models in the stream of literature on optimal law enforcement³ are built on the assumption that prosecutors, together with the judiciary, behave benevolently, that is

¹ See Hylton and Khanna (2007) and literature cited therein.

² See Landes (1971).

³ For comprehensive surveys of the literature see Garoupa (1997) and Polinsky and Shavell (2000).

to say, they second social-welfare maximizing goals –whether this is optimal deterrence⁴, absolute deterrence⁵, retribution⁶, or victim compensation⁷ - in enforcing criminal law, therefore making appropriate use of criminal procedure.

On the other hand, legal scholars have long pointed at the discrepancies between the idealistic stereotype of the benevolent judiciary and the reality of trials and prosecution. To begin with, prosecutors have *tremendous discretion over the reputation, liberty and life of individuals*⁸. Obviously, discretion needs not necessarily be a problem in itself: Judge Easterbrook⁹ for instance assumes that prosecutors use their discretion to optimally screen cases that maximize deterrence given their budget constrain. However this later view might be naïve or quite unrealistic as prosecutors discretion is certainly open and often prone to abuses¹⁰. For example, Stephen Schulhofer¹¹ argues that, as self-interested agents, prosecutors' decisions naturally diverge from those that would be made in the interest of the public. Prosecutors may pursue other goals such as salary and other career advances¹² as well as re-election (in the US)¹³ since the record of convictions is often set as a performance measure for the prosecutor¹⁴. Furthermore, other factors may disalign the incentives of the prosecutor such as risk aversion¹⁵ or simply the different weight she attributes to the social costs of false positives¹⁶. Thomas Miceli¹⁷ notes how the same prosecutorial goals set forth by William Landes in his seminal article are misaligned with societal goals once one includes the possibility of erroneous convictions¹⁸.

⁴ See Becker (1968).

⁵ See Posner (1985). On the distinction between Becker's and Posner's ideas about the scope of criminal law, see Hylton (2005).

⁶ See, among others, Kahan (1998).

⁷ See, for example, Fletcher (1995).

⁸ See Jackson (1940).

⁹ In his seminal article, Easterbrook (1983).

¹⁰ See Wright (2005).

¹¹ See Schulhofer (1988).

¹² See, among others, Christensen (1981) Glaeser, Kessler, and Morrison Piehl (2000), Long (2005) and Boylan (2005).

¹³ See Gordon and Huber (2002).

¹⁴ See Meares (1995).

¹⁵ Notably Albonetti (1987).

¹⁶ As explained by Hylton and Khanna (2007) .

¹⁷ See Miceli (1990).

¹⁸ For a model that includes prosecutorial concern for false positives see Baker & Mezzetti (2001) and also Raghav (2005).

In fact, the persistent and systematic misalignment of prosecutorial incentives vis-à-vis societal goals has led Keith Hylton & Vic Khanna to formulate a public choice theory of criminal procedure that justifies pro-defendant safeguards as necessary second best constraints to impede prosecutorial agency problems¹⁹. We discuss some of these safeguards in the following section.

II. The pro-defendant safeguards in criminal procedure

Most likely, some defendants brought to trial are factually innocent and the procedure is usually meant at supporting courts' effort to sort out whether the suspected defendant is truly guilty. Given the risk that some innocents may end up convicted, and the fact that not all guilty individuals are necessarily detected and brought to court as defendants (and even if they are, their responsibilities may not be proven in court), criminal procedure struggles to achieve two somewhat conflicting goals: on one hand the achievement of greater accuracy in adjudication²⁰ in absolute terms; on the other hand the struggle to wrongfully convict as few innocents as possible.

II.a. Presumption of innocence

The presumption of innocence is a cornerstone of all procedures of modern democracies both in common law²¹ and civil law countries²². It makes the prosecutor bearing the burden of proving the culpability of the defendant. In statistical terms, the innocence of the defendant is the null hypothesis the court is presented with and that the prosecutor tries to refute. The court bases its decision upon the evidence presented by both parts and expresses a verdict of guilty/non guilty. There thus could be false positives (type I errors) or wrongful convictions of innocents, and false negatives (type II errors) or wrongful acquittals of guilty

¹⁹ In their article, Hylton and Khanna (2007).

²⁰ See, among others, Kaplow (1994).

²¹ In diverse guises it is nevertheless present in the Universal Declaration of Human Rights (article 11), in the Convention for the Protection of Human Rights and Fundamental Freedoms of the Council of Europe (article 6.2) and it is well established principle both on countries of common law tradition such as the US (see Coffin v. United States, 156 U.S. 432 (1895)) or Canada (see section 11(d) of the Canadian Charter of Rights and Freedoms).

²² There is a tendency to consider the presumption of innocence as a feature that fits best the adversarial system of common law countries vis-à-vis the inquisitorial system of civil law countries (O'Reilly, 1994). However, this is not necessarily the case: see for instance, Ingraham (1996). The presumption of innocence is for instance clearly remarked in the French Declaration of the Rights of Man and of the Citizen (article 9) that has constitutional value and in article 27 of the Italian constitution.

individuals. Achieving greater accuracy implies reducing both types of errors while not convicting innocents means decreasing only type I errors. To partially reconcile these two approaches it should be noted that the two errors are considered to have different degrees of importance. Judge Posner asserts that the costs of conviction of the innocent far exceeds the benefits of conviction of one more guilty individual²³. This is another way of arguing that it is preferable to have (often many) guilty acquitted than an innocent convicted. There appears to be a strong preference of different legal systems for the concern with respect to the possible wrongful conviction of an innocent prevailing over the apprehension of the guilty that might indeed escape a due conviction²⁴. As a consequence, in order for the first concern to prevail, the criminal procedure may be tilted towards the interests of the defendant in a variety of ways. Of course not all procedures adopt all of these features but generally speaking it is arguable that all criminal procedures of Western legal systems have some institutional arrangements that tilt the legal process towards the interests of the defendant. They encompass high level of evidence necessary to convict; the set of duties imposed on the prosecutor (such as mandatory disclosure of evidence); the set of rights which the defendant is entitled to (such as the right to silence) or asymmetric appeal rights that impede the prosecutor to appeal an acquittal at trial.

II.b. Evidence: the standard of proof

Different burdens of proofs (preponderance of evidence, clear and concurring evidence, beyond any reasonable doubt) imply different thresholds of rejections of the null hypothesis. In civil cases (where the standard of preponderance of evidence applies) the plaintiff must show that her claims are “more likely than not” true. Conversely, in order to

²³ See Posner (1999).

²⁴ How many guilty escaping conviction to trade off against an innocent convicted? What’s the tradeoff between the two types of errors the society considers acceptable? Volokh (1997) does not offers a definitive answer, however he provides an entertaining excursus on assertions of which number should this tradeoff ideally correspond to, excursus which begins with the Holy Bible for which the entire city of Sodoma where basically all are guilty individuals shall be saved if only ten innocents are among them (*Genesis* 18:23-32) and wings down to an error ratio of *one hundred* (guilty acquitted against one innocent convicted) according to Benjamin Franklin (1970) (who argued: *It is better one hundred guilty Persons should escape than that one innocent Person should suffer* in, and an error ratio of ten (guilty acquitted against one innocent convicted) according to Judge Blackstone (1766) and the famous Blackstonian error ratio of ten (guilty acquitted against one innocent convicted). Many more sentences asserting different error ratios are cited in Volokh (1997).

obtain a criminal conviction the prosecutor must convince the judge beyond any reasonable doubt.

