State Complicity in the Sexual Assault of Women:

The Fate of Cassandra?

by

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ABSTRACT

In this paper I investigate why, despite rampant sexual assaults against women, it is an adamant fact that only a minuscule fraction of their male assailants are convicted. The model embodies the crucial aspect of the criminal justice system based on common law that prosecutors are *not* the victims' advocates but, rather, prosecute to serve the public interest. In a simple sequential game framework, I examine the effects of a pervasive feature of sexual assault cases: the police's exaggerated belief, contrary to facts, of the falsity of women's reports of assault. This distortion in beliefs adversely affects their endogenous investigational effort on the assaults and on the suspects. Along with the victims' lack of private representation in the court system this, in turn, generates a self-confirming equilibrium in which women's reports are largely disbelieved, police disbelief ironically encourages some false reporting, few victims choose to report the crimes, and the conviction rate on those cases that are reported and proceed to trial is low. A second feature of sexual assault cases, namely, the sharp attrition in active files as they pass through the criminal justice system (to the extent that it is exogenous) is shown to worsen the outcome—again, through an endogenous investigational response of the police. When the police are allowed to also investigate victims (either in order to discredit them or to prepare for trial), I find that police disbelief of women's reports induces a *de facto* substitution of the investigation of victims for the investigation of suspects, worsening the already appalling miscarriage of justice. An attempt to reduce the alleged false reporting by punishing women who are deemed to have lied is shown to be counterproductive. In fact, the attempt is likely to reduce the already-low reporting by genuine victims, inducing a further decrease in conviction rates and an endogenous increase in the frequency of sexual assaults. I finally discuss the policy implications that arise out of the analysis.

Keywords: sexual assault, rape, credibility, criminal justice system, attrition
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1 Introduction

After Troy fell to the Greeks, princess Cassandra of Troy sought refuge in the temple of goddess Athena—but in vain. The Greek Ajax the Lesser located Cassandra, dragged her away from the statue of Athena she was clinging to, and raped her on the temple's premises. To add to her many woes, Cassandra had been cursed by Apollo, for rejecting his sexual advances, to be never believed when she revealed anything that she saw as true—as a result of which, whenever Cassandra spoke, she was dismissed as delusional. This paper is about contemporary women in rich, liberal democracies who are sexually assaulted and seek refuge in the state—but only to be disappointed and possibly victimized again because their allegations are met with disbelief and their seriousness downgraded.[1] With the aid of a simple model, I formally analyze whether the state is abdicating its responsibility to these women and, if so, how this comes about. I investigate the role of beliefs on incentives and consequences of these for women, for the perpetrators of sexual assault, and for the police force. I end with various policy recommendations that fall out of the analysis.

Sexual assault is among the most gendered of phenomena; it affects far more women than men.[2] What is more, women's fear of rape magnifies their fear of many other victimizing crimes (like burglary, battery, murder) because they can occur simultaneously with rape [Ferraro (1996)]. Despite being one of the most traumatic experiences that they can be subjected to, a large majority of women are unwilling to disclose rape incidents even to their family and friends, much less to the police authorities.[3] The reticence has to do with feelings of shame, guilt, embarrassment, fear, resistance to reliving the trauma, the perception that they will be disbelieved, discredited, and the horrific experience belittled, among many other reasons. By all accounts, these perceptions are rooted in society's treatment of sexually

[1] The focus on rich countries is certainly not because sexual assault is less of a problem in poor countries; if anything, it may be a lot worse. The reason, rather, is that whatever empirical evidence there is available on the issue is best available in the former. The treatment of other countries, especially developing countries, is well outside the scope of this modest project and warrants a separate study.

[2] In the years 1994 and 1995, 99% of all victims of rape and sexual assault in the U.S. were female and 99% of the perpetrators were male [Greenfield (1997)]. Roughly 1 in 5 American women have been raped at some point in their life [Black et al (2011)].

[3] For example, in the U.S., for the period 1995-2013, women in the age group 18-24 years experienced the highest frequency of rapes, of which only 20% were reported among college students and 32% among non-college students [Sinozich and Langton (2014)].

assaulted women. The attitudes and behavior of the police, the prosecutors, the defense lawyers, the jurors, and the general public are such as to engender the sorts of anxieties and concerns that persuade survivors of sexual assault to not divulge their experiences.

The disparity between the number of women victimized by sexual assault and those that receive justice from the state is appalling, a phenomenon that has been referred to as the 'justice gap' [Lonsway and Archambault (2012)].[4] Based on a sample of 8,000 American women in 1995-96 obtained by the National Violence Against Women Survey, it was found that 17.8% had been raped during the lifetime and 0.3% were raped during the preceding year [Tjaden and Thoennes (2006)]. Among women who were raped since age 18 years, only 7.8% saw their assailants prosecuted, 3.3% were convicted, and 2.2% were jailed (*Ibid.* p. 33). According to data from Statistics Canada, of the 460,000 Canadian women who were sexually assaulted in the year 2004, only 8% reported the crime, and only 0.3% of the perpetrators were convicted [Johnson (2012)]. In England and Wales, in 2011 the conviction rate for rape was 1.2%.[5]

What accounts for the abysmal rates of conviction across countries for the crime of sexual assault? Evidence points to a confluence of contributing factors. A prominent candidate that has attracted a lot of attention is 'rape myths'. These are beliefs about rape victims, their character, and their behavior that are persistently held despite being factually incorrect. One such is that women who 'cry rape' are vindictive and are seeking revenge for being jilted.[6] Another is that a woman being sexually assaulted should resist with all her strength. A third is that if a woman is raped, she would immediately raise a 'hue and cry' about it, irrespective of the shock, humiliation, and confusion she experiences. A fourth is that it is only rape if perpetrated by a stranger who jumps out of a bush wielding a knife, and uses force.[7] Examples

[4]Prosecutors are believed to be 'overzealous', that is, they advocate too vigorously on behalf of the victims despite the fact that their duty is to work in the public interest—which includes the defendants [Fisher (1988)]. In the light of this, the low conviction rates for rape is particularly surprising.

[5]Using data provided by the Ministry of Justice (2013), there were 85,000 women who reported being raped in 2011 and 1058 perpetrators were convicted.

[6]No doubt a popular variant of playwright William Congreve's line: "Hell hath no fury like a woman scorned." Jordan (2004) cites an American Judge Ploscowe who claimed in his 1951 book *Sex and the Law* that, in making rape allegations with ease, this adage is frequently encountered in practice.

[7]Estrich (1987) has defined this as what people believe is "real rape". Most of the rapes are actually committed by someone the victims know, and without the use of force or weapons (and are called 'simple rapes', as opposed to 'aggravated rapes' which involve physical force).

of such persistent myths can be multiplied. Though recent reforms in law forbid the use of some of these arguments in courts, it is thought that they may still inform decisions. Beliefs of this sort immediately lead to suspicions about—not the alleged perpetrator but—the alleged victim, tacitly deflecting blame from the perpetrator to the victim.[8]

Suspicion of sexual assault victims is deeply built into the law, stemming from the fear of the "vindictive shrew" view of the complainants [Gruber (2009)]. This is instrumental in setting up formidable barriers against women reporting the crime and then in receiving justice. After sexual assault has occurred, only a small fraction of the crimes are reported. Of those that are reported, there is then attrition at each stage as the cases go through the criminal justice system. There is, first, skepticism displayed when the police officers who interview the victims, as a result of which many victims decide against proceeding [Kelly et al (2005)]. Of the cases that victims do not voluntarily drop, based purely on beliefs and hunches, the police drop a substantial fraction under the label 'Unfounded' without investigation in North America [Yung (2014)] and 'No Crime' in the U.K. [Kelly et al (2005)].[9] Of the cases that the police hand over to prosecutors, a substantial number is again dropped because the prosecutors think that there is not enough evidence for the juries to convict the accused and also because the victims opt out for other reasons. Rape myths are at play at the level of the police, the defense lawyers, and possibly the jurors.[10] This is an important reason why conviction rates for sexual assaults are so low.

Since in rape cases there is usually no evidence, the case revolves on the relative credibility of the alleged perpetrator and the alleged victim. Rape myths contribute to undermining the credibility of victims—'credibility discounting' is the telling phrase that Tuerkheimer (2017)

[8] In *The American Jury*, Kalven and Ziesel (1966, Ch. 17) show that the jury tends to import the idea of "contributory negligence" from tort law into criminal law, where it has no place. If jurors think that the woman has assumed the risk of rape, then it is a private matter between her and the defendant, and they tend to acquit the latter. This is especially true of simple rape as opposed to aggravated rape.

[9] Sometimes, even rapes kits are not sent to the labs for examination simply because the police believe that there is no truth to the claim of rape [Yung (2014)].

[10] Not all research lend support to the view about jury bias against women. Using data from 4,310 jury verdicts from all courts in England and Wales over the period 2006-2008, Thomas (2010) shows that juries convict in 55% of the rape cases brought in front of them. This conviction rate is higher than those in attempted murder, manslaughter, threatening to kill, etc. Since most of the rape complainants were women, this shows that juries are not biased against women through rape myths etc. The cause of low conviction rates relative to the number of rapes reported is not so much due to jury bias as to attrition in the cases brought to trial.

recently invoked to describe the phenomenon.

This raises the question: What is the true extent of false reports of sexual assault? This is a crucial issue because beliefs regarding false reports determine the responses of the police and, as we shall see, influences the responses of the state's entire criminal justice system right up to the final verdict. The answer to this question has been contentious because initial studies have used data from police departments, which are suspect, but now a clearer picture has emerged.[11] In the U.S., for example, police departments across the country have been systematically dropping reports ('unfounding', as mentioned), and consciously misclassifying reports of sexual assault so that their success rates look good.[12] The arbitrary dropping of rape cases based purely on uninformed beliefs, preconceptions, and from other motives is rampant also in Canada [Johnson (2012)] and the U.K. [Kelly et al (2005)].[13]

Careful analyses of the records in line with the International Association of Police Chiefs' (IACP's) gold standard of how rape reports should be classified, show that in the U.S. the rate of false reports is around 5.9% [Lisak et al (2010)] and 2.5% in the U.K. [Kelly et al (2005)]. (A more detailed account of the statistics in this paragraph is provided in the next section.) In sharp contrast, police beliefs regarding false reports seem to be off the mark by an order of magnitude. In the U.S. some evidence shows that police officers believe that a third to 50% of the reports are false [Page (2008), Schwartz (2010)]. In the U.K., a study found that 25% of the reports of rape were believed to be false by police officers [Temkin (1997)].[14] In the light of sharp criticism from researchers, to make convictions more likely, liberal democracies have been reforming their rape laws by removing archaic, patriarchal restrictions and emphasizing the need for *consent* to the sexual act.[15] Police forces have also

[11] An example of this is the study by Kanin (1994), now discredited, which came up with 41% as the rate of false reporting in the U.S.

[12] In fact, this has gone to such an extent that the practice has seriously compromised the statistics collected by the Uniform Crime Reports of the FBI. What were seen on paper as downward trends in sexual assaults in recent years were, in fact, decidedly upward trends after the misrepresentation is corrected [Yung (2014)].

[13] For an insightful journalistic view on how reports of sexual assault in contemporary Canada are deemed "Unfounded", see the article by Robyn Doolittle, "Unfounded: Why police dismiss 1 in 5 sexual assault claims as baseless," *Globe and Mail*, February 3, 2017.

[14] Because of adherence to rape myths that induce disbelief in women's reports, only serial rapists who have sexually assaulted many women are likely to be brought to justice, and even then with difficulty. This is because it takes reports from many women to make the allegations more credible to strident skeptics. Celebrity perpetrators who have recently figured in the media are examples.

[15] As Martha Nussbaum points out, however, there is no treatment in the law of cases where sex *begins*

been improving their procedures for handling rape cases and training the officers to interview with greater sensitivity to victims. Despite these efforts, there have been limited results [Spohn and Horney (1992), Futter and Mebane (2001)]. Conviction rates as a proportion of the number of reports received remain at exceedingly low levels.

If conviction rates are to change, one requires better evidence so that perpetrators can be found guilty beyond reasonable doubt. The prior beliefs of the police about the veracity of rape reports will certainly impinge on their incentives to investigate.[16] Furthermore—and this is another serious issue that has not been discussed—a substantial proportion of the complainants withdraw the complaints, and this, too, will affect police incentives for undertaking investigation.[17] A large fraction of the women who file reports drop out at the prosecution stage, and the police legitimately see their efforts as having amounted to nothing and that their time would have been better spent in attending to other crimes. But if this anticipatory behavior of the police is not taken into account by observers and researchers, it may appear that credibility discounting by the police is the only factor responsible for the poor record of convictions.

In this paper, with a formal model I examine why conviction rates in sexual assault cases are so low and what can be done about it. While both women and men can be victims of sexual assault, women comprise the preponderance of victims (by a ratio of approximately 9:1). To keep the analysis manageable, I narrow the scope to focus on women victims of heterosexual assaults, though homosexual assaults are important, too. (Some of the insights offered here apply equally to sexually assaulted males, too.) Furthermore, for ease of analysis I shall treat rapes and sexual assaults as synonymous here and as the prototypical crime analyzed here.