The law & economics literature on the standard of proof is extensive and takes different routes. One first venue is the determination of the optimal standard of proof. Some authors model the standards that minimizes the social costs of judicial errors with exogenous type I and type II error costs²⁵. Other derive the optimal standard from litigation expenditures²⁶; litigation expenditures vis-à-vis error costs²⁷; the fact-finding technology²⁸ and the optimal exert of care by parties²⁹. Another stream of literature addresses parties' incentives to disclose evidence³⁰.

It has been long known that the different standards of evidence directly affect the ratio of the two types of errors³¹. It is safely arguable that, the higher the standard required—all else being equal- the more it is difficult to achieve a conviction and hence the lower it is the number of innocents convicted (false positives) and the higher it is the number of guilty individuals acquitted (false negatives). By increasing the standard of proof required, the law shoulders on the prosecutor most of the risks of the factual error that may happen in the fact-finding process³².

II.c. Limiting appeals of acquittals: double jeopardy

The appeal process—whereby litigants can have decisions of the adjudicators reviewed by a higher authority—is a general feature of formal legal systems and of many private

²⁵ See Miceli (1991) and also Yilankaya (2002).

²⁶ See Hay and Spier (1997).

²⁷ See Rubinfeld and Sappington (1987).

²⁸ See Sanchirico (1997).

²⁹ See Demougins and Fluet (2006).

³⁰ See Milgrom and Roberts (1986) discussing sufficient conditions for full revelation by parties and optimal strategies for decision-makers; Shavell (1989) discussing optimal sanctions to trigger revelation of evidence to courts; Shin (1998) arguing the superiority of the adversarial systems as a mechanism of evidence revelation by the parties; Cooter and Emons (2003; 2004) showing that perjury is an imperfect truth-revealing mechanism used to force the disclosure of evidence and suggesting more efficient mechanisms based on strict liability and bond-posting of witnesses.

³¹ See May (1875). Since Kaplan (1968) the application of decision theory and probability theory to the doctrine of evidence have met with wide success (see for instance Milanich, 1981; Posner, 1999; Lempert, Gross et al., 2000) albeit it is often flawed with some remarkable mistakes (for example Allen and Pardo, 2007).

³² See Stith (1990).

decision-making procedures³³. The criminal procedure of some countries –mainly common law³⁴- restricts or altogether bans the possibility for the prosecutor to appeal an acquittal whereby the right of the defendant to appeal a conviction remains in place. In the legal scholarship, asymmetrical appeal rights have found different type of justifications: They qualify the verdict of a jury that in the US has the legitimate authority of acquitting against evidence, authority that would be undermined by letting a public official appellate the jury decision³⁵. They serve the ultimate interest of the defendant in finality that is to say the interest in having the process concluded once and for ever³⁶. Other justifications of asymmetric appeal rights have been given on the ground of reducing the costs of litigation³⁷ and on putting some constrains on the prosecutorial right and its ability to abuse discretion over life, liberty and reputation of the defendant³⁸.

Asymmetric appeal rights however are primarily justified on the basis of their impact on the error ratio³⁹. They tilt the criminal procedure in favor of the defendant by preventing the prosecutor to seek to reverse acquittals given that some of the correct acquittals could be reversed in appeal. At the same time some erroneous convictions at trial can be correctly reversed in appeal and thus asymmetric appeal rights should –so the argument runs- keep the final number of false positives down. However assuming that there exist some false negatives, then asymmetric appeal rights prevent the prosecutor from seeking reversal of these types of mistakes and thus asymmetric appeal rights also incur in the tradeoff between

³³ See Shavell (1995; 2006).

³⁴ These asymmetric appeal rights are a constitutional right in US (Steinglass, 1998) in Canada and in much of the common law world whereas they are seldom applied in countries of continental law tradition; see Khanna (2002) for a comparative survey. Curiously in Italy, inappellability has been recently introduced in 2006 but quickly dismissed as unconstitutional in 2007 (Rizzolli, forthcoming).

³⁵ See Westen and Drubel (1978).

³⁶ See Stern (1990, pg 55) and Westen (1980). See also *Arizona v. Washington*, 434 U. S. 497, 503 (1978). It is however difficult to see why the same ultimate interest does not apply also in case of conviction.

³⁷ This argument can take two forms: on one hand asymmetric appeal rights reduce the high costs for defendants to get through the process, at least if they are acquitted at trial (Steinglass, 1998): The concern here is with the capability of an individual to sustain the costs of the trial in a formally adversarial system but where the prosecutor can take advantage of –usually- vastly superior resources to pursue its goals. By disempowering the prosecutor of the chance to appeal an acquittal –so the argument runs- part of this balance is restored. On the other hand by preventing the prosecutor from appealing the authority saves at least in monetary terms on the costs of justice.

³⁸ See Hylton and Khanna (2007) }.

³⁹ See inter alia *In re Winship* 397 U.S. 358 (1970).

the two types of errors mentioned above. Prohibiting the prosecutor to appeal thus places most of the risks of legal error on the prosecutor's side⁴⁰.

II.d. Mandatory disclosure

In general terms, mandatory disclosure forces the parties to reveal information in their possession upon the request of the counterpart. This rule smoothens the discovery process, increments the rate of settlements and reduces transaction costs⁴¹ and agency costs in particular.⁴² In criminal procedure, mandatory disclosure is a pro-defendant safeguard in so far as it supports the emergence of exculpatory evidence⁴³ as it increases the probability of an innocent defendant of not falling victim of false positives. Nevertheless it has been shown that mandatory disclosure may have an ambiguous effect on convictions if not coupled with the right to silence⁴⁴. This is because if, on one hand, mandatory disclosure tends to reduce convictions directly as more exculpatory evidence is produced, on the other

⁴⁰ See Stith (1990).

⁴¹ For a general overview, see Cooter and Rubinfeld (1994).

⁴² See Mahoney (1995).

⁴³ In the case of US, mandatory disclosure descends from the due-process requirements embedded in the fifth amendment to the constitution. After *Brady v. Maryland*, 373 U.S. 83, 84 (1963) which made the disclosure of exculpatory evidence in favor of the defendant compulsory for the prosecutor, the failure of prosecutors to fully disclose information have led to the upheld of countless cases (Gershman, 2006) and the so-called *Brady rule* have been codified in both prosecutorial guidelines and incorporated into an explicit ethical duty upon government attorneys (American Bar Association. and American Bar Association. Criminal Justice Standards Committee., 1993) although more binding and enforceable rules to constrain prosecutorial behavior have in the meanwhile been advocated (Green; Kurcias, 2000). The intent of *Brady* was the one of compelling prosecutors to their constitutional mandate to guarantee the defendant a due process. Although the obligation to disclose has constrained prosecutors discretion, it has arguably failed to align their incentives with the societal pursuit of fair trials if it is true that prosecutorial suppression of evidence has accounted for 16% to 19% of reversible errors of death-penalty sentences between 1973 and 1995 according to Gelman et al (2004) and that according to Bedau and Radelet (1987) one in ten of 350 wrongful death-sentence convictions held between 1900 and 1985 where the result of prosecutorial suppression of evidence.

⁴⁴ The right to remain silent is another often fund cornerstone of criminal procedure in common law countries. In US it derives from the fifth amendment. Noticeably, the right to silence has been withdrawn in Northern Ireland in 1988 and England in 1994 in order to facilitate the conviction of suspected terrorists (Mialon, 2005). After *Griffin v. California* (April 5, 1965) the right to silence, on one hand, recognizes the right of the defendant to not self-incriminating (witnesses may instead be held liable if they refuse testimony) and on the other hand, it prevents the jury from inferring any conclusion from defendant's silence. Seidmann and Stein (2000) and Seidmann (2005) argue that, absent the right to silence, the guilty mimics the innocents and by doing so he pools with them, thus undermining the credibility of innocents that make exculpatory statements. This increments the probability that innocents are convicted wrongfully. Mialon (2005) furthers the case for the right to silence by noting that, when evidence pertaining the culpability is inaccurate or unknown to the defendant, the later may prefer to stay silent, either because the evidence might indicate that he is guilty or because he might not know the evidence he is charged with. In either case, the innocent defendant might be wrongfully convicted if the adverse inference from silence is not prevented, but correctly acquitted if the right to silence is in place.

hand, it tends to increase convictions indirectly by worsen the jury's adverse inference from the defense's silence. Under mandatory disclosure, and assuming that the defendant has better information on the case, the jury may be less inclined to believe that the defendant remains silent because it does not know the evidence, and more likely to believe that the defendant keeps his mouth shut because the evidence is incriminating.

Mandatory disclosure and double jeopardy are distinctive features of common law criminal procedures. They represent the distinction of such systems as they are believed to constitute important procedural safeguards for errors against innocent defendants. Scholars have been so far divided between those emphasizing the “false negative” downside of the pro-defendant procedure⁴⁵ and those celebrating its merits in terms of successful restraint on prosecutorial abuses⁴⁶. Neither side of the argument disputes the fact that these procedural mechanisms work in the interests of defendants. Our paper questions this point. We argue that pro-defendant mechanisms, while helping defendants in general may end up hurting the innocents accused. In the following section we show that, under certain conditions, the innocent defendant is not-well served by pro-defendant safeguards.

III. The model

Suppose prosecuted individuals are guilty with probability Q and not guilty with probability $1-Q$, exogenous in the model⁴⁷. A prosecutor can choose one of two prosecutorial strategies, *passive*, that is to say, no use of further investigation after the evidence is gathered by the police and the prosecutor behaves passively in court; or *active/aggressive* where instead the prosecutor operates further investigation that actually reveals the true behavior of the accused and behaves aggressively in court to secure a conviction. This second strategy comes at a cost C . Essentially, by being active, the prosecutor improves the accuracy of the accusation with cost C ⁴⁸.

⁴⁵ That is to say the fact that the bias in procedure causes *too many* guilty individuals to escape conviction. See Atkins and Rubin (2003) and Cassell and Fowles (1998).

⁴⁶ See among all, Hylton and Khanna (2007) .

⁴⁷ See the following section for further discussion.

⁴⁸ Therefore discovering the factual truth with probability one is a mere normalization. All probabilities are measured in relation to this state of the world.

A guilty individual is convicted in first instance with probability Pg and an innocent is convicted in first instance with probability Pi ($<Pg$) if the prosecutor is passive; these probabilities are 1 and Ri ($\leq Pi$) respectively if the prosecutor is aggressive (since the accuracy of the available evidence is increased). An active self-interested prosecutor might not want to use the evidence gathered if it is exculpatory for the innocent wrongly accused. Therefore, we allow Ri not to be zero. On the other hand, the fact that the prosecutor knows that the defendant is innocent might affect her performance or some of the exculpatory evidence for the prosecution might be leaked, hence the probability Ri is arguably less than the probability Pi (for which such information has not been gathered).

The benefit for the prosecutor from winning a case is B (always sufficiently large to justify prosecution⁴⁹), the cost for the convicted individual is H , independently of the quality of the conviction. Suppose whoever loses always appeals if allowed. In other words, we assume H for the accused and B for the prosecutor are always large enough to justify an appeal. In appeal, a conviction is confirmed with probabilities Ag and Ai for the guilty and the innocent respectively. An acquittal is confirmed with probabilities Tg and Ti for the guilty and the innocent respectively. As expected, $Ag > Ai$ and $Tg < Ti$. Therefore appeals perform as an imperfect error-correction mechanism.

⁴⁹ Dropping the case is the most passive strategy the prosecutor can take. We abstract from such decision to concentrate on the adverse effect of pro-defendant procedural rules on the behavior of the prosecutor.

III.a. Symmetric appeal right with no disclosure of evidence

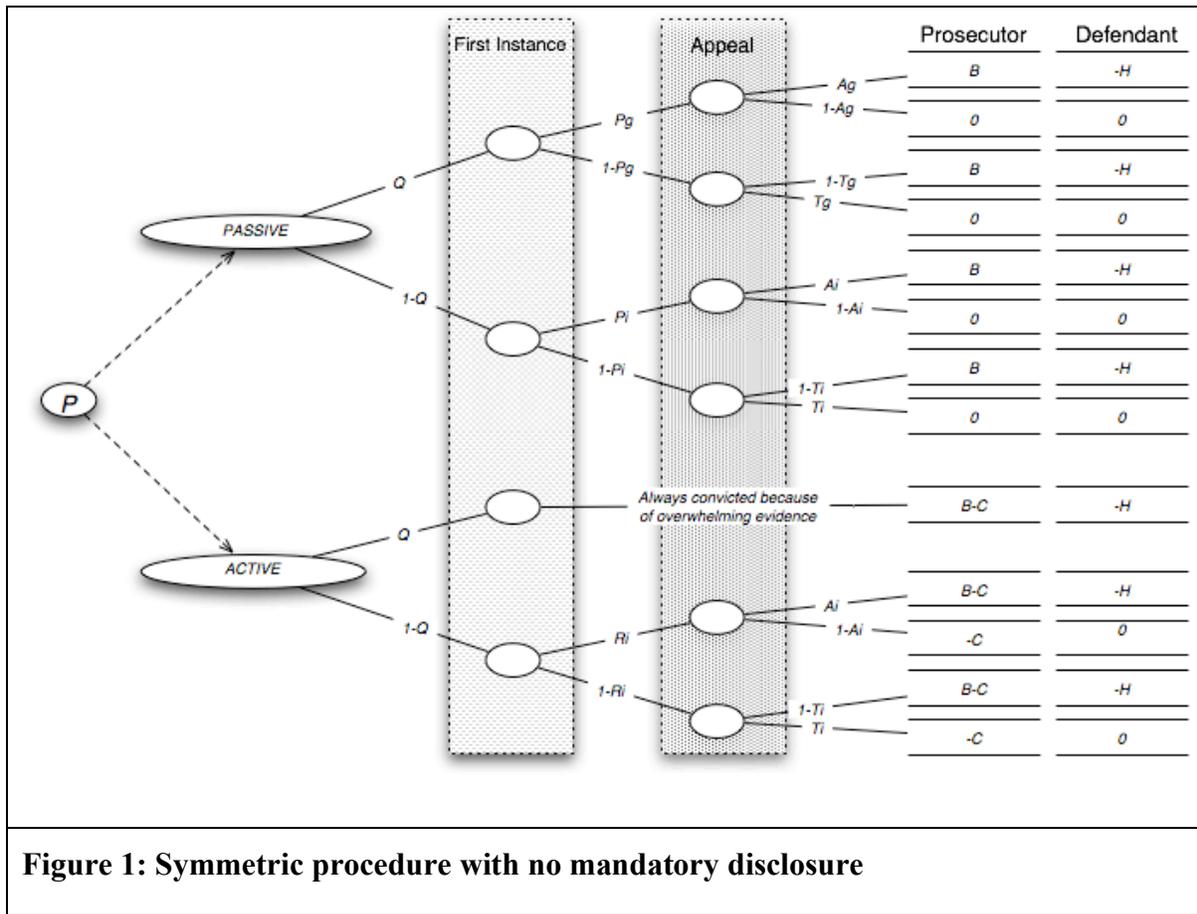


Figure 1: Symmetric procedure with no mandatory disclosure

Figure 1 summarizes the decision nodes and the respective payoffs. Notice that the prosecutor plays a game against nature, not against the defendant who has a very passive role in the simple version of the model⁵⁰.