I identify a feature of the criminal justice system (hereafter CJS) that is crucial to the

consensually but in the process quickly gets out of hand and becomes nonconsensual. See "Why Some Men Are Above the Law," The Blog, https://www.huffingtonpost.com/martha-c-nussbaum/why-some-men-are-above-thelaw_b_8992754.html?1452889415

[16] A 17-year old British girl, "Jane Doe", reported a rape in 2012 but her case was promptly dismissed as false when, in fact, the police did not care to test a T-shirt for the rapist's DNA. After this was done, Jane Doe was vindicated. [Avalos (2016)]

[17] For example, in a study of Jordan (2004) in New Zealand, 38% of the cases that were deemed by the police to be "genuine" the complainants dropped out.

miscarriage of justice in sexual assault cases: in common law the prosecutor is not the victim's advocate but, rather, prosecutes the accused in the "public interest".[18] Although the victim does receive some justice if the perpetrator is convicted, when the case is prosecuted in the public interest the benefits accrue largely to society—but much of the costs the victim incurs are private. And these costs, in psychological terms, are large and large precisely because her behavior and character are publicly scrutinized. When her credibility is seriously in question—*and this is what sets apart sexual assault cases from other criminal cases that are also prosecuted in the public interest*—the fact that in common law the victim does not have a private advocate very seriously handicaps her case. This is why credibility discounting is a hugely important matter, as we shall see.

The point of departure in this paper is the focus on evidence gathering by the police in rape cases and the factors that impinge on it.[19] Given that rapes usually have no independent witnesses, evidence collection is of paramount importance. Since this is an endogenous choice, the amount collected will depend on the prior beliefs of the police regarding the truthfulness of reports of rape. If the putative victims are not believed, the requisite evidence will not be collected. Furthermore, in its rational use of resources, the police will also have to consider the attrition rate, namely, the proportion of complainants who will not endure the trial to the end, since the investigative efforts of the police have been wasted if the victims drop out of the process. We explicitly incorporate both these factors—credibility discounting and victim attrition—into our analysis. Low prior police beliefs about truthful reporting (based on rape myths) and high rates of attrition through the CJS conspire to bring about an unpalatable equilibrium outcome. They endogenously reduce the number of sexual assaults reported by genuine victims and, perversely, increase the incentives for false reporting—with the net effect that, by lowering the conviction rate, they encourage more sexual assault. I then ask whether credibility discounting can persist an equilibrium phenomenon and, if so, under what

[18] The reason why rapes, along with other serious crimes like murder etc. are prosecuted in the public interest is presumably that there are serious externalities involved. The rapist is a danger to society and by getting him off the streets, other women are protected. If the rapist and victim came to a private understanding and settled, this negative externality would not be addressed. See Hubbard (1999) for the benefits and costs of suing in civil court as opposed to the criminal court.

[19] The importance of evidence collection has been noted by Kelly et al (2005), Avalos (2016), Tuerkheimer (2017).

conditions.

I further allow for the possibility that the police force investigates the victim in addition to investigating the suspect. This is warranted by the need for information in the adversarial CJS, should the case go to trial, in which evidence regarding the victim is brought into intense scrutiny by the defense to discredit her as a witness when she claims lack of consent. I show that, when police priors of truthful reporting are low, the mix of their investigative effort is tilted towards the *victims* at the expense of investigation of the suspects. This further exacerbates the consequences of the fact that the state is not the victim's advocate and inadvertently benefits the suspect who is already privately represented by the defense. As a result, the conditions are stacked even more firmly against the victims, thereby lowering equilibrium reporting rates and allowing men to sexually assault with impunity. I then use this framework to ask whether women who may falsely report sexual assault should be punished in order to protect innocent men. I show that, although well-intentioned, this would be a misguided step. Since there is the possibility that even truthful reports may be erroneously deemed false, genuine victims may reduce reporting rates and the frequency of sexual assault can actually increase in equilibrium as a result. I finally discuss several policy implications that come out of the analysis.

2 A Very Brief Overview of the Empirical Picture

The possibility of false reports looms large in law and over the proceedings of sexual assaults in the criminal justice system. False reports of rapes, however, are relatively infrequent. Lisak et al (2010) carefully examined all the rape cases of a northeastern university in the United States.[20] The authors found that the rate of false reporting was 5.9%. When the data used by Clark and Lewis (1977) of rapes in Toronto is carefully scrutinized, the rate of false reporting turns out to be 6%. Using data from a 2005 British Home Office study and

[20] The authors were careful to implement the strict code of classification recommended by the International Association of Chiefs of Police (IACP). According to IACP guidelines, a case should not be filed as false unless investigation has revealed that no sexual assault has occurred. It is not enough if no evidence of an assault was discovered; it had to be demonstrated with careful investigation that no crime in fact occurred. This ensures that shortcuts by police to discount the credibility of victims, bolstered by nothing but prior beliefs, are prevented from misclassifying reports as false.

meticulously reclassifying the 2,653 rape cases, Kelly et al (2005) found that 2.5% were false reports. Heenan and Murray (2006), after examining 850 rape reports over a 3-year period in the province of Victoria in Australia found that the rate of false reporting was 2.1%. In a meta analysis of seven studies on confirmed false reporting, Ferguson and Malouff (2016) find that the rate of false reporting is 5.2%.

In sharp contrast to the above figures derived from careful classification of sexual assault reports, police beliefs about the rate of false reporting are wildly off the mark. In a study by Feldman-Summers and Palmer (1980), police officers in the U.S. believed that 60% of the reports on rape are false. Until the early 1980s, police officers in England and Wales were told during training to expect 60% of the reports of rape to be false [Stern (2010, p. 59)]. Temkin (1997), on interviewing police officers in Sussex, England, found that they believed 25% of the rape reports are false—and this was well after changes had been made in police procedures in recording and handling the complaints of rape victims. Jordan (2004) examined the 1997 police files for sexual assault from three large cities in New Zealand. She found from the written comments of the police that their dominant mindset was one of suspicion towards complainants, triggered by various cues. In a survey of 891 police officers in southeastern United States, Page (2008) found that personnel in the criminal justice system as a whole believed that only 50% of the rape reports were "true", with the correct assailant identified. Schwartz (2010) interviewed first responder police officers for rape victims in the U.S. and one of the questions asked was what percentage of the complainants report rape that never happened. The 428 officers who responded to the question claimed, on average, that about one-third of the putative rapes never happened (p. 44). Credibility discounting, then, is a pervasive phenomenon; beliefs regarding the frequency of false reporting are an order of magnitude higher than what is factual.

An additional disturbing feature of sexual assault cases is the steep rate of attrition of cases as they proceed through the CJS [Frazier and Haney (1996)]. Stern (2010, pp. 44-45) reports a typical case from a Home Office study conducted in 2003–4 for eight police forces in England and Wales. Of 100 reported cases, on average 15 were not recorded as crimes, 20 were dropped by the victim who decided not to pursue, 23 were dropped because of lack of sufficient

evidence, 14 were dropped for other reasons, and in the remaining 26 the perpetrator was charged, and 19 of these were prosecuted (during which several victims dropped out and did not cooperate), with the result that 12 were found guilty of rape or another offence. This 12% conviction for rape or a related offence compares with 14% for Canada and the U.S., 11.5% for Australia [Daly and Bouhours (2010)]. Only about half the convictions, however, were for the original charge of rape. Furthermore, since only 14% of rape victims were found to have reported the crime on average across the five countries in the latter study, the conviction rate as a proportion of the crimes committed would be expected to be much smaller than the numbers provided above. In accordance, of the women who were raped, only around 1.8% find their assailant held accountable.

In response to feminist criticisms since the early 1970s of rape laws and the attitudes of the police, governments in developed countries have responded by instituting reforms in the laws and have had the police lay down guidelines for appropriate handling of rape cases. For example, the law no longer requires the victim to demonstrate that she resisted; nor can the sexual history of the victim be invoked by the defense (though some exceptions are made). The effects of these reforms, however, have been rather limited in terms of the number of cases processed and the outcomes, as seen in the study by Spohn and Horney (1992) of six urban jurisdictions in the U.S. for the 1970-1984. A later study by Bachman-Paternoster (1993) over the period from the 1970s to the 1990s at a national level also showed almost no impact except for a moderate increase of 10% over the period in the reporting of rapes. Programs intended to make the police more informed and sensitive in response to criticism have also had very limited success, as the studies by Temkin (1997) and Jordan (2001) cited above have found.

In sum, for women who have been sexually assaulted, police disbelief of their reports are grossly exaggerated relative to the facts. The attrition rates before sexual assault cases reach the CJS and while in the CJS, remain high. A minuscule fraction of the victims have the very serious harm done to them acknowledged by vindication, which implies that the requisite signals to men for engaging in sexual assault are not forthcoming. The question is why. In the next section, we provide a simple framework to formally begin examining the mechanism

that perpetuates this dire state of affairs.

3 Sexual Assault and the Criminal Justice System: A Simple Model

One might ask where the need for a formal model is, especially if verbal narratives might plausibly suggest some of the results that are derived here through a model. The role of the model is in laying bare the assumptions that are necessary to generate the alleged implications. In informal narratives, there are usually unstated assumptions which can play a crucial role but their role may be unclear or hidden. When narratives are modeled, what seem like plausible conclusions often turn out to be unwarranted except under stringent conditions. My formal model has the virtue of identifying the precise conditions under which the conclusions are valid. Since in mainstream economics formal modeling has been adopted as a necessary discipline for generating conclusions that are deemed credible, I adopt that discipline. Formal modeling also plays another important role in this paper. The problems being investigated here, shockingly, have not received serious attention from economists. If the case I'm making here is presented only through informal arguments, mainstream economists—who are the ones who often need to be persuaded, not feminists—would dismiss them out of hand because the methodology does not fall within the paradigm acceptable to them. The issues being investigated here are so serious that I would like to thwart a cavalier dismissal of the unpalatable implications.[21]

We suppose that an exogenous fraction of the male population comprises potential sexual predators and an equal proportion of the female population comprises potential victims. We normalize these proportions for each sex to 1.[22] Victims have the option of reporting the assault to the police, which could make the perpetrators accountable. Since there is a considerable debate about whether the reports are truthful, and this doubt influences the law and enforcement practices, it is essential to allow for the possibility that some reports may be false. The police force, informed by their beliefs of the probable veracity of the reports,

[21] 'Credibility discounting' routinely occurs in economics, too, with respect to arguments that are not formally couched.

[22] The conclusions do not hinge on this normalization; it is invoked to economize on notation.

do what they think fit to resolve the matter. This is the milieu in which sexually assaulted women seek redress. In the model spelled out below, there are four sets of actors: men who sexually assault women, victimized women, women who may feign assault, and the state.

The model here focuses on rapes by strangers not by acquaintances (which is left for future research). Rapes by acquaitances are more complicated. Victims are less likely to come forward in the first place and, in case they do, are more likely to pull out midway through the proceedings because an agreement has been privately reached or they have been persuaded to. The absence of randomness in the choice of victims in acquaintance rape complicates the formal analysis.

Heterogeneity is eschewed for analytic tractability: the perpetrators are all presumed identical, as are all the potential victims. The choices made by the men and women here are obviously discrete: potential perpetrators choose to either sexually assault or not assault; victims choose to either report or not report. But in what follows, it is very convenient to have them decide on the probability with which they make a choice. Mixed strategies in this context simplify the analysis. The time line is as follows. A sexual predator decides on the probability with which to assault a woman. If he assaults, he does so only once; we assume away serial rapists here for simplicity. An assaulted woman then decides on the probability with which to report the event and identify the alleged assaulter. For analytic tractability, we treat the state as comprising the police and the prosecutor. The police fowards a case or not and provides the evidence if the former, and the prosecutor decides whether to press charges. If the woman reports a sexual assault the police, who entertain prior beliefs about the veracity of the reports, then gather evidence on the suspect. In doing so, they also anticipate the probability with which they think the prosecutors downstream will decide to press charges, the likelihood that the victim would drop the charges and withdraw from the process, and the resulting probability of a guilty verdict ultimately. Of course, in making their choices the predators and putative victims will anticipate what is to come in the sequence of events, and so we need to solve for the equilibrium choices by working backwards.

3.1 *State's Actions*

The police collect evidence on suspects, and we denote the amount of this evidence by s. More evidence increases the chances of convicting a guilty person and lowers the chances of convicting an innocent one. We posit that an *assaulter* is found guilty with probability $A(s)$, with $A'(s) > 0$ and $A''(s) < 0$.[23] We also posit that with probability $N(s)$ a *non-assaulter* (an innocent man) is found guilty, with $N'(s) < 0$ and $N''(s) > 0$.[24] We make the following assumption regarding the distributions $A(s)$ and $N(s)$, which is a strong sufficient but not necessary condition for what follows:

Assumption 1: $A'(s) >\mid N'(s) \mid$ over the relevant range of s.

Assumption 1 says that when there is a marginal increase in evidence on suspects, the decrease in probability of convicting an innocent man is smaller in magnitude than the increase in probability of convicting the perpetrator.