III.a.1. How does prosecutor behavior affects correct sentences and errors' incidence

Under symmetric procedure with no mandatory disclosure, the probability of obtaining a correct conviction, a correct acquittal, false positives and false negatives (denoted ϵ_1 & ϵ_2 respectively) under both passive and aggressive behavior from the part of the prosecutor are as follow:

⁵⁰ See the following section for further discussion.

| | Passive | Active | Δ Active |
|---------------------|----------------------------|----------------------------|-----------------|
| Correct convictions | $Q[PgAg+(1-Pg)(1-Tg)]$ | Q | $>0^{51}$ |
| Correct acquittals | $(1-Q)[Pi(1-Ai)+(1-Pi)Ti]$ | $(1-Q)[Ri(1-Ai)+(1-Ri)Ti]$ | ≥ 0 |
| ε_2 | $Q[Pg(1-Ag)+(1-Pg)Tg]$ | 0 | < 0 |
| ε_1 | $(1-Q)[PiAi+(1-Pi)(1-Ti)]$ | $(1-Q)[RiAi+(1-Ri)(1-Ti)]$ | ≤ 0 |

Note that a more aggressive prosecutor improves the quality of the process by maxing out the probabilities of convicting guilty individuals and of acquitting innocents, thus by bringing ε_1 and ε_2 errors down. Hence, in our model, more aggressive or more active is a better technology of law enforcement (albeit more expensive).

The final outcomes give place to the following expected payoffs for prosecutor and accused (take into account that the prosecutor does not know if individuals are guilty or innocent unless she is active):

| | | Accused | |
|------------|---------|--|--|
| | | Guilty | Innocent |
| Prosecutor | Passive | $[Pg Ag + (1-Pg) (1-Tg)] B;$ $-[Pg Ag + (1-Pg) (1-Tg)] H$ | $[Pi Ai + (1-Pi) (1-Ti)] B;$ $-[Pi Ai + (1-Pi) (1-Ti)] H$ |
| | Active | $B - C;$ $-H$ | $[Ri Ai + (1-Ri) (1-Ti)] B - C;$ $-[Ri Ai + (1-Ri) (1-Ti)] H$ |

Table 1: Expected payoffs of prosecutor and accused

⁵¹ To see why correct convictions improve, note that $PgAg+PgTg < Pg+Tg$ and therefore $[(PgAg)+(1-Pg)(1-Tg)]$ must be less than one.

The expected payoffs for the prosecutor are:

Passive: $Q_1 B$, with $Q_1 = QPgAg + Q(1-Pg)(1-Tg) + (1-Q) Pi Ai + (1-Q) (1-Pi) (1-Ti)$;

Active: $Q_2 B - C$, with $Q_2 = Q + (1-Q) Ri Ai + (1-Q) (1-Ri) (1-Ti)$.

Notice that Q_1 is the probability of winning the case for the passive prosecutor and Q_2 is the probability of winning the case for the active prosecutor. Therefore a prosecutor is active as long as:

$$(1) \quad (Q_2 - Q_1) B > C$$

The prosecutor is active if her expected gain in prosecuting more than compensates the cost of being active, C . Notice that

$$(2) \quad (Q_2 - Q_1) = Q [1 - PgAg - (1 - Pg)(1 - Tg)] + (1 - Q)(Pi - Ri)(1 - Ti - Ai)$$

The expected gain from being active is not necessarily positive since although guilty defendants are convicted with a higher probability, the opposite happens with the innocent (and the value of prosecuting an innocent is a perfect substitute for the value of prosecuting the guilty). Therefore, unless we impose that

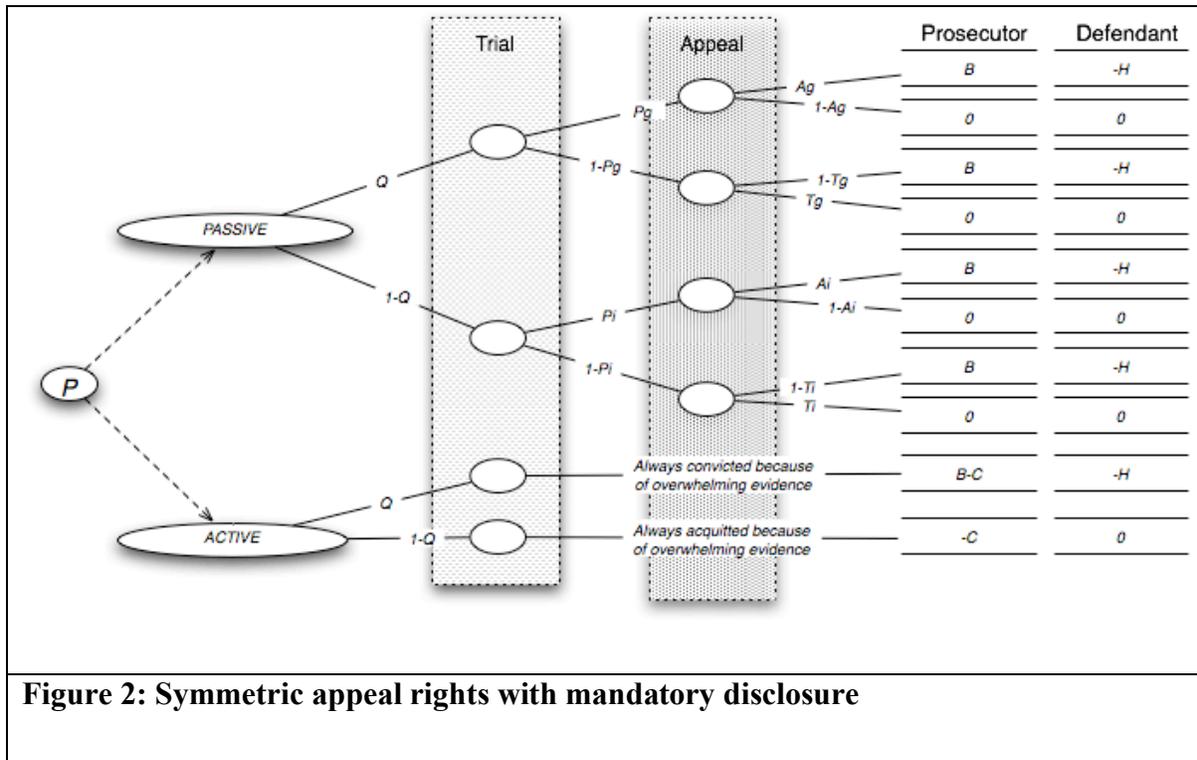
$$(3) \quad Q [1 - PgAg - (1 - Pg)(1 - Tg)] + (1 - Q)(Pi - Ri)(1 - Ti) > (1 - Q)(Pi - Ri)Ai,$$

there could be situations for which Q_2 is less than Q_1 . Those situations are uninteresting since the prosecutor would never adopt the more accurate technology since it would never pay-off.

III.b. Symmetric procedure with mandatory disclosure

Let us consider now a rule of mandatory disclosure as discussed in section II. If the prosecutor is active, she must disclose the evidence she discovers to the accused especially

when it is exculpatory. As a result, innocents accused are not prosecuted as explained by Figure 2.



The only difference with the previous game is that the probability of convicting the innocent when the prosecutor is active is zero, that is, $R_i=0$. Therefore, the expected payoff from being active is reduced.

III.b.1. How the prosecutor's behavior affects correct sentences and errors' incidence

With mandatory disclosure, the probability of obtaining a correct conviction increases since an aggressive prosecutor finds out the truth and must reveal it even if it leads to an acquittal. Therefore both correct convictions and acquittals improve and both error types go down to zero:

| | Passive | Active | Δ Active |
|---------------------|--------------------------|--------|-----------------|
| Correct convictions | $Q[(PgAg)+(1-Pg)(1-Tg)]$ | Q | >0 |

| | | | |
|--------------------|---------------------------------|-------|------|
| Correct acquittals | $(1-Q)[P_i(1-A_i)+(1-P_i)T_i]$ | $1-Q$ | >0 |
| ε_2 | $Q[P_g(1-A_g)+(1-P_g)T_g]$ | 0 | <0 |
| ε_1 | $(1-Q)[P_i A_i+(1-P_i)(1-T_i)]$ | 0 | <0 |

Consider different levels of B (nevertheless high enough to justify prosecution and appeal if necessary). There are three cases to be considered:

(i) *Prosecutors who are passive under both models.* In this case nothing changes;

(ii) *Prosecutors who are active under both models.* Now the innocent is better-off (because the probability of conviction is zero) and nothing changes for the guilty.

(iii) *Prosecutors who are active without mandatory disclosure but become passive with mandatory disclosure.* This happens because they cannot withhold information anymore therefore making the technology with improved accuracy relatively more expensive. In this case the innocent is worse-off (because the probability of conviction has increased from R_i to P_i) and the guilty is better-off (because the probability of conviction has decreased from one to P_g).

The following table summarizes the results:

| | Mandatory disclosure | |
|-----------------------------|----------------------|----------|
| | Guilty | Innocent |
| Prosecutor always passive | = | = |
| Prosecutor always active | = | + |
| Prosecutor changes behavior | + | - |
| Average | + | +/- |

Remark 1: Under a mandatory disclosure rule, (1) The guilty is better-off on average; (2) Some innocents are better-off (those matched with prosecutors who are active all the time);

(3) Some innocents are worse-off (those matched with prosecutors who change their behavior in response to mandatory disclosure); (4) If the number of prosecutors changing their behavior in response to mandatory disclosure is overwhelming, the innocent is worse-off on average.

III.c. Asymmetric appeal rights with no mandatory disclosure

We now look at what happens when double jeopardy is introduced as discussed in section II. Now only defendants can appeal a conviction, the prosecutor must stop after an acquittal.

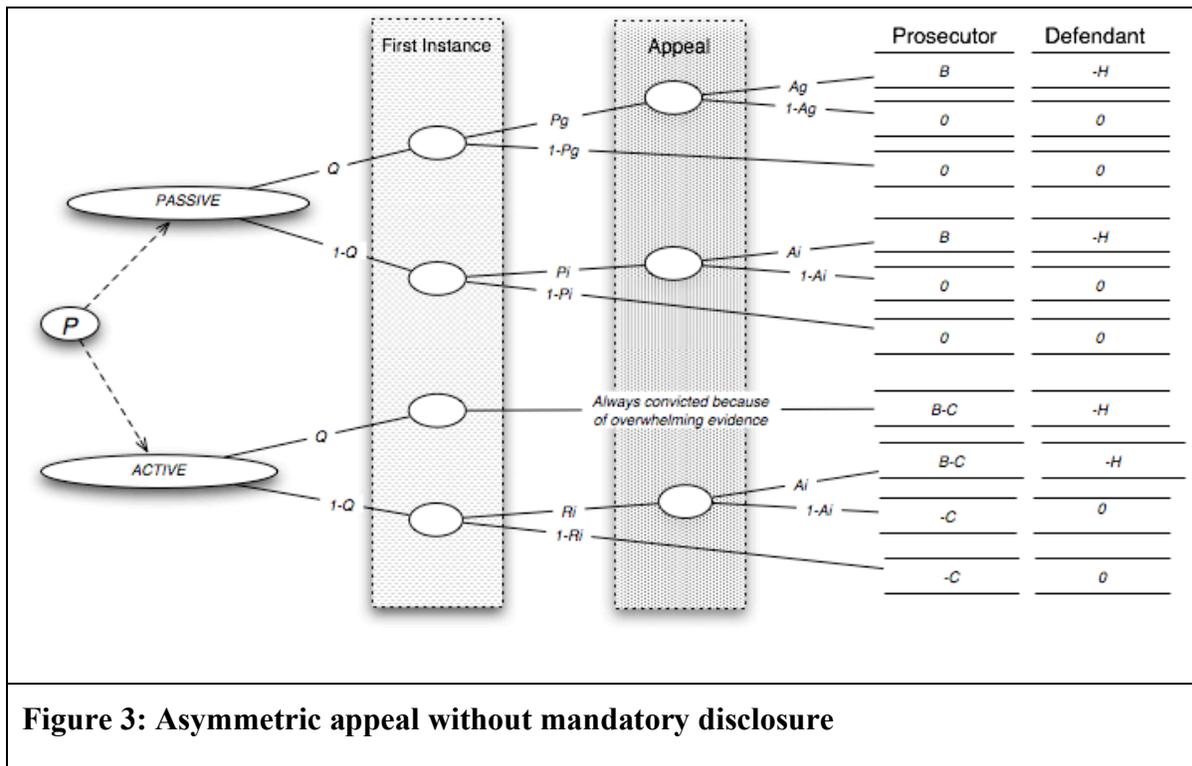


Figure 3: Asymmetric appeal without mandatory disclosure

III.c.1. How the prosecutor's behavior affects correct sentences and errors' incidence

Under asymmetric procedure but without mandatory disclosure, the probability of obtaining a correct conviction, increases from $QPgAg$ to Q when the prosecutor becomes active. Wrongful convictions and correct acquittals decrease by a Pi/Ri factor respectively and mistaken acquittals go to zero.

| | Passive | Active | Δ |
|---------------------|--------------------------|--------------------------|----------|
| Correct convictions | $QPgAg$ | Q | >0 |
| Correct acquittals | $(1-Q)[Pi(1-Ai)+(1-Pi)]$ | $(1-Q)[Ri(1-Ai)+(1-Ri)]$ | ≥ 0 |
| ε_2 | $QPg(1-Ag)$ | 0 | <0 |
| ε_1 | $(1-Q)PiAi$ | $(1-Q)RiAi$ | ≤ 0 |

Again, it is noteworthy that an aggressive behavior improves the performance of the trial by lowering both errors, ε_1 & ε_2 . The payoff matrix for the prosecutor and the accused is as following:

| | | Accused | |
|------------|---------|-----------------|-------------------|
| | | Guilty | Innocent |
| Prosecutor | Passive | $PgAgB; -PgAgH$ | $PiAiB; -PiAiH$ |
| | Active | $B-C; -H$ | $RiAiB-C; -RiAiH$ |