Collecting evidence is costly and the opportunity cost of every piece of evidence collected on the suspect is denoted by c, a constant. Let J_0 denote the punishment (say, *jail* term) inflicted on a man who is convicted. We presume that J_0 is also the benefit the state receives from a guilty verdict on someone it believes is guilty.[25]

Suppose that the police has *prior* beliefs that a proportion π of reported cases of sexual assault is truthful and a proportion $(1-\pi)$ is false. Further, suppose that they posit that only a proportion δ of the cases, whether true or false, will continue to press charges and endure until the trial verdict comes down.[26] We may refer to δ as the endurance rate, which is an inverse measure of the proportion of cases that drop out of the CJS or the "attrition rate" $(1-\delta)$. When confronted with a report of sexual assault, the police choose their evidence

[23] Here, and in all the other probability functions in this paper, the efficacy of evidence exhibits diminishing returns.

[24] The probability that a guilty man escapes conviction, which here is $(1-A(s))$, is the conventional Type I error and the probability that an innocent man is found guilty, which here is $N(s)$, is the conventional Type II error.

[25] This ignores the cost of incarceration. Alternatively, it may be assumed that prisoners pay for themselves by being forced to provide some free labor.

[26] It is possible that women's participation in the criminal justice process depends on the extent to which the police believes their reports, that is, δ can depend on π, presumably positively. However, in this analysis, these parameters as exogenous. Discussion on how to endogenize them will be deferred till later in the paper when policy is addressed.

collection, s, on *suspects* to solve

$$\max_{s} \quad J_0\delta[\pi A(s) - (1-\pi)N(s)] - cs. \tag{1}$$

The first term in the square bracket is the perceived probability that an assaulter will be convicted, while the second is the perceived probability that an innocent man will be convicted. This objective immediately implies that, in general, the choice of investigative effort will depend on the police prior π, consistent with observations in the literature that the absence of police investigation is linked to their disbelief of claimants [e.g. Kelly et al (2005), Avalos (2016), Tuerkheimer (2017)].

The accused is represented by defense counsel whose sole responsibility is their client. The victim, on the other hand, is not represented by anyone; the police and the prosecutors are working on behalf of the state and, therefore, are ostensibly working in the "public interest": they are also concerned about the rights of innocent men who may get wrongly convicted and this concern is captured by the second term in the square brackets in (1). This lack of exclusive representation already puts the victim at a disadvantage *vis-à-vis* the accused, except when $\pi = 1$. When $\pi < 1$ as opposed to $\pi = 1$ the effect on evidence collection is not only due to the fact that the expected jail sentence on the alleged perpetrator (which partly compensates the victim) declines, but it is also increases the weight on the possibility of wrongly convicting an innocent man. Hence the investigative effort in evidence collection on the suspect will be lower than if the victim were the sole client of the prosecutor. This shortfall is greater when π is lower. The feature that is peculiar to rape relative to other crimes prosecuted in the public interest is the π is out of sync with the reality for rape cases, as we have seen. And the endogenous dependence of investigative effort (evidence collection) on the prior beliefs of the agents of the CJS puts the victims of sexual assault at a severe disadvantage. This asymmetry between the representation of the accused and that of the victim, coupled with the endogeneity of evidence collection to the police's prior beliefs is the fundamental source of the vulnerability of rape victims in the criminal justice system. The formal model makes this precise.

Note that, when $A(s) > N(s)$—as can be reasonably expected for any s—the cross partial of the police's objective function with respect to π and δ is positive. That is, the marginal net benefit to the police of an increase in prior π is enhanced when the probability δ that the victim will prosecute and endure the trial is higher, and vice versa. Thus, there is a complementarity between police beliefs about the veracity of reports and victim participation in the CJS. The first order condition to (1) is

$$JG_s(\pi, s) - c = 0. \tag{2}$$

where $J \equiv J_0\delta$, the expected jail term, and $G(\pi, s) \equiv \pi A(s) - (1 - \pi)N(s)$, which is the perceived probability of the net expected benefit to the police of a guilty verdict, and the subscript here (and throughout the paper) denotes partial derivative with respect to the variable indicated. We denote the optimal evidence on suspects gathered by the police, which is the solution to (2), by $s^\dagger(\pi, J)$. Since $G(\pi, s)$ is strictly concave in s, this solution is unique. Obviously, if J_0, π, and δ are low, the police will set $s^\dagger(\pi, J) = 0$ since the expected payoff to collecting evidence does not cover its opportunity cost. When there is an interior solution, the comparative static derivative with respect to J is $s^\dagger_J(\pi, J) > 0$, while that with respect to π is $s^\dagger_\pi(\pi, J) > 0$.[27] The police gather more evidence on suspects when their perceived expected reward to a conviction (that is, $J \equiv \delta J_0$) increases. When the police prior π increases marginally, the weight on convicting the alleged perpetrator increases while that of convicting an innocent man decreases. If a marginal increase in evidence increases the probability of convicting the right offender by more than the decrease in the probability of convicting an innocent man (Assumption 1), an increase in π induces an increase in evidence collection on the suspect. If not (that is, if Assumption 1 is violated), an increase in π will lower evidence collection. Wrongful conviction for rape most certainly does occur, but it is relatively rare. It follows that when the police prior, π, of truthful reporting increases the police will gather more evidence on suspects.

A stereotypical view that women who claim that they were raped tend to lie about it (that

[27] The proofs of all the comparative static results in this paper are relegated to Section 1 of the online Appendix.

is, π is low) reduces police effort in gathering evidence on suspects. This lowers conviction rates and, by acquitting perpetrators, tends to confirm the prior belief that truthful reporting is unlikely. Low police priors can be self-sustaining in this manner, and sexually assaulted women can be perpetually denied justice. This outcome is consistent with the observation of Kelly et al (2005, p. 52), arrived at after interviewing British police officers and examining complainants' responses, that their behavior "... reproduces an investigative culture in which elements that might permit a designation of a false complaint are emphasized...at the expense of a careful investigation, in which the evidence collected is evaluated." Evidence like photographs, medical records etc. that can be used later are not often collected by the police; 85% of the cases dropped at the prosecutorial stage is due to insufficient evidence [Harris and Grace (1999)]. Careful investigation might provide reasonable answers to inconsistencies in the victims' statements and thereby increased conviction rates [Stern, 2010, p. 88)].

Since $s_J^\dagger(\pi, J) > 0$, where $J \equiv \delta J_0$, it follows that we must also have $s_\delta^\dagger(\pi, J) > 0$. If more victims are expected to press charges and endure the trial process till the end, more suspect-oriented investigation will be undertaken by the police. A fundamental problem here is that conviction requires the cooperation of the victims and the police. In the absence of contracting, when there is a significant probability that one of core agents will drop out, the investigative effort of the other will naturally fall short compared to the cooperative outcome. The model brings out the complementarity between the actions of the police and of the victims.

The above results are summarized in the following statement.

Lemma 1: The police collect more evidence on suspects when there is an increase in (a) the police prior π on reports being truthful, (b) the proportion δ of victims who endure the criminal justice system until the end of the trial, and (c) the severity of jail sentences for perpetrators convicted of sexual assault.

In their classic study of juries in *The American Jury*, Kalven and Zeisel (1966, Ch. 10) find that usually the prosecution has a lot more witnesses than the defendant. This is not true to the same extent in rape cases because there are rarely eye witnesses. As a consequence, the victim is already put at a disadvantage relative to victims of other crimes. This further

underlines the importance of the police's role in collecting evidence in rape cases.

Having looked at the decisions of the state, we now turn to the decisions of private citizens.

3.2 *Assaulted Woman's Choice*

If a woman has been sexually assaulted, she has to decide whether to report the crime and press charges if the prosecutor decides to. The benefit to her of reporting is that the perpetrator could be convicted and sent to jail. If she expects to endure the ordeal of the trial till the end with a probability δ, the problem she confronts is to choose the probability, r, of *reporting* the assault so as to maximize her expected utility:

$$\max_{r} \quad JrA(s) - C(r) - Z, \tag{3}$$

where $C(r)$ is the expected cost of embarrassment of going public, reliving the trauma, getting unwanted media attention, etc., with $C'(r) > 0$, $C''(r) > 0$.[28] The last term Z is the physical and psychological cost of the trauma a woman faces when she is assaulted, taken as a sunk cost at this stage. Note that J enters into the objection function in (3) not merely because a woman raped wants justice. Among the reasons that women who participate in the CJS give most frequently for doing so is that they want to protect themselves in the future and also prevent the rapist from assaulting other women [NILECJ (1978, Table 6, Ch 3)]. Jail time incapacitates the perpetrator in this regard. The first order condition that defines the unique optimum for r is

$$JA(s) = C'(r) \tag{4}$$

We have seen that the evidence gathered on suspects, $s^{\dagger}(\pi, J)$, is increasing in π. Thus if $JA(s^{\dagger}(0\,, J)) > C'(0)$, a woman who has been assaulted will always choose to report it with some positive probability. In fact, she will report with probability $\widetilde{r}(s, J) \equiv \psi(JA(s^{\dagger}(\pi, J)))$,

[28] In an expected utility framework, the cost of reporting $C(.)$ should be linear in the probability. The reason I assume that the cost function is strictly convex is that it simplifies the algebra and captures the intuitive notion that the marginal consequences to a slightly higher probability of reporting probability is increasing in that probability. Forcing the cost function to be linear actually complicates matters substantially and would require considerable reformulation, which is unwarranted for what it would deliver. We can interpret the strict convexity as capturing a woman's *perceived* increase in marginal cost as the probability increases.

where $\psi \equiv C'^{-1}$, an increasing function of its argument, is given by the solution to (4). This solution has the derivatives $\widetilde{r}_s(s, J) > 0$ and $\widetilde{r}_J(s, J) > 0$. Thus s is a strategic complement of r: if the police force is more assiduous in gathering evidence on suspects, sexually assaulted women would be more likely to report the crime because the probability of seeing justice done is greater. The equilibrium probability that an assaulted woman will report the crime is thus given by $r^\dagger(\pi, J) \equiv \widetilde{r}(s^\dagger(\pi, J), J)$. Given the behavior of $s^\dagger(\pi, J)$ with respect to π and J established above, it readily follows that $r^\dagger_\pi(\pi, J) > 0$ and $r^\dagger_J(\pi, J) > 0$, and from the latter it also follows that $r^\dagger_\delta(\pi, J) > 0$. The first two of these comparative static derivatives of the reporting probability are consistent with a frequently-cited reason for why sexually assaulted women do not seek police help, namely, police disbelief and light expected sentences [Kelly et al (2005), NILECJ (1978), Payne (2009)].[29] A light punishment for rape may mean that the perpetrator either gets no jail sentence or gets out of jail soon, and the victim may worry about whether he will return to harm her again for reporting him. This fear may induce her to not report in the first place. The last comparative static derivative, $r^\dagger_\delta(\pi, J) > 0$, is consistent with the fact that women say they don't report rapes because of fear of police treatment and trial procedures [NILECJ (1978)], and anticipation of having to drop out later induces them not to report in the rape.

It is readily seen that if there is an upward shift in the marginal cost schedule $C'(r)$ of reporting, the probability with which she would report the crime would be lower. This otherwise mundane observation has important ramifications for the low rates at which sexual assault victims report the crime. If the costs of engaging with the CJS—the humiliation of having her private life exposed and publicly examined in minute detail in the trial, seeing her character assassinated, her motives impugned, hearing her description of the most degrading experience of her life discredited as fiction or as something she actually consented to and enjoyed—are perceived as exorbitant, she may well decide that going through it is not worth the justice she may receive. She would tend not to report the crime at all. And, if they do report it, they may have second thoughts when they realize what awaits them in the

[29] The light sentence that was handed out to the perpetrator in the recent Stanford rape case has been condemned by women's rights advocates because, among other things, it will disincentivize rape victims from reporting the crime.

trial proceedings and they drop out. It is a matter of common sense that these costs of an adversarial CJS obviously will have a very significant impact on the reporting and attrition rates.

3.3 *Unassaulted Woman's Choice*

As mentioned, for centuries the laws on sexual assault have been conditioned by the belief that women falsely report sexual assault, and so we must allow for this possibility in our analysis. False reports are believed to occur, rightly or wrongly, for many reasons. For example, in the event of being jilted, a woman may report a consensual sex act as a rape; or consensual sex that is later regretted may be reported as rape; or rape may be used as a cover for infidelity, etc. [Kanin (1994), De Zutter et al (2017)]. In order to maximize the potential effect of this, we pick the strongest motive that women have been alleged to have: revenge, with the goal of seeing the man incarcerated. Denote the probability that a woman from this group is *lying* when reporting sexual assault by l. If ρ (≥ 0) denotes the intensity of a woman's desire for *revenge*, then her perceived benefit of seeing the (innocent) man she accuses go to jail for an expected J years is ρJ. We assume that ρ is the same for all women. It is reasonable to expect that $\rho < 1$, since women who have been truly raped would feel a greater need to see the man held accountable and incarcerated. We assume that $C(l)$ is the expected cost to her of lying[30] and that she, too, expects to last out the trial with probability δ, in which case she chooses l to maximize her expected utility:

$$\max_{l} \quad \rho J N(s) l - C(l), \tag{5}$$

and the first order condition defining a unique maximum is

$$\rho J N(s) = C'(l). \tag{6}$$

[30] Choosing the same function $C(.)$ here as before ensures comparability between the frequencies of truthful and false reporting by pivoting the analysis. It might be objected that the cost of lying would be lower than the cost of truthful reporting because the former women have not really been assaulted. However, it should be noted that this cost includes the gruelling court procedures and the strident credibility discounting that the defense engages in throughout the trial. Besides, someone who is fabricating a rape charge would need to work harder at concealing the truth.