Table 2: Expected payoffs of prosecutor and accused under asymmetric procedure

The expected payoffs change now as well as the decision to be active:

$$(4) \quad (Q_4 - Q_3) B > C$$

With $Q_3 = Q Pg Ag + (1-Q) Pi Ai$ and $Q_4 = Q + (1-Q) Ri Ai$. Again note that Q_3 is the probability of winning the case for the passive prosecutor and Q_4 is the probability for the active prosecutor, when she cannot appeal an acquittal. Notice that

$$(5) \quad (Q_4 - Q_3) = Q(1-PgAg) - (1-Q)(Pi-Ri) Ai$$

The intuition is the following: by not allowing appeals, the expected gain from passive and active prosecution is reduced. However, the possibility of appeals is relatively more important when the prosecutor is passive than when she is active because in the latter case

she only appeals against the acquittal of an innocent whereas in the former she appeals for acquittals of innocent and guilty defendants as well. Therefore, under asymmetric appeal rights, being active becomes relatively more attractive to the prosecutor. In other words, it should be the case that $(Q_4 - Q_3)$ is greater than $(Q_2 - Q_1)$. The mathematical condition is satisfied as long as:

$$(6) \quad \underbrace{Q(1-P_g)(1-T_g)}_{\text{guilty convicted in appeal when prosecutor is passive}} + \underbrace{(1-Q)(1-P_i)(1-T_i)}_{\text{innocent convicted in appeal when prosecutor is passive}} > \underbrace{(1-Q)(1-R_i)(1-T_i)}_{\text{innocent convicted in appeal when prosecutor is active}}$$

Consider again different levels of B . There are three cases to be considered:

- (i) *Prosecutors who are passive under both models.* In such a case both innocent and guilty are better-off (since the probability of conviction is lower when the prosecution cannot appeal an acquittal);
- (ii) *Prosecutors who are active under both models.* Now the innocent is better-off because the probability of conviction is lower when the prosecutor cannot appeal an acquittal and nothing changes for the guilty since he is convicted in first instance anyway.
- (iii) *Prosecutors who are passive with symmetric appeal rights and active with asymmetric appeal rights.* In this case the innocent is better-off (because the probability of conviction has decreased from $P_i A_i + (1-P_i)(1-T_i)$ to $R_i A_i$) and the guilty is worse-off (because the probability of conviction has increased to one).

The following table summarizes the results:

| | Asymmetric Appeal Rights | |
|-----------------------------|--------------------------|----------|
| | Guilty | Innocent |
| Prosecutor always passive | + | + |
| Prosecutor always active | = | + |
| Prosecutor changes behavior | - | + |
| Average | +/- | + |

Remark 2: Under asymmetric appeal rights, (1) Some guilty defendants- those matched with prosecutors who are passive all the time- are better-off whereas some guilty defendants -those matched with prosecutors who change behavior in response to appeal rights- are worse-off; (2) If the number of prosecutors who change their behavior in response to asymmetric appeal rights is overwhelming, the guilty is worse-off on average; (3) All innocent accused are better-off.

III.d. Mandatory Disclosure with Asymmetric Appeal Rights

We now put together these two pro-defendant criminal procedure rules, mandatory disclosure and asymmetric appeal rights. The only difference with the previous game is that the probability of convicting the innocent when the prosecutor is active is zero, that is, $R_i=0$. Therefore, the expected payoff from being active is reduced. The question concerns the extension of this reduction, given that mandatory disclosure makes being passive more attractive to the prosecutor whereas asymmetric appeal rights make being active more attractive.

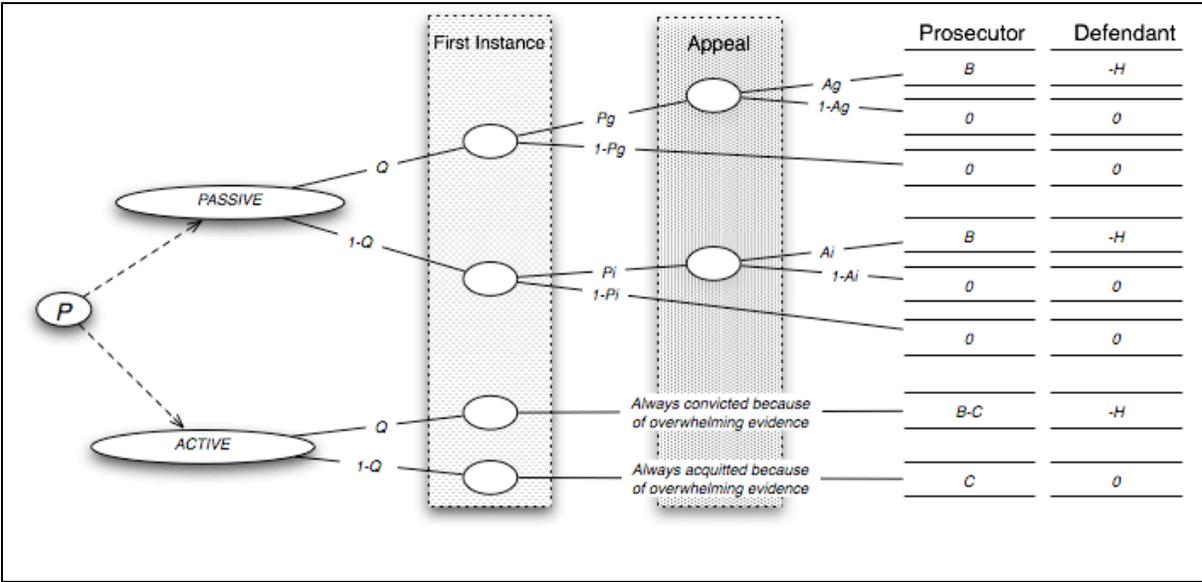


Figure 4: Asymmetric appeal right with mandatory disclosure

III.d.1. How the prosecutor's behavior affects correct sentences and errors' incidence

Under asymmetric procedure and with mandatory disclosure, the probability of obtaining a correct conviction, increases from $QPgAg$ to Q when the prosecutor becomes active. Wrongful convictions decrease⁵² whereas correct acquittals increase⁵³ and mistaken acquittals go to zero.

| | Passive | Active | Δ |
|---------------------|--------------------------|--------|----------|
| Correct convictions | $QPgAg$ | Q | >0 |
| Correct acquittals | $(1-Q)[Pi(1-Ai)+(1-Pi)]$ | $1-Q$ | >0 |
| ε_2 | $QPg(1-Ag)$ | 0 | <0 |
| ε_1 | $(1-Q)PiAi$ | 0 | <0 |

The decision to be active is explained by:

$$(7) \quad (Q-Q_3) B > C$$

With $Q_3 = QPgAg + (1-Q)PiAi$ as before. While Q_3 is still the probability of winning the case for the passive prosecutor when she cannot appeal an acquittal, Q is the probability of winning for the active prosecutor, which, under mandatory disclosure, is equal to the probability of the accused of being guilty. Notice that

$$(8) \quad (Q-Q_3) = Q(1-PgAg) - (1-Q)PiAi \quad \text{And}$$

$$(9) \quad (Q_2-Q_1) = (Q-Q_3) - Q(1-Pg)(1-Tg) + (1-Q)(Pi-Ri)(1-Ti) + (1-Q)RiAi$$

Since we have assumed that the loss from appeal rights is more significant when the prosecutor is passive than when she is active, we can rewrite that:

⁵² To see why, consider that $PiAi \geq RiAi$ by assumption.