Thus if $\rho JN(s^\dagger(0,J)) > C'(0)$, a 'vindictive' woman who has not been assaulted will choose to report it with some positive probability at least in the neighborhood of $\pi \simeq 0$. We assume this to be the case. We denote the solution to (6) by $\widetilde{l}(s,J) \equiv \psi(\rho JN(s^\dagger(\pi,J)))$, which has the comparative static derivatives $\widetilde{l}_s(s,J) < 0$ and $\widetilde{l}_J(s,J) > 0$. Here s is a strategic substitute of l: the more careful the police are in investigating suspects, the less the incentive a woman has to falsely accuse a man of rape because the chance of convicting an innocent man is lower. The equilibrium probability that a woman will falsely report an assault is given by $l^\dagger(\pi,J) \equiv \widetilde{l}(s^\dagger(\pi,J),J)$. Since the probability of wrongful conviction is empirically seen to be low (but certainly positive), that is, since $A(s^\dagger) >> N(s^\dagger)$, comparing the first order conditions (4) and (6) suggests, we should expect that $l^\dagger(\pi,J) << r^\dagger(\pi,J)$ even if $\rho \approx 1$. This is consistent with evidence: the proportion of false allegations is only around 6% of total reports in the U.S. [Lisak et al (2010)] and even lower elsewhere.

The comparative static derivative of $l^\dagger(\pi,J)$ with respect to J is of ambiguous sign; a higher jail sentence increases the reward to 'vindictiveness' but it also leads to more evidence gathering, which lowers the probability of convicting an innocent man. For the same reason, the comparative static derivative of $l^\dagger(\pi,J)$ with respect to δ is of ambiguous sign. In contrast, the comparative static derivative with respect to π is determinate, with $l^\dagger_\pi(\pi,J) < 0$; a larger value of π induces the police to collect more evidence, which increases the chances of exonerating the innocent man who has been accused. Police disbelief of women's reports of sexual assault, therefore, has the unintended effect of actually *facilitating* false reporting by increasing the chances of convicting the innocent. This is an important and nontrivial insight that falls out of the model.

3.4 *Potential Perpetrator's Choice*

Now consider the group of men comprising sexual predators. Let a be the probability that a man sexually *assaults* a woman.[31] If he does, he is posited to receive a perceived benefit of S. It should be emphasized that S does not merely stand for the sexual benefit the man

[31] Note that a will also be the measure of men in the population of sexual predators who commit assaults because we have ruled out serial assaulters.

receives—which he presumably does, consistent with the argument made by Posner (1992, Ch. 14). It can also embody some nonsexual benefits such as domination over a particular woman, in line with some of the feminist literature [Brownmiller (1975)].[32] It is also assumed that potential sexual assaulters respond to incentives: I reject the view that they are hardwired to do what they do without caring for the consequences.[33] Since a sexual assault is reported with probability r, with probability $rA(s)$ an assaulter will be apprehended and found guilty, in which case he will incur a punishment J. He will choose a to solve

$$\max_{a} \quad [S(1-r) + Sr(1-A(s))]a - JrA(s)a - D(a), \tag{7}$$

where $D(a)$ is the cost associated with the assault, with $D(0) = 0$, $D'(a) > 0$, and $D''(a) > 0$. The square bracket in (7) is his expected benefit when he is not apprehended and the next term is the expected cost of being sent to jail. Assuming the solution is interior, the unique optimal probability of assault, $a^{\dagger}(\pi, J)$, in equilibrium is given by the solution to the first order condition

$$D'(a) = S - (S + J)r^{\dagger}(\pi, J)A(s^{\dagger}(\pi, J)). \tag{8}$$

It is readily seen in the light of the properties of $r^{\dagger}(\pi, J)$ and $s^{\dagger}(\pi, J)$ that $a^{\dagger}_{\pi}(\pi, J) < 0$ and $a^{\dagger}_{J}(\pi, J) < 0$. In other words, when the police force is less cynical of the truth of women's reports (that is, π is higher), perpetrators will assault less frequently because the police will gather more evidence on suspects, which increases the probability of conviction and also raises the probability of the crime being reported. Increasing punishment in case of conviction naturally decreases the frequency of assault.

For an interior solution, it also follows immediately that $\partial a^{\dagger}(\pi, J)/\partial S > 0$. While this is analytically banal, its implication can be nontrivial. For example, with the move towards greater gender equality in western democracies in the last 50 years, generally men have been able to exercise less control over women. Thus, the value to men who wish to dominate

[32] I disagree, however, with views claiming that rape is used *only* for nonsexual ends. The evidence is that both types of predators exist: those who are sexually-motivated and those who are predominantly driven by other motives like violence, domination, etc. [see e.g. Barbaree et al (1994)].

[33] See Ehrlich (1974) for evidence on this. For an extended discussion of what might motivate rapists, see Bryden and Grier (2011).

women for nonsexual purposes would have increased, that is, with women's liberation, S for potential rapists may well have seen an increase. This would suggest that an increase in the frequency of rapes is an unfortunate downside of women's liberation. Here, greater incidence of rape would accompany a *decline* in patriarchy.[34] This, of course, is not to suggest that the movement towards the dismantling of patriarchy is bad; rather, it is to clarify that one of the costs of this decline may be an increase in the incidence of rape.[35]

Another theoretically mundane result with interesting implications is transparent from (8): a downward shift in the perpetrators' marginal cost schedule $D'(a)$ would increase the equilibrium frequency of assaults. When women assert themselves in their new-found liberation and travel alone to neighborhoods previously deemed unsafe or fraternize with men in parties involving alcohol and drugs, perpetrators would perceive an exogenous downward shift in their marginal cost of assaulting, and the frequency of sexual assaults would increase.[36] This undesirable outcome, once again, has to be reckoned as a cost to women of greater freedom and equality. Therefore, it is possible that the rise in the incidence of sexual assaults since the 1960s in the U.S. was partly a consequence of the greater freedom exercised by women during the women's liberation movement.[37]

3.5 On the Nature of the Equilibrium

The quartet $(a^\dagger, r^\dagger, l^\dagger, s^\dagger)$ defines the actions of the private citizens and the police in the subgame perfect equilibrium, conditional on the prior, π, the police entertains about the proportion of cases that are truthful and the expected jail sentence, J. The parameter δ that captures the probability that a woman who reports a sexual assault will prosecute and endure the trial to the end merely reduces the expected sentence from J_0 to $J = \delta J_0$ and so

[34] This implication of the model is compatible with the argument recently made by Bryden and Madore (2016).

[35] In an empirical study on domestic violence in India, Eswaran and Malhotra (2011) found that an increase in the autonomy of wives can increase, rather than decrease, violence against them. It is probable that marital rape, too, is sometimes used as a vehicle by husbands to retain bargaining power within marriage.

[36] This, again, is consistent with an argument of Bryden and Madore (2016) that greater freedom of women increased the access of vulnerable women to potential rapists.

[37] For the time trend in the rate of sexual assault, see the FBI's Uniform Crime Reporting Statistics: https://www.ucrdatatool.gov/Search/Crime/State/RunCrimeStatebyState.cfm.

the introduction of δ is analytically trivial. However, the presence of δ makes a significant difference in the interpretation: outcomes that are often inadvertently attributed entirely to π should really be attributed to the product π *and* δ.

The properties derived above of the equilibrium values of the endogenous variables of private citizens are collected for handy reference below.

Proposition 1: (a) All else constant, an increase in the proportion, π, of the reported assaults that are believed by the police to be truthful, (i) increases the probability that sexual assaults will be reported, and (ii) decreases the probability of false reports, and (iii) decreases the frequency of sexual assaults.

(b) All else constant, an increase in δ, the probability that a victim will prosecute and endure the trial process, (i) increases the probability that sexual assaults will be reported, and (ii) has an ambiguous effect on the probability of false reports, and (iii) decreases the frequency of sexual assaults.

Part (a) of this proposition brings out the seriousness of police disbelief of victims' reports of sexual assault. When the police force entertains the notion that a large proportion of the sexual assault reports lodged by women are false, it has pernicious consequences. First, this belief disincentivizes them and, since the acquisition of evidence is endogenous, the evidence that ought to be gathered is not. Because they are less likely to be apprehended and convicted, sexual predators engage in rape with greater frequency. The police thereby unwittingly become the accomplices of sexual predators. More skepticism in the police force regarding the veracity of reports of assault also lowers the probability of convicting perpetrators, and induces assaulted women to report the crime less frequently. So, as sexual assault becomes more pervasive its true extent becomes more hidden. Finally, since the reduction in evidence collection lowers the detection of false accusations of assaults, the proportion of false reports of assaults increases. Ironically, police cynicism regarding the credibility of women who report rapes brings about an increase in the proportion of reports that are false. Furthermore, by ensuring that more perpetrators are acquitted, it renders police beliefs a self-fulfilling prophesy. Thus, in the realm of sexual offenses the prior beliefs of the police are of utmost importance

in determining outcomes, and the model lays bare the precise mechanism.

In this model, it is theoretically conceivable that a sufficiently large value of the prior π may of itself eliminate the incentive of sexual predators to assault women altogether. Since the probability, $r^{\dagger}(\pi, J)A(s^{\dagger}(\pi, J))$, that a predator will be convicted is increasing in π, it is conceivable that there is a sufficiently large prior, say $\overline{\pi} < 1$ that is such that $S - (S + J)r^{\dagger}(\overline{\pi}, J)A(s^{\dagger}(\overline{\pi}, J)) = D'(0)$, in which case (8) shows that potential perpetrators will set $a^{\dagger}(\pi, J) = 0$ for all $\pi \geq \overline{\pi}$. This assumes, of course, that the punishment is sufficiently large to affect the incentives of all perpetrators. While complete elimination of sexual assault will likely not obtain in reality because of heterogeneity among sexual predators, it nevertheless underlines the role of police skepticism towards victims in magnifying the problem.[38]

Since an increase in δ has effects that are similar, but not identical, to those of π, it also brings out the importance of the fact that victims drop out midway through a trial and police effort is wasted. If they anticipate substantial drop outs, the police will rationally curtail their effort in evidence collection. To the extent that the CJS is responsible for the attrition of victims, reforms in laws and procedures may be warranted. However, there may be components of δ that are exogenous[39], and these are also implicated in the poor equilibrium outcomes in sexual assault cases. In Section 6 we shall briefly discuss how δ can be increased.

Consulting (6) and (8) we see that if at $\pi = 0$ the following two conditions are satisfied:

$$(i)\ JA(s^{\dagger}(0, J)) > C'(0)\ \textit{and}\ (ii)\ \rho JN(s^{\dagger}(0, J)) > C'(0), \tag{9}$$

we will observe that $r^{\dagger}(\pi, J) > 0$ for all values of π and $l^{\dagger}(\pi, J) > 0$ for at least some values of π in the neighborhood of $\pi \simeq 0$.[40] In other words, for low values of π we shall then observe a pooling equilibrium in which some proportion of the reports will be true and a few others

[38] In principle, of course, it is always possible to engineer $a^{\dagger}(\pi, J) = 0$ by choosing a sufficiently large punishment J for sexual assault. However, liberal democracies rightly do not find it appropriate to impose draconian measures, especially because there can be serious miscarriage of justice when the convicted man is possibly innocent. Furthermore, if the punishment is not deemed to fit the crime, juries shy away from returning a guilty verdict—a problem referred to as "jury nullification."

[39] Such as when the perpetrator makes private amends or the victim is persuaded that the perpetrator should be forgiven.

[40] Note that even at $\pi = 0$, the police's investigational effort can be positive because, as we see from (1), it will want to avoid convicting the innocent.

false.[41] Some 'vindictive' women will be free-riding off the truthfulness of assaulted women for personal reasons (given the presumed motivation invoked for false reporting).

If inequality (i) in (9) is reversed but inequality (ii) holds—which is very unlikely because that require a very high intensity for 'revenge', ρ—we shall observe a separating equilibrium for sufficiently small π in which all reports of sexual assaults are false. Such an outcome, however, would the *consequence* of the police force entertaining low priors of receiving truthful reports, but will confirm and entrench stereotypical views that most women reporting rapes are lying. As π increases, $s^{\dagger}(\pi, J)$ rises and true victims have more incentive to report. The incentive for women to provide untruthful reports, on the other hand, declines because the probability of convicting an innocent man, $N(s^{\dagger}(\pi, J))$, declines. If the police prior goes to the other extreme $\pi = 1$, it may be the case that $JA(s^{\dagger}(1, J)) > C'(0)$ even if $JA(s^{\dagger}(0, J)) < C'(0)$. Thus for high values of π we shall either observe a pooling equilibrium, or a separating equilibrium with only truthful reports if $\rho JN(s^{\dagger}(1, J)) < C'(0)$. On the other hand, at low values of π we shall either observe a pooling equilibrium or a separating equilibrium in which there are only false reports. The composition of reports in the equilibrium, therefore, changes in favor of truthful reports as the police prior about the veracity of reports increases. Police beliefs tend to bring about the very outcome they believe to be the case, a nontrivial implication of the model. The model also demonstrates how the nature of the pooling equilibrium changes when police priors change.

It is important to note that, in the equilibrium, the expectations of all the actors are not met. The women and the perpetrators of sexual assault operate under correct expectations. But the police force does not—the actual proportion of truthful reports is not what they have assumed it to be—it is much smaller in reality. This is nevertheless an equilibrium outcome because decade after decade and in country after country, police priors are not being updated to be consistent with fact. Inconsistent police priors is one of the premises on which the this paper rests, and the model brings out its stark implications.

The question arises: Why do false beliefs on the part of the police persist? This is a

[41] If the marginal cost of reporting an assault is zero at low probability of reporting, that is, if $C'(0) = 0$, it is clear that we will always observe a pooling equilibrium in the neighborhood of $\pi \simeq 0$ since the probability of reporting will be non-zero for both genuine and false reports.

difficult question to answer because it would require inputs from psychology and sociology in addition to those from economics. Rape myths undoubtedly have much to do with this. The stickiness of preconceptions is also very likely due to the confirmatory bias that psychologists allude to: we tend to interpret new information in a manner consistent with our previously held beliefs. (See Section 2 of the Appendix for more on this.) Yet another reason may be purely economic—it may have to do with the incentives the police forces are operating under. If they are rewarded (by promotions, etc.) for the proportion of cases they solve, they may well have a conscious or unconscious motive for "unfounding" difficult cases under the pretext that they are falsely reported [see Yung (2014)]. This issue calls for much more work in the future.

4 Investigating *Victims* As Well As Suspects

While investigating sexual assaults, the police devote some effort to gathering evidence on the putative victim, too. Police disbelief of the victims induces them to find ways to prove that they are lying [Kelly et al (2005, p. 51)]. Furthermore, lawyers for the defense bring up issues like sexual history, the alleged victim's actions, the victim's character etc. during trial, despite the fact that law reforms in recent years have ruled some of these out [Ellison (2002, Ch. V), Temkin (2000), Talitz (1999), Craig (2014)]. The purpose of these strategies, it appears, is to discredit the victim as a witness and also to evoke rape myths in the minds of jurors. These images are known to influence jurors even after the judge advises them to disregard these issues [Temkin and Krahe (2008, Ch. 3)]. This means that, to counter the tactics of the defense, the police and the prosecutors also need to obtain information on matters pertaining to the victim. The relevant evidence here would be interviews with her acquaintances and friends, email and text messages, posts on social media, etc. It is for this reason, along with the gruelling treatment given to victims on the stand, that many victims express the view that it is as if it is *they* who are on trial, not the perpetrator.[42] We extend the model of the previous section to now allow the police to obtain information on the putative victim, too.

[42] In the words of a victim, "I felt I had to prove my innocence rather than his guilt." [Chambers and Millar (1986, p. 90)].

We shall see that a skeptical police prior can crucially tilt the balance of the mix between suspect-oriented evidence and victim-oriented evidence, further magnifying the effect of the fact that the state does not represent the victim.

We denote the evidence that is gathered by the police on the victim by v. We expect that the probability, $F(v)$, that a *false* report will be exposed as false is increasing in the evidence gathered on the victim, and so I posit that $F'(v) > 0$ with $F''(v) < 0$. However, it is also possible that the evidence may erroneously identify a *truthful* report as false, and I denote this probability by $T(v)$. More evidence on the victim will reduce the probability of labeling a genuine victim as a liar, that is, we expect that $T'(v) < 0$ and $T''(v) > 0$.[43] I make the following assumption, which is a strong sufficient but not necessary condition, regarding the distributions $F(v)$ and $T(v)$:

Assumption 2: $F'(v) >\mid T'(v) \mid$ over the relevant range of v.

Assumption 2 says that the marginal effect of victim-evidence is greater in exposing liars than in mislabeling truth-tellers.

4.1 *State's Actions*

What motivates the police to investigate victims is the punishment for lying. (Punishment for lying is also introduced here because it of considerable importance to the police as a potential policy measure, an issue dealt with in the next section.) This punishment is denoted by P (say, years in the *penitentiary*).[44] A component of P could also be the considerable psychic cost inflicted by the police on women they believe to have lied, a fact for which there is ample documentation. The police will now choose s and v to solve

$$\max_{s,v} \quad J[\pi A(s) - (1-\pi)N(s)] + P[(1-\pi)F(v) - \pi T(v)] - cs - cv. \tag{10}$$

The first term, involving J, is familiar. The second term, involving P, denotes the anticipated benefit to the state of exposing false reports less the anticipated cost of mislabeling

[43] In this case, the probability $T(v)$ that a truthful report will be taken as a lie is a Type I error. The probability $(1 - F(v))$ that a false report will be accepted as true is a Type II error.

[44] In the U.K. the maximum sentence for making a false allegation of rape is life in prison, which is harsh by North American standards. This is probably because the typical sentence for rape is also higher in the U.K.

truthful reports as false. The police now has to trade off on two margins. First, as before, it has to balance the gains from apprehending perpetrators of sexual assault against the miscarriage of justice that occurs when innocent men are convicted of rape. Second, it has to balance the gains from apprehending false reporters of sexual assault against the miscarriage of justice that occurs when true victims of sexual assault are convicted for lying. The first order condition for the suspect-targeted evidence, s, is the same as that before, namely (2). I change the notation slightly here and denote the optimal solution for s by $s^*(\pi, J)$ to reflect the change in scenario, that is, $s^*(\pi, J) \equiv s^\dagger(\pi, J)$. Its comparative static properties with respect to π and J remain the same as before: $s^*_\pi(\pi, J) > 0$ and $s^*_J(\pi, J) > 0$. Note that $s^*(\pi, J)$ is independent of P.[45]

The first order condition for the victim-oriented evidence, v, is

$$PH_v(\pi, v) - c = 0, \tag{11}$$

where $H(\pi, v) \equiv (1 - \pi)F(v) - \pi T(v)$ is the perceived probability of a net benefit from this evidence. We denote the solution to this by $v^*(\pi, P)$. From (11) we see that $v^* = 0$ for low values of P because the opportunity cost of effort is not covered. Let $\underline{P}$ denote the largest value of P for which $v^* = 0$. (This $\underline{P}$ will depend, of course, on all the other parameters like J, π, etc. which we suppress for brevity.) Assuming the solution is interior (that is, $P > \underline{P}$), we see that $v^*_\pi(\pi, P) < 0$ and $v^*_P(\pi, P) > 0$. Thus, a strong prior that the report of sexual assault is false (that is, a low value of π) will induce the police to seriously investigate the victim in order to expose the alleged falsehood of her report. An increase in the punishment for lying increases the incentive of the police to investigate the victim because it is in their interest to reduce false reporting, and so $v^*_P(\pi, P) > 0$.

Note that, since $s^*_\pi(\pi, J) > 0$ and $v^*_\pi(\pi, P) < 0$, when police priors on truthful reporting increases, more effort is devoted to gathering evidence on suspects and less on victims. Thus there is a trade-off between investigating the perpetrator and investigating the victim, and which way the police lean in their investigation depends on their prior belief about the truth

[45] This would not be so if the cost of effort was jointly convex in s and v. Since the results of the analysis are reinforced in the latter case, the simpler linear cost assumption is retained here.

of the report. Low values of the prior π induce the police to focus on the *victim* in their investigation, consistent with the opinions repeatedly expressed by victims in interviews about their experience with the CJS [Kelly et al (2005), Payne (2009)].

We summarize the comparative statics on police actions in the statement below.

Lemma 2: (a) An increase in the police prior π (i) increases the evidence collected on suspects, and (ii) decreases that collected on victims.

(b) An increase in the punishment P for false reporting (i) has no effect on the evidence collected on suspects, and (ii) increases the evidence collected on victims.

We now consider the choices of private citizens.

4.2 *Assaulted Woman's Choice*

As before, in deciding to make a report a victim must trade off the justice she receives from seeing her assaulter convicted against the private cost $C(r)$ she faces of reporting. But now she must also confront the possibility of being falsely accused of lying and incurring a punishment P, which we assume is larger than $\underline{P}$. She now chooses the probability r of reporting the crime by solving

$$\max_{r} \quad [JA(s) - PT(v)]r - C(r) - Z, \tag{12}$$

the solution to which, assumed to be interior, is uniquely determined by the equation

$$C'(r) = JA(s^*(\pi, J)) - PT(v^*(\pi, P)). \tag{13}$$

For a given π, a victim's optimal probability in equilibrium of reporting, denoted now by $r^*(\pi, J, P)$, is lower when there is punishment if found (erroneously) to have lied than the reporting probability $r^\dagger(\pi, J)$ in the absence of such a punishment. Punishment for lying dissuades genuine victims from coming forward to report the assaults they have experienced, so there is a level effect on reporting rates of punishments for lying.

All else constant, what is the marginal effect of higher police prior π that the report is truthful? In this case, we find that the comparative static derivative $r^*_\pi(\pi, J, P)$ has an ambiguous sign, in contrast to the clear positive effect when $P = 0$. On the one hand, as

before, a higher π induces the police to accumulate more evidence on the suspect and raises the chances of convicting him. On the other hand, the endogenous decline in victim investigation raises the probability that a truthful report is mistakenly seen as being false, which lowers the incentive to report the crime. The net effect, therefore, is ambiguous. However, when the punishment for being deemed to have lied is relatively small, we expect the first effect to dominate, and the frequency of reporting assaults will increase when π increases. For large P, however, the effect of a higher prior can lower the probability of truthful reporting because victims might fear that the lower investigative effort on victims might result in an erroneous inference that they have lied and thus face a stiff punishment.

Likewise, the effect of higher punishment for being deemed a liar has an ambiguous effect on the probability of reporting an assault, that is, $r_P^*(\pi, J, P)$ is of indeterminate sign. But for small punishment, it is the case that $r_P^*(\pi, J, P) < 0$. An increase in the punishment for being (mistakenly) deemed to have lied will naturally tend to reduce the chances of reporting an assault. However, the higher punishment also induces the police to gather more evidence on the victim, thereby lowering the chances of them mistakenly concluding that the report was false, which would tend to increase the probability of reporting an assault. When P is small, the former effect dominates. Thus, if the state introduces punishments for reports deemed false, genuine victims may respond by reporting assaults *less frequently.* (An example worked out and discussed in the Appendix illustrates this point.) So as P increases, reporting by genuine victims will initially decrease, though after P becomes sufficiently high $r_P^*(\pi, J, P)$ may reverse sign if the second effect alluded to above overwhelms the first. But obviously, $r^*(\pi, J, P)$ can never rise above $r^*(\pi, J, 0)$ for any value of P because $s^*(\pi, J)$ in (13) is independent of P and having $P > 0$ only reduces the marginal benefit of reporting.[46]

4.3 *Unassaulted Woman's Choice*

As before, a few unassaulted women may report rapes arguably to seek 'revenge' (if we credit the usual account) by seeing a man innocent of rape go to jail. But now, in addition to the personal cost she bears after making the report, she has to consider the potential penalty in

[46] This is the level effect alluded to earlier.

case her false report is exposed as such. She will choose the probability, l, of lying and making a false report now by solving

$$\max_{l} \quad [\rho JN(s) - PF(v)]l - C(l). \tag{14}$$

The equilibrium probability of making a false report, assuming it to be strictly positive, now denoted by $l^*(\pi, J, P)$, is uniquely determined by the solution to the equation

$$C'(l) = \rho JN(s^*(\pi, J)) - PF(v^*(\pi, P)). \tag{15}$$

Once again, there is a level effect of punishments for lying: the frequency of false reporting is reduced relative to when $P = 0$. The comparative static derivatives of false reporting probability are $l^*_P(\pi, J, P) < 0$ and $l^*_\pi(\pi, J, P)$ is of indeterminate sign. As expected, a marginal increase in the punishment for a false report reduces the frequency of such reports. Surprisingly, a more favorable police prior has an ambiguous effect on the frequency of false reports in contrast to the clear decline when only a suspect-oriented investigation was possible. This arises because there are now two opposing forces at work. A woman who files a false report benefits when the (innocent) man she accuses gets wrongly convicted. When π increases, the police increase their suspect-oriented evidence gathering, which lowers the probability of this miscarriage of justice, reducing the benefit the untruthful woman expects to receive. On the other hand, when π increases the police produces less victim-oriented evidence, reducing the chances that the falsity of her report is exposed. The net effect of an increase in π on the frequency of false reporting depends on which of these forces dominates. If the latter dominates, by taking the focus off the putative victim, a more favorable police prior increases the frequency of false reports. Even if this is the case, however, we would not expect the effect to persist for all π; for sufficiently high π, enough suspect-oriented evidence would be collected that the probability of convicting an innocent man will be very low, thereby eliminating the incentive for false reporting. In other words, we would expect the frequency of false reports to be either monotonically declining in π or, if it is non-monotonic, to be hump shaped in π.

The important point to note regarding the effect of punishments for false reporting on

women's choices is that genuine victims of sexual assault may report the crimes less frequently in equilibrium. The model shows that this serious consequence is theoretically demonstrable, not merely a vague assertion—which is what it would be if the argument were made purely at an informal level.