⁵³ Notice that $(1-Q)[Pi(1-Ai)-Ri(1-Ai)-(1-Ri)]$ can be rearranged as $Pi+Ai(Ri-Pi)-1$ and given that $Ri-Pi \leq 0$ by assumption, therefore $Pi+Ai(Ri-Pi)-1 < 0$.

$$(10) \quad Q(1-Pg)(1-Tg) > (1-Q)(Pi-Ri)(1-Ti)$$

It is clear that $(Q_2-Q_1) - (Q-Q_3)$ is positive, that is, with mandatory disclosure and asymmetric appeal rights, being active is less attractive for the prosecutor, if and only if:

$$(11) \quad \underbrace{(1-Q) Ri Ai}_{\text{loss from mandatory disclosure (prosecutor should be passive)}} > \underbrace{Q(1-Pg)(1-Tg) - (1-Q)(Pi-Ri)(1-Ti)}_{\text{loss from asymmetric appeal rights (prosecutor should be active)}}$$

Consider again different levels of B . The three cases to be considered are:

(i) *Prosecutors who are passive under both models.* In this case both innocent and guilty are better-off since the probability of conviction is lower when the prosecution cannot appeal an acquittal and mandatory disclosure plays no role here;

(ii) *Prosecutors who are active under both models.* Now the innocent is better-off because the probability of conviction is zero due to mandatory disclosure and nothing changes for the guilty since he is convicted in first instance anyway.

(iii) *Prosecutors who change their behavior in response to pro-defendant criminal procedure rules:* In this case we can distinguish when (a) *Mandatory disclosure dominates* and prosecutors become passive. The innocent in this case is worse-off (because the probability of conviction has changed from zero to $Pi Ai$) and the guilty is better-off (because the probability of conviction has decreased from one to $Pg Ag$). (b) *Asymmetric appeal rights dominate* and prosecutors become active: the innocent is better-off (because the probability of conviction has decreased from $Pi Ai + (1-Pi)(1-Ti)$ to zero) and the guilty is worse-off (because the probability of conviction has increased to one). The following table summarizes the results:

| | Mandatory disclosure dominates (Active -> Passive) | | Asymmetric appeal rights dominate (Passive -> Active) | |
|---------------------------|---|----------|--|----------|
| | Guilty | Innocent | Guilty | Innocent |
| Prosecutor always passive | + | + | + | + |

| | | | | |
|-----------------------------|---|-----|-----|---|
| Prosecutor always active | = | + | = | + |
| Prosecutor changes behavior | + | - | - | + |
| Average | + | +/- | +/- | + |

Remark 3: Under asymmetric appeal rights plus mandatory disclosure, (1) Some guilty defendants are better-off (those matched with prosecutors who are passive all the time or those matched with prosecutors who change behavior from active to passive in response to asymmetric appeal rights) and some guilty are worse-off (those matched with prosecutors who change behavior from passive to active in response to asymmetric appeal rights); (2) If prosecutors who change their behavior from passive to active in response to appeal rights are a tiny minority, the guilty is better-off on average; (3) Some innocent are better-off (those matched with prosecutors who are passive all the time or those matched with prosecutors who are active all the time or those matched with prosecutors who change behavior from passive to active in response to asymmetric appeal rights) and some innocent are worse-off (those matched with prosecutors who change behavior from active to passive in response to asymmetric appeal rights); ; (4) If prosecutors who change their behavior from active to passive in response to appeal rights are overwhelming, the innocent is worse-off on average.

Therefore, we can conclude that:

1. For the guilty defendant, mandatory disclosure is the best regime followed by mandatory disclosure with asymmetric appeal rights, and finally asymmetric appeal rights only.
2. For the innocent, asymmetric appeal rights is the best regime followed by mandatory disclosure with asymmetric appeal rights, and finally mandatory disclosure only.
3. Mandatory disclosure with asymmetric appeal rights could help both the innocent and the guilty (pro-defendant bias); however when the mandatory disclosure effect dominates, it hurts the innocent while helping the guilty defendant.

Notice the contrast between mandatory disclosure and asymmetric appeal rights. On average, mandatory disclosure benefits the guilty whereas asymmetric appeal rights might hurt him. As to the innocents, mandatory disclosure might hurt them whereas asymmetric appeal rights actually helps them. Although both rules are perceived as pro-defendant, they seem to have different impact on defendants depending on them being guilty or not.

IV. Legal Policy Implications

Our model explains why different pro-defendant criminal procedure rules can have very different impacts on the welfare of the accused. Depending on which effects identified by the model prevail, pro-defendant criminal procedure might benefit the guilty and hurt the innocent. This has consequences for the quality of criminal procedure as we have discussed in the model (false positives and false negatives) but also for deterrence. From previous literature⁵⁴, we know that if a certain rule or policy hurts the innocent and benefits the guilty (or more generally, a rule that benefits the guilty more than the innocent), then it fosters criminal activities. The reason is that the relative cost of violating the law is reduced. Conversely, pro-defendant criminal procedure that helps the innocent and hurts the guilty (again, more generally, a rule that hurts the guilty more than the innocent) increases deterrence.

A quiet significant point of our model is that mandatory disclosure and asymmetric appeal rights have opposite effects on the prosecutor's choice of enforcement technology. The choice of a more accurate technology is undermined by mandatory disclosure (because the prosecutor loses the exclusive property rights over the information) and is conversely fostered by asymmetric appeal rights (since the prosecutor has to win in first instance). The two effects together have an ambiguous impact on the prosecutorial strategy. In terms of deterrence, the model suggests that mandatory disclosure induces under-compliance (because it is likely that the guilty benefits more than the innocent due to change of behavior on the prosecutor's side) whereas asymmetric appeal rights could enhance compliance (because the conviction of the guilty is relatively more likely due to change of

⁵⁴ See Png (1986) and Polinsky and Shavell (2000) for models in which type I errors jeopardize deterrence. See Lando (2006) for a critique.

prosecutor's behavior). In essence, these two features of criminal procedure could have dramatically different results in the welfare of guilty and innocent parties, and ultimately on deterrence. Naturally our model is based on a set of assumptions that are disputable and therefore discussed in the next paragraphs:

IV.a. Ethics of the Prosecutor

The model is based on the assumption that a prosecutor is willing to prosecute an innocent (that is, a person whom the prosecutor knows to be innocent for sure) given the odds of winning the case when courts cannot perfectly observe evidence. In our view, there are two significantly different issues with this assumption. First, to state that the prosecutor knows that an individual is innocent for sure is a mere normalization, and therefore we could just interpret the individual's culpability as high probability rather than probability one (that is, all probabilities in the mathematical model take this probability as the reference). Hence, what we are actually assuming is that the prosecutor is willing to take a defendant to court with a low probability of culpability when the odds are not too bad given the fact that courts have imperfect information (in this case, even more imperfect than the prosecutor). Second, we take the view that prosecutors are opportunistic. The extent to which they want to maximize convictions or sentences is a matter of debate as we have discussed on section II. Naturally, rules of ethics for prosecutors nominally solve the problem. In fact, if prosecutors were committed not to prosecute individuals with a low probability of culpability (if compliance with rules of ethics were assured at no cost) no matter what the odds are in court, then mandatory disclosure and asymmetric appeal rights would not pose a problem to the innocent. It is the opportunistic behavior of prosecutors that introduces the mechanism by which pro-defendant criminal procedure hurts the innocent.