4.4 *Potential Perpetrator's Choice*

A potential perpetrator of sexual assault is not directly affected by the punishment for false reporting, though he is most definitely affected through the altered choices of women. His optimization problem remains the same as in (7), reproduced below:

$$\max_{a} \quad [S(1-r) + Sr(1-A(s)) - JrA(s)]a - D(a).$$

His optimal solution in equilibrium, assumed to be interior and now denoted by $a^*(\pi, J, P)$, is determined by the solution to

$$\begin{aligned} D'(a) &= S(1 - r^*(\pi, J, P)A(s^*(\pi, J))) - Jr^*(\pi, J, P)A(s^*(\pi, J)) \\ &= S - (S + J)r^*(\pi, J, P)A(s^*(\pi, J)). \end{aligned} \tag{16}$$

An increase in the police's prior that a report is true will necessarily result in a lower incidence of sexual assaults for small P (because evidence collection on suspects is greater and the reporting of genuine assaults is higher). More interestingly, the sign of $a^*_P(\pi, J, P)$ is ambiguous. A sufficient, but not necessary, condition for $a^*_P(\pi, J, P) > 0$ is $r^*_P(\pi, J, P) < 0$. Inflicting punishments on women for submitting false reports can induce a higher frequency of assaults in equilibrium. This is because offenses may be reported less frequently by genuine victims and, therefore, the perpetrators are less frequently convicted. (This is illustrated in an example shown in the Appendix.)

The results obtained above for the choices of private citizens when the police investigate the suspect as well as the victim are summarized in the following statement.

Proposition 2: When the police can undertake investigation of the putative victim as

well as the suspect, a marginal increase in the punishment P for reports deemed false can have non-monotonic effects on the choices of private citizens. But when P is small, (i) the frequency of truthful reporting decreases, (ii) the frequency of false reporting decreases when the police prior π is small, and (iii) the frequency of sexual assaults increases.

What does punishment for false reporting do to the nature of the pooling and separating equilibria? When a punishment for lying is imposed, the frequency of both truthful and false reports will likely decline. It is *a priori* unclear how the composition of a pooling equilibrium will change. We can see this by comparing (13) and (15), which are the first order conditions that determine the frequencies of truthful and false reporting, respectively. The left hand sides are the respective marginal costs of reporting and the right hand side the marginal benefits. If ρ is not much larger that 1, the first term on the right hand side of (13) exceeds that of (15) for any (π, J) because the probability of convicting a perpetrator typically greatly exceeds that of convicting an innocent man, that is, $A(.) > N(.)$. The second term on the right hand side of (13) is smaller than the corresponding term in (15) because the probability of labeling a genuine report as false is smaller than the probability of exposing a false report as false, that is, $T(.) < F(.)$. Therefore, the marginal benefit is higher for a genuine report than for a false report. When false reporting is punished, though both true and false reporting can decline, the effect is likely to be greater on false reporting. Therefore, it is possible that what was a pooling equilibrium for $P \leq \underline{P}$, may become, when $P > \underline{P}$, a separating equilibrium in which only genuine reports are observed. In any case, this would be the state's expectation behind imposing a punishment for false reporting in the first place. This observation leads us to the next section.

5 Should Women be Punished for False Reporting?

False reports of sexual assault waste the state's resources and, more importantly, could end up incarcerating innocent men. Punishments for false reporting may seem like a logical solution to this problem and they are often imposed [Avalos (2016)]. But such punishments have other consequences that complicate matters. Nowhere does the fact that the prosecutor is not the

victim's advocate become more apparent than in the attempt of the state to punish her for lying. It is reasonable to ask whether false reports of sexual assault should be punished, which is the question we investigate now.

An increase in punishment is likely to reduce false reports, which in turn could reduce the frequency sexual assaults, as we have seen in the previous section. Imposing punishments for this purpose, however, ignores two facts, demonstrated in the previous section:
(i) Such a punishment could reduce the frequency of reports from genuine victims because they may be erroneously deemed to be false. This unintended effect does not arise because of risk aversion on the part of victims—we have assumed risk neutrality. Rather, it arises because the state's law enforcement machinery is not foolproof: it can erroneously deem an honest victim to be a liar, and this can prove very costly to someone who has already been victimized. Furthermore, even improving the police prior π—which tends to encourage more genuine reporting—may be insufficient to offset the reduction in reporting by genuine victims when punishments for false reporting are imposed.
(ii) Punishment for false reporting, perversely, can—and very likely will—increase the frequency of sexual assaults. If fewer victims of sexual assault report the crimes, the probability that perpetrators will face a jail sentences will be lower and they are emboldened to assault more frequently.

Another way of looking at this is through the lens of Type I and Type II errors. If the null hypothesis is that the man accused of rape is indeed innocent, Type I error occurs when he is wrongly convicted and punished. The evidence on this type of error is that it is extremely small. A Type II error occurs when a guilty man goes free, and this occurs with probability around 97% in the U.S.[47] Punishments for women deemed to be lying decreases the former, while it could increase the latter even further because more assaults are committed.

Consulting the first order condition for the suspect-oriented evidence (2), we see that it is independent of the punishment P for false reporting. When $P \leq \underline{P}$, we have seen that victim oriented investigation is not undertaken and so these punishments have no effect. A visual aid for the behavior of the reporting and assault frequencies in provided in Figure 1.

[47] See https://rainn.org/statistics/criminal-justice-system

As a function of the punishment P for false reporting (starting from the minimal effective punishment $\underline{P}$), the schedule RR' displays the equilibrium reporting frequency of genuine victims; the schedule LL' shows the equilibrium frequency of false reports, which become zero at some punishment level $\overline{P}$; and the upward sloping schedule AA' is the equilibrium frequency of sexual assault.

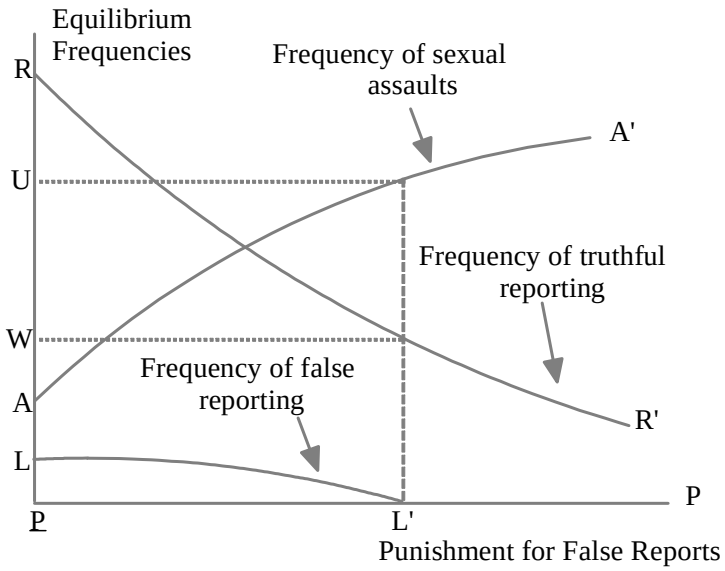

Figure 1: The effect of enforcing a separating equilibrium with only truthful reports through punishments for lying.

In the Figure, we have shown a pooling equilibrium. As P increases, the composition of this equilibrium changes—truthful and false reports change at different rates, with false reporting vanishing at $P = \overline{P}$. If the state chooses to enforce a separating equilibrium with only truthful reporting by setting a sufficiently high penalty $\overline{P}$ (corresponding to point L' in the Figure), the truthful reporting rate falls in equilibrium by the amount RW, while the frequency of sexual assault rises in equilibrium by AU. So, as the number of victims rises as a result of punishments for false reporting, a smaller proportion of victims are seeking help from law enforcement by reporting them.

The fall in reporting frequency may give rise to the impression that the policy of punishments for false reporting is working, that it is dissuading false reports of rape. This is

incorrect. While fewer (or zero) false claims are being made, fewer genuine reports are also be made. In fact, since in reality false claims are only about 6% of the reports in the U.S. (and of the same order or less in other developed countries), the decline from women who are falsely reporting is likely to be a negligible fraction of the decline in genuine reports. In a pooling equilibrium, we have to be careful to parse out the various sources of the decline in reporting. These effects suggest that punishing potential victims may be a bad policy. This is a very important implication of the paper's model.

The purpose of inflicting punishments for false reporting of sexual abuse is largely to reduce the conviction of innocent men. However, when implemented, we have to account for not only the men who are falsely convicted but also the women who are erroneously proved to have submitted false reports; both sets of people are punished without cause. Punishment for false reporting will generate a set of women who are not only victimized by sexual predators but also by the state. In fact, the measure of innocents (men and women) who are punished by the state may well increase even though the number of innocent men who meet this misfortune will decline.

In effect, as a result of the policy of punishing women who are deemed to have submitted false reports, the benefit is a decrease in the number of innocent men falsely convicted. On the cost side, there is the increase in the number of victimized women who are assaulted but receive no justice. Given the assumption that each perpetrator engages in at most one assault, the latter quantity is also the policy-induced increase in the number of perpetrators who escape justice. Convicting innocent men is certainly a miscarriage of justice. Implementing a policy that increases sexual assaults on women and also increases the number of victims who find no vindication is also a miscarriage of justice. This is the trade-off that is implicit in the policy of punishing false reports, setting aside resources saved by the police force.

The following numbers offer a revealing perspective. Levitt (2013) reports that, in England and Wales over the period January 2011 through May 2012, there were 5,651 prosecutions for rape and 35 for false reports. In other words, prosecutions for false allegations were only 0.62% of the number of prosecutions for rape. These will be an even smaller percentage of the number of reported cases of rape.

In Section 3 of the Appendix I provide a simple example for which the subgame perfect equilibrium is explicitly worked out to illustrate the trade-offs that are involved in punishing reports deemed false. Of course, these are only the results of simulation for a particular example—and for a particular set of parameter values, at that—and may not reflect the real world. This may seem a valid objection. However, when we consider the proportions of women and men who do not receive justice in real-world sexual assault cases, what such simulation results suggest may not be outlandish. In the real world, of all women victimized by sexual assault in the U.S., only about 3% get to see their assailants convicted. What proportion of these convictions are false? Going with the only piece of solid empirical evidence there is in sexual assault cases, suppose we take this as 9% from Gross (2008), which is based on an extremely small sample. Since 97% of the women victims do not see justice, 97% of the perpetrators walk free (assuming away serial rapists). But in $3\% \times 9\% = 0.027\%$ of the cases, innocent men are convicted. To prevent the miscarriage of justice to men in 0.027% of the cases, punishments for reports deemed false that will increase the number of victimized women and further increase the proportion who do not see justice done to above 97%. This certainly seems a travesty of justice.

6 Policy Implications

There are several policy implications that follow from this paper's analysis. I discuss three of the important ones in this section.

6.1 Eliminating Credibility Discounting

We have seen that the opinions of decision makers in the CJS (police, prosecutors, judges, and juries) about false reports are far from the facts of the matter. We have seen the reasons for this and their pernicious consequences in the preceding analysis. As noted earlier, the effects of attempted reforms are only marginally noticeable and leave much to be desired.

The persistence of false beliefs suggests that convergence to the correct figure of accurate reporting depends crucially on the initial belief about the value of π. Were Bayesian updating

to function in an objective manner, false initial beliefs would have been a problem only in the short run but not in the long run. Confirmation bias, however, can thwart the functioning of this corrective mechanism and so rape myths can persist over the long run, despite being starkly contradicted by the facts on the ground. This brings home the importance of initial beliefs on even the long-run in the case of sexual assault.

A campaign has been launched recently in the United States called *Start by Believing* [Lonsway and Archambault (2014)]. This program urges people who are approached by victims of sexual assaults (be they family members, friends, or the police), to start by believing that the claim is true. This would promote reporting of sexual assaults and prevent attrition in the CJS. In terms of our model, the program essentially seeks to change the initial beliefs to $\pi = 1$. We have seen that as π increases, victim-oriented evidence gathering endogenously declines while that oriented towards the suspect increases. Thus the model predicts that the outcomes would be much more in line with facts if $\pi \simeq 1$, and will ensure that more women get justice while sexual predators will be discouraged. The *Start by Believing* policy will automatically result in a "shift from a focus on the discreditability of complainants to enhanced evidence gathering and case-building" [Kelly et al (2005, p. 89)]. The jury is still out on whether the policy is meeting with success in practice, but the initiative is promising. One policy that might help is to have rape investigation teams that are of mixed-gender composition, since women are more inclined to believe victims than are men [Suarez and Gadalla (2010)].

Recently, Tuerkheimer (2017) has suggested a proposal that also has promise. She argues that credibility discounting should be deemed an actionable form of discrimination. The idea is that, by being disbelieved, sexually assaulted women are denied justice and this contravenes the Equal Treatment Clause of the Fourteenth Amendment to the U.S. Constitution. This is an angle that may have scope because even stereotyping is now seen as violating the law, depending on the context [Herz (2014)]. In stereotyping, some average feature of a well-identified group is attributed to every individual in that group without allowing for heterogeneity. With credibility discounting, one would reckon that the case is even stronger than for stereotyping because the 'characteristic' in question—the alleged tendency of women

reporting rape to lie—is not even true in an average sense, as the evidence clearly reveals. The analysis of this paper suggests that, if the police were mandated by law to investigate *all* reports, the evidence gathered would have a cascading effect: fewer cases would be dropped by the police, a higher proportion of cases would be prosecuted, and a higher proportion of trials would result in convictions.

6.2 Reducing Attrition in the Criminal Justice System

As we have seen, rape cases undergo severe attrition as they proceed through the CJS [Gregory and Lees (1996), Kelly et al (2005), Spohn and Tellis (2012)]. This has usually led scholars and policy makers to focus on the actions of the police and the prosecutors. This is correct, because their actions do seriously contribute to the problem. However, part of the attrition may be exogenous to these actors in the CJS. Women can and do drop out because of personal reasons, dealing with the trauma, attending to their families, etc. If this happens, the investments of the police in the cases are wasted. This, too, lowers conviction rates and encourages sexual assaults in the future on other women. So there is an externality associated with a single individual dropping out, one that she does not internalize. Furthermore, the statistical information on the average drop out rate will be used by the police to rationally allocate their resources, leading to a lowering of investigative effort that, in a vicious circle, could result in endogenous attrition.

Apart from the private satisfaction she might receive, a victim who bears witness in the state's case against a perpetrator is conferring a positive externality on society. If the perpetrator is convicted and jailed, her testimony would have prevented other women from being assaulted and, also, the punishment is a deterrent to other perpetrators of this crime. While the state bears much of the cost for the criminal trial, the victim also bears a substantial part of it. When a victim withdraws her complaint or decides not to cooperate with the prosecution for reasons exogenous to the CJS, the positive externality her testimony confers on society is not forthcoming. Sexual assault rates marginally increase as a result and the police's investigative efforts have been for nought. Successful prosecution requires the victim's participation and the state's evidence, and the difficulty is that there is no contract feasible to

ensure adequate performance of both parties. There is, potentially, two-sided moral hazard here and the outcome in such scenarios is well-known to be typically inefficient. This is a separate issue from credibility discounting, and needs to be addressed because exogenous attrition—captured by $(1-\delta)$ in our model—dilutes the police's incentives to collect evidence.

Among the reasons victimized women cite for not proceeding with the trial is that they lack the needed support. Quite apart from being treated with respect and sensitivity by the CJS, they need information about legal procedures and knowledge about what they should expect in the trial. Furthermore, they need help with the tremendous trauma of being assaulted and seeing the integrity of their bodies violated. Attending to these needs falls outside the purview of the CJS and so they require complementary efforts from the states' social and health services, rape victim advocates, along with help from local support groups. What are called Sexual Assaults Response Teams (SARTs) in North America and Sexual Assault Referral Centers (SARCs) in the U.K. are aimed at performing precisely this function. But they still are relatively few and far between and they have a long way to go before most victims have access to one [Stern (2010, Ch 2)].

Stern (2010, p. 98) hints at the possibility that the criminal justice system of other countries like France, which is based on civil law, may have some lessons for those based on common law. The report by Bacik et al (1998) is extremely suggestive in this regard. In the French case, the victim can have a lawyer represent her (though with some restrictions). The law delivers two verdicts, one on the sentencing and the other on the compensation the victim is to receive either from the accused or the state. This lawyer, whose main role is in determining the compensation the victim is due but not in the sentencing, is a source of support to the victim throughout the trial. We would expect this feature of the French system to lower attrition. This indeed seems to be the case. From Bacik et al (1998, p. 221) we see that in 1996 there were $7,191$ cases of rape reported, of which $5,856$ were prosecuted, and in $2,740$ cases convictions were obtained. So 81% of the reported cases proceeded to trial, and 38% of the reports resulted in convictions. This figure is more than 3 times that in the U.K., Canada, and the U.S., all of which have legal systems based on common law. Allowing the victim to have an advocate even in a limited capacity, then, seems to dilute the effects of

credibility discounting and also temper the attrition in the CJS.

6.3 On Punishing False Reporting and Correcting Police Disbelief

The previous section formally examined the question of whether women should be punished for false reporting of sexual assault. This could prevent the 'perverting of justice' and the incarceration of innocent men, while also saving the state's resources. My argument demonstrated that such a policy would have very unpalatable unintended consequences.

If the police force views false reporting to be a problem—though this view is not borne out by the evidence—it would be inappropriate to address it by punishing women who were deemed to have reported falsely. This policy might work if the state's CJS were free from the possibility of making a Type I error (a truthful reporter being thought to have lied). But, given the extent of the credibility discounting women experience in the CJS and the rate at which rapists are acquitted, it would be ludicrous to expect victims to have confidence that they will not be mistakenly deemed liars. As we have seen, the elimination of false reporting through punishments can be accompanied by a decline in truthful reporting and a corresponding increase in the frequency of assaults. In effect, more women will likely be victimized, a smaller proportion will see their assailants incarcerated, and perpetrators will perceive a lower expected punishment for assaulting. Since the number of men who are wrongly convicted is very small, implementing a policy that would reduce this number to zero while exacerbating a miscarriage of justice that is already immense would be unreasonable by any account.

Police believing that women are telling the truth about assault is a better route to eliminating lying than inflicting punishment for lying. The former has the advantage of not dissuading victims from reporting. That is, more victims get justice and fewer rapes are perpetrated. And, as we have seen in subsection 3.5, without punishing women for lying it could theoretically take us from a pooling equilibrium with incidence of some lying to a separating equilibrium with only truthful reporting. In practice, this expedient may not entirely eliminate false reporting but, by increasing the police's investigative effort, it could dramatically reduce it below its already-low levels. A policy of correcting police disbelief of rape reports

has much to recommend it. It is difficult to cite examples of this, however, because the comparison between correcting police disbelief versus inflicting punishments for lying has never been made, to my knowledge. So this recommendation is as much a call for more empirical work on the issue as a suggestion for policy reform.

7 Conclusions

This paper examines the role the state plays in aggravating the problems confronting women who have been sexually assaulted. We have shown that exaggerated police beliefs about the falsity of sexual assault claims can become self-fulfilling through their under-investment in evidence collection. This lowers the probability of conviction (thereby lending a spurious credence to their initial beliefs), discourages victims of sexual assault from coming forward, in some cases encourages false reports, and increases the frequency of sexual assaults. Investigation of victims—made necessary by an adversarial criminal justice system—may end up substituting for investigation of suspects precisely when the police are skeptical about the veracity of sexual assault reports. The paper also demonstrates, however, that police cynicism is not the only reason for suboptimal investigative effort. The high rate of victim attrition in the criminal justice process also dilutes police incentives to undertake adequate investigations that would result in convictions. While some of the attrition is endogenous and is probably brought about by the state's procedures, much of it is also exogenous to the system. The paper also examines the question of whether the state should impose a punishment on women who are deemed to have falsely reported sexual assault. The analysis suggests that this would be a mistake because the policy would induce even fewer victims to come forward (while reducing the already-low levels of false reporting), and this would increase the frequency of sexual assaults. I draw out the policy implications that come out of the analysis.

Sexual assault has serious short- and long-term health consequences for women. Victims of sexual assault suffer from a host of problems [Dworkin et al (2017), World Report on Violence and Health (2002)]. There are many tangible and intangible costs of rape to the victim and to society. The tangible costs are the direct ones like cost of medical treatment,

loss of productivity etc. The intangible costs are the psychological costs of rape, which are harder to measure and so have to be elicited indirectly by, for example, statistically parsing out the share of psychological costs from jury awards. McCollister et al (2010) estimate the total tangible cost to society per rape in the U.S. at $\$41,000$ and intangible costs at around $\$199,000$, giving a total cost per rape of $\$240,000$ in 2008 dollars. The authors point out that these costs are much larger than the cost society would incur in preventing rapes.

We can form an estimate of how much it costs to reduce the incidence of rapes. Boba and Lilley (2009) examined the effect on reduction in rape (and aggravated assault) of the funding through the U.S. Department of Justice for the Violence Against Women Act of 1994. They employed panel data over the years 1996-2002. After controlling for jurisdictional fixed effects, the overall time trend for all crimes, and other funding that might have affected the outcome, they find that the elasticity of rapes with respect to VAWA funding though the DOJ is -0.066 and is statistically significant. The authors are careful not to infer a causal relationship between funding and rape reduction because the allocation of VAWA funding was not randomized. Nevertheless, assuming the correlation is causal, we can obtain a rough-and-ready estimate of the cost of rape reduction. Black et al (2011, Table 2.1, p. 18) shows that, if we include only completed rapes and drug/alcohol facilitated penetration, there were around 1.4 million rapes of women in the U.S. in 2010, and 0.066% of this would be 924 rapes. Laney (2010, p. 4) gives \$210 million as the DOJ's share of the VAWA funding for 2010, and 1% of this is \$2.1 million. So increasing funding by \$2.1 million reduces 924 rapes of women. Therefore, the cost of rape reduction of women through VAWA funding is around $\$2,270$ per rape. Given that the cost to society of a rape is around $\$240,000$, VAWA funding gives a return to society that is more than hundred-fold.

An alternative measure of the cost of preventing rape can be obtained from the results of a randomized control evaluation of an innovative program for university students at three Canadian universities by Senn et al (2015). The program showed a significant reduction in the incidence of rape among the students who undertook the program: their one-year risk of completed rape was 5.2% as opposed to 9.8% in the control group that did not take the program. They found that for every 22 students who underwent the program, on average, one

rape was prevented. The cost for administering the program to 22 students was approximately \$5,155.[48] So for a price of \$5,155 one rape is prevented on average at a university. This is a pittance compared to the cost to the victim and society of a rape that has occurred.

In the light of these numbers, it is unconscionable that rape can be engaged in with impunity (or, since the conviction rate is so low, should one say immunity?). This state of affairs can only reflect the fact that rape is a crime that is not taken seriously enough.

Reducing the incidence and serious effects of sexual violence against women, broadly requires society to perform two functions: reduce the incidence of such violence and attend to the needs of the victims. In reducing the incidence, deterrence through the enforcement of law should certainly be pursued more vigorously but it is only one avenue. A possibly more fruitful route is not to take the proclivity in some men to rape as given but, rather, to change the culture in which rape is seen by men as acceptable. The perception of men about rape is culture-dependent [Kahan (2010)].[49] Men need to be socialized, have their patriarchal values questioned, and have their consciousness raised about the seriousness of rape and the importance of consent.[50] Policies that address men should have a high social payoff for they would prevent or attenuate the problem by either altering social norms or by encouraging bystander intervention, instead on exclusively focusing on minimizing the damage once it is done. There are a few such programs, evaluated by rigorous randomized control treatments, that show promise but they certainly do not get anywhere near the exposure they should.[51]

On the deterrence side, victimized women need to be encouraged to come forward when

[48] This has been computed using the data provided for the program at http://www.blueprintsprograms.com/program-costs/eaaa-enhanced-assess-acknowledge-act-sexual-assault-resistance-education

The amount has been coverted to USD using the exchange rate of 1.34 for December 2016, when the numbers were last updated. I gratefully acknowledge the help of Dr. Karen Hobden and Dr. Charlene Senn, two coauthors of the study, in accessing the cost figures.

[49] Interestingly, based on an experimental study Kahan (2010) finds that people who are hierarchical—both men and women—are culturally conditioned to interpret a women's 'No' as not necessarily 'No' and would tend to acquit the accused irrespective of how the law defines rape.

[50] Rape is not the only action that is a crime when there is lack of consent; theft, battery, trespassing, etc. also become crimes when there is no consent [Estrich (1987, Ch. 3)]. What singles out rape, however, is that usually sex is consensual and is presumably to the mutual benefit of both parties; in rape, it is decidedly *not*. As a quote from Stern (2010, p. 7) puts it, "Rape is unique as it is an inherently lawful activity made illegal because of lack of consent."

[51] In particular, see *Coaching Boys to Men* [Miller et al (2012)] and *Sexual Violence Prevention Through Bystander Education* [Banyard et al (2007)].

they have been assaulted; to be interrogated with respect by the police; to be believed when they make their claims; to be shown that their claims are being seriously investigated; encouraged to press charges when their cases have been built; supported while the trial is in progress; have their trauma attended to with therapy when required; to be cross-examined with sensitivity by the defense and not have their character destroyed in public and left to feel that they've been raped all over again, this time by the criminal justice system; and, finally, to have their case weighed by jury members who are free from the taint of rape myths. Then, perhaps, women would be truly equal to men in this domain of the law; then, perhaps, the state can legitimately view the rape of women as a crime committed against itself instead of merely appropriating the crime for political ends even as it leaves the victims unrepresented in the name of the public interest; then, perhaps, of every hundred women who are raped, more than a handful can hope to see the harm they have suffered acknowledged, their dignity reinstated, and their assailants held accountable; and then, perhaps, sexually assaulted women in our societies will avoid the fate of Cassandra.

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Appendix

8 Comparative Static Results

Comparative Statics of $s^{\dagger}(\pi, J)$

Taking the derivative of (2) with respect to J yields $J[\pi A''(s^{\dagger}) - (1-\pi)N''(s^{\dagger})]s^{\dagger}_J(\pi, J) = -[\pi A'(s^{\dagger}) - (1-\pi)N'(s^{\dagger})]$,which on using the concavity of the objective function yields $s^{\dagger}_J(\pi, J) > 0$.

Totally differentiating (2) with respect to π we obtain $J[\pi A''(s^{\dagger}) - (1-\pi)N''(s^{\dagger})]s^{\dagger}_{\pi}(\pi, J) = -J[A'(s^{\dagger}) + N'(s^{\dagger})]$,so that $sign[s^{\dagger}_{\pi}(\pi, J)] = sign[A'(s^{\dagger}) + N'(s^{\dagger})] > 0$, by Assumption 1.

Comparative Statics of $l^{\dagger}(\pi, J)$

Totally differentiating (6) with respect to J we obtain $sign[l^{\dagger}_J(\pi, J)] = sign[N(s^{\dagger}) + JN'(s^{\dagger})s^{\dagger}_J(\pi, J)]$. Since $N'(s^{\dagger}) < 0$ and $s^{\dagger}_J(\pi, J) > 0$, we see that the sign of the right hand side is ambiguous.

Clearly, $sign[l^{\dagger}_{\pi}(\pi, J)] = sign[N'(s^{\dagger})s^{\dagger}_{\pi}(\pi, J)] < 0$, since $N'(s^{\dagger}) < 0$ and $s^{\dagger}_{\pi}(\pi, J) > 0$.

Comparative Statics of $v^*(\pi, P)$

Totally differentiating the first order condition (11) with respect to π we get

$$[(1-\pi)F''(v) - \pi T''(v)]v^*_{\pi}(\pi, P) = F'(v) + T'(v),$$

so that $sign[v^*_{\pi}(\pi, P)] = -sign[F'(v^*) + T'(v^*)] < 0$, given Assumption 2.

Differentiating (11) totally with respect to P we obtain

$$[(1-\pi)F''(v) - \pi T''(v)]v^*_{P}(\pi, P) = -[(1-\pi)F'(v) - \pi T'(v)].$$

The square bracket on the left hand side is negative, but since on the right hand side $F'(v) > 0$ while $T'(v) < 0$, it follows that $v^*_P(\pi, P) > 0$.

Comparative Statics of $r^*(\pi, J, P)$

Assuming the solution is interior, differentiating (13) with respect to π, we obtain

$$C''(r)r^*_{\pi}(\pi, J, P) = JA'(s^*(\pi, J))s^*_{\pi}(\pi, J) - PT'(v^*(\pi, P))v^*_{\pi}(\pi, P).$$

Since $C''(.) > 0$, the sign of $r^*_{\pi}(\pi, J, P)$ is the same as that of the right hand side of the above equation. The first term on the right hand side is positive, while that of the second is negative.

Totally differentiating (13) with respect to P we obtain

$$C''(r)r^*_{P}(\pi, J, P) = -T(v^*(\pi, P)) - PT'(v^*(\pi, P))v^*_{P}(\pi, P).$$

Since $T'(.) < 0$ and $v^*_P(\pi, P) > 0$, it follows that the second term is positive, while the first term is negative. For small P, we see that $r^*_P(\pi, J, P) < 0$.

Comparative Statics of $l^*(\pi, J, P)$

Totally differentiating (15) with respect to P yields

$$sign[l_P^*(\pi, J, P)] = sign[-F(v^*(\pi, P)) - PF'(v^*(\pi, P))v_P^*(\pi, P)].$$

Since $v_P^*(\pi, P) > 0$ it follows that $l_P^*(\pi, J, P) < 0$.

Totally differentiating (15) with respect to π we get

$$sign[l_\pi^*(\pi, J, P)] = sign[JN'(s^*(\pi, J))s_\pi^*(\pi, J) - PF'(v^*(\pi, P))v_\pi^*(\pi, P)].$$

Since $N'(.) < 0$, $F'(.) > 0$, and $v_\pi^*(\pi, P) < 0$, it follows that $sign[l_\pi^*(\pi, J, P)]$ is ambiguous.

Comparative Statics of $a^*(\pi, J, P)$

Totally differentiating (16) with respect to P we obtain

$$sign[a_P^*(\pi, J, P)] = sign[-(S + J)A(s^*(\pi, J)r_P^*(\pi, J, P)],$$

so that $a_P^*(\pi, J, P) > 0$ when $r_P^*(\pi, J, P) < 0$.

9 Why Do Police Beliefs About False Reports Persist?

The measure of the number of truthful reports, TR, of sexual assault that are lodged is given by $TR = (1/\delta)\ a^\dagger(\pi, J)r^\dagger(\pi, J)$, since $a^\dagger(\pi, J)$ is the frequency of assaults in equilibrium and $r^\dagger(\pi, J)$ is the fraction of these that are reported. The measure of false reports, FR, that are lodged in equilibrium is $FR = (1/\delta)[1 - a^\dagger(\pi, J)]l^\dagger(\pi, J)$, since $[1 - a^\dagger(\pi, J)]$ is the measure of women who have not been assaulted. We define the equilibrium proportion of truthful reports in the total number of reports as $\Pi(\pi, J)$, which is given by:

$$\Pi(\pi, J) = \frac{TR}{TR + FR} = \frac{a^\dagger(\pi, J)r^\dagger(\pi, J)}{a^\dagger(\pi, J)r^\dagger(\pi, J) + [1 - a^\dagger(\pi, J)]l^\dagger(\pi, J)}. \qquad ((A.1))$$

The ratio $\Pi(\pi, J)$ is determined by the evidence-collecting response of the police force to reports of assaults, which in turn is determined by the priors π they hold about the truthfulness of the reports. We have already seen that $r^\dagger(\pi, J)$ is increasing in π, while $a^\dagger(\pi, J)$ is decreasing, as is $l^\dagger(\pi, J)$. In principle, the product $a^\dagger(\pi, J)r^\dagger(\pi, J)$—which is the number of truthful reports received—could either increase or decrease with π. From an decrease in the number of reported assaults, therefore, we cannot infer that the problem of sexual assaults is getting better; it could just mean that there is less reporting by victims. Likewise, an increase in the number of truthful reports does not imply that assaults are getting more frequent. Since the incentive for lying unambiguously decreases with π, it is likely that the number of false reports declines relative to the number of truthful reports, in which case $\Pi(\pi, J)$ will be increasing in π.

Since $J = \delta J_0$, the ratio $\Pi(\pi, J)$ also depends on the proportion δ of complainants who will

endure the prosecution until the end. An increase in δ increases the effective punishment to perpetrators, and so increases $r^\dagger(\pi, J)$ and $l^\dagger(\pi, J)$, and reduces $a^\dagger(\pi, J)$. In other words, the effects of an increase in δ are somewhat similar (but not identical) to those of an increase in π. For the police, the effort applied to the collection of evidence will be wasted if the complainant withdraws the complaint or does not endure the trial, just as it is wasted if the complainant is fabricating the incident. In choosing their investigative effort, the police are responding to *both* these. By ignoring the former, we would be attributing entirely to the police prior π effects that the probability of complainant withdrawal δ also seriously contributes to. This analysis possibly reconciles divergent views on the true value of π of the police (who may be responding to the compounded effects of π and δ) and a vast number of academic scholars (who may be attributing the entire effect to π alone).

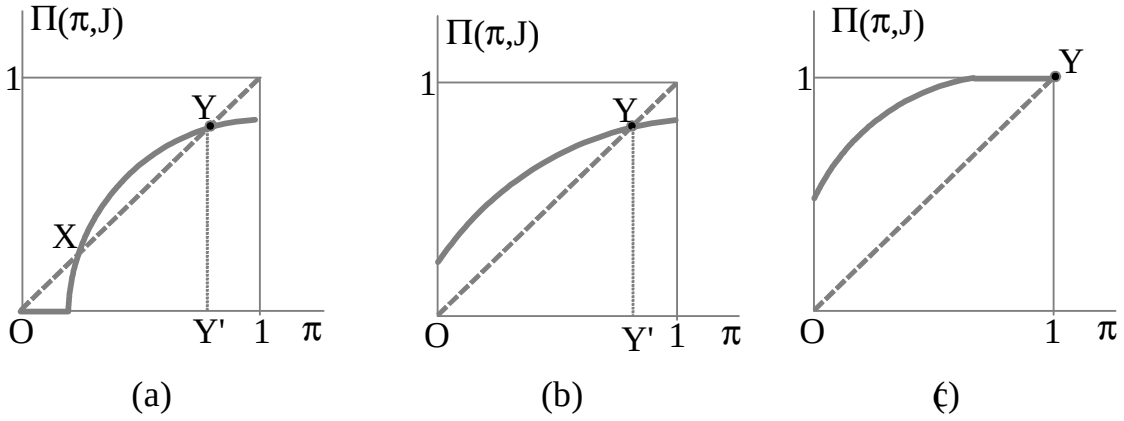

Figure A1: Equilibrium police belief about truthful reporting, assuming rational updating

If police beliefs about the veracity of rape reports are to be consistent with the outcome, the value of π should turn out be the proportion of truthful reports among the reports received. In other words, π should be the fixed point, say $\pi^\dagger(J)$, of the mapping $\Pi(\pi, J)$. This fixed point is the solution to the equation

$$\Pi(\pi, J) = \pi. \qquad ((A.2))$$

Once the prior $\pi^\dagger(J)$ is determined, it would nail down the subgame perfect equilibrium that would obtain when the police force updates its beliefs in Bayesian fashion so as to be consistent with the evidence. Recall that, since $J = \delta J_0$, this fixed point depends on the probability δ that a complainant will prosecute and last out the trial.

Note that there is no presumption that the fixed point is unique. If at $\pi = 0$ we have a separating equilibrium with only false reports, $\Pi(\pi, J)$ would behave as in Figure A1(a). In this case there could be multiple fixed points. These are shown as X and Y in the Figure (assuming two fixed points), but only Y is stable in the sense that small deviations in π around Y would return police beliefs to this fixed point but the same is not true of X. In

this case $\pi^{\dagger}(J)$ will be given by $OY\prime$ in the Figure. On the other hand, if there is a pooling equilibrium at $\pi = 0$, we would expect $\Pi(\pi, J)$ to behave as shown in Figure A1(b).[52] Here the fixed point, taken to be unique, is shown as Y in the Figure. If $\Pi(\pi, J)$ is always above the 45° line, the fixed point Y will be at $\pi = 1$, as shown in Figure A1(c).

At current levels of police beliefs π, the best estimates of the (endogenous) proportion of reports that are false lie between 2% and 8% [Lonsway et al (2009)], the most accepted figure **f**or the U.S. being 5% [De Zutter et al (2017)] or 5.9% [Lisak et al (2010)**;** this figure is around $2-4\%$ in Canada[53]].Therefore, the empirical estimate of $\Pi(\pi, J)$ on the left hand side of (11) is $1/(1 + FR/TR) = 1/1.059 \simeq 0.94$, taking the figure of 5.9% of Lisak et al (2010) for the U.S. *If this proportion remains fixed*, one would expect that, if the police force is not permanently prejudiced by stereotypical views about women who are sexually assaulted and are willing to update their beliefs in the light of evidence, the proportion of reports believed to be truthful should gravitate to the empirically observed proportion. Unbiased Bayesian updating, therefore, should lead to posterior priors to be larger than $\pi^{\dagger}(J) = 0.94$ in the U.S. In reality, however, police beliefs about truthful reporting are very far from what is expected. Even with such disbelief, the fact that the actual proportion of truthful reports is around 0.94 suggests that the most likely scenario is the case shown in Figure A1(c). Were police beliefs malleable, they would gravitate to the fixed point $\pi^{\dagger}(J) = 1$.

This raises the natural question: Why are police beliefs so out of line with fact? There are at least two possible explanations. One is that the police and the general public (from which juries are drawn) hold stereotypical beliefs based on rape myths, and this is the explanation typically offered in the literature [Lonsway and Fitzgerald (1994), Temkin and Krahe (2008, Ch. 2)].

I suggest, along with Tuerkheimer (2017), that part of the reason for the persistence of erroneous beliefs is probably rooted in a well-established fact in the psychology of belief formation: confirmatory bias. This is a bias that tends to select information in favor a previously held belief while discounting contrary evidence. This tendency remains even in the presence of Bayesian updating, as was shown by Rabin and Schrag (1999). In essence, signals that require interpretation are interpreted more frequently than warranted to be in favor of the previously believed hypothesis. As a result, erroneous beliefs of the police (who have access to the relevant data on the issue)—and, even more so, those of the general public (who do not)—can persist in the face of new evidence to the contrary.

Given the theory presented here, however, it is unlikely that police posterior beliefs will hover around $\pi = 0.94$ or higher *even in the absence* of persistent bias. The reason, which is my second possible explanation, is that police investigative effort also depends on δ, the probability that complainants will endure the entire criminal justice process. As long as complainants can initiate the process and drop out midway, the optimal police effort in equilibrium will be found wanting. This would result in more perpetrators being acquitted, thereby lending a spurious credibility to police beliefs that most of the reports are false or cannot withstand

[52] Note that $\pi^{\dagger}(J)$ is the fixed point for a given endurance parameter δ. If δ endogenously responds positively to a higher π, we would expect the $\Pi(\pi, J)$ schedule to shift higher and the fixed point to move further to the right.

[53] SexAssault.ca, https://www.sexassault.ca/statistics