IV.b. Costs of Appeals

The assumption that all cases are appealed is a simplification to focus on an imperfect error-correction mechanism rather than on a device to signal guilt. In fact, unlike previous work⁵⁵, the appeal cannot be used as a signaling device for the accuracy of the conviction since all decisions are appealed. However, since appeal courts are less prone to errors (an

⁵⁵ See Shavell (1995)

assumption found also in previous literature) then at least some errors are nevertheless corrected in appeal. Obviously appeals are expensive and therefore not all cases will be appealed. However, we argue that such simplification generates an equilibrium that is more realistic than anticipated. If only strong cases are appealed, that is, cases that generate a significantly high benefit to the appealing party to outweigh the cost, then one could infer that there is a high likelihood the first court's decision is likely to have been mistaken. In other words, it is likely that innocents appeal convictions more frequently than guilty and that prosecutors appeal wrong acquittals more frequently than accurate acquittals. The problem is that such signaling device is not feasible as a subgame perfect equilibrium. An opportunistic prosecutor might start appealing weak cases in order to induce the court to perceive them as strong, and by the same token the guilty might start appealing his case in order to induce the court to perceive him as innocent. Due to this opportunistic behavior, there should be a pooling equilibrium and therefore the signaling device cannot be strong in equilibrium.

Allowing for the possibility of not appealing a ruling does not change dramatically our model. Appeals are costly. Hence the prosecutor would like to anticipate his preferred outcome to the first court rather than postpone to the second court. Not only because the outcome at the second court is more costly, but also because the defendant might not want to appeal. That being so, the prosecutor is more likely to be active rather than passive if appeals are costly. Still, mandatory disclosure and asymmetric appeal rights would have essentially the same relative impact on the prosecutor's decision of being active or passive that they have in the basic model.

IV.c. Compliance with Mandatory Disclosure

The model presupposes that prosecutors comply with mandatory disclosure. The reality is that prosecutors can still manage what evidence is exculpatory and has to be disclosed and what evidence is irrelevant or unrelated to the charges and should not be disclosed. The decision is likely to be more relevant for the innocent defendants than for the guilty. The reason is that the evidence the prosecutor does not want to disclose is probably favorable to the defendant. That being so, we should re-interpret the probability of conviction of an innocent to be zero when the favorable evidence is disclosed as a mere normalization and

not literally. Once we recognize that compliance with mandatory disclosure is not assured because prosecutors are opportunistic, there are questions concerning enforcement mechanisms and sanctioning. To the extent that mandatory disclosure is to be effective, compliance should be achieved at the lowest cost. Naturally these costs have to be balanced against the benefits from assuring effective mandatory disclosure.

IV.d. Behavior of the Accused

In the model, the defendant is passive. Although not realistic, the assumption is not too strong if we consider that a high percentage of defendants are represented by pro-bono councilors or public defenders who usually are not eager to engage in expensive and aggressive defensive strategies⁵⁶. In fact, our model essentially captures the idea of a defendant who relies heavily on the evidence produced by the prosecutor and therefore not playing an active role in criminal litigation.

As we noted, the model is of a game between the prosecutor and nature. Introducing the possibility for different strategies for the accused makes the model more complex and more realistic. Plausibly, a defendant can also choose between being passive or active (trying to produce evidence to support his innocence). Depending on how the behavior of each side determines the probability of a conviction for the guilty and for the innocent, different game structures are possible. We could have correlated equilibria (both sides are passive or both sides are active). We could also have a game with no equilibrium in pure strategies.

Although modeling the behavior of the accused introduces more complexity, the identified effects of mandatory disclosure for the prosecutor and asymmetric appeal rights still exist.

Mandatory disclosure for the prosecutor as we have seen could make the prosecutor more passive and therefore hurt the innocent. The reaction of the defendant could mitigate the problem, for example, just suppose the accused becomes more active in gathering evidence. But that would naturally increase the legal costs for an innocent defendant who has to

⁵⁶ See Rhee (1996); Seron et al. (2001) and Sandefur (2007).

search and discover evidence to support his innocence rather than waiting for the prosecutor to do that. Asymmetric appeal rights could make the prosecutor more active in order to secure a conviction in the first court. In a correlated equilibria type of game, that would force an innocent defendant to become more active, thus increasing again legal costs.

In conclusion, a more complex model that explicitly accounts for the behavior of the defendant does not eliminate the problems we have identified with pro-defendant criminal procedure. It is possible that the accused could counter-balance the change of prosecutor's behavior and therefore mitigate the dilemmas we have discussed in the model. However, such mitigation is costly and therefore would increase the burden borne by an innocent defendant.

IV.d.1. Evidence and Discovery

The recognition that prosecutors could engage in opportunistic behavior raises important questions concerning evidence and discovery. In our model, prosecutors can hide evidence (but they cannot fabricate evidence, for example); a matter addressed by mandatory disclosure. Prosecutors can also manage evidence in order to enhance strategic appeals, an issue solved by the asymmetric appeal rights. The extent to which evidence and discovery rules can reduce the gains to the prosecutor from engaging in opportunistic conduct is of importance in our model. The less transparent evidence rules are, the more significant is the problem we arise with our model; that is to say that pro-defendant criminal procedure rules might have unintended consequences because prosecutors adjust their strategies.

IV.d.2. Inquisitorial vs. Adversarial

The results produced by our model depend on the prosecutor's goal being to secure a conviction. Arguably such assumption is more consistent with an ideal adversarial system where the prosecutor strives to win the case by presenting the evidence, looking at the facts, and convincingly arguing the culpability of the defendant. In an ideal inquisitorial system where the prosecutor has a secondary role adjunct to the judge, the standard argument is that the goal of the prosecutor is to help the judge or the court to assess the facts and discover the truth. Therefore, in a purely ideal inquisitorial system, *ceteris paribus*, pro-

defendant criminal procedure rules might not have a strong detrimental effect as the one we have identified because the prosecutor's behavior is less determinant for the outcome

V. Conclusions

In this paper we study the effects of two pro-defendant criminal procedure rules, mandatory disclosure of evidence by the prosecutor and asymmetric appeal rights, on the behavior of prosecutors. We show that they have a different impact. Mandatory disclosure of evidence makes the prosecutor more passive since she loses any informative advantage. Asymmetric appeal rights could make the prosecutor to be more aggressive in the first instance court in order to secure a conviction.

The change of behavior by the prosecutor affects the welfare of the defendant. However, this effect is not the same on all defendants, it crucially depends on whether the defendant is guilty or innocent. We argue that, under certain circumstances, these rules hurt the innocent and benefit the guilty. Such observation carries two important implications. Due to changes in prosecutor's behavior, pro-defendant criminal procedure could actually decrease the quality of criminal convictions (by increasing false positives) and reduce criminal deterrence (by varying the balance between the payoff of committing a crime and of being deterred).

This paper identifies the strategic role of the prosecutor as a major determinant of the efficacy of pro-defendant criminal procedure rules. While previous literature⁵⁷ has argued that full discretion on side of the prosecutor promotes efficiency, we take the view that it could seriously undermine the quality of criminal justice and deterrence. The critical question is the extent to which the goals of the prosecutor are misaligned with those of society in general. If they are, then pro-defendant criminal procedure rules could exacerbate the problem.

⁵⁷ See among all Easterbrook (1983).

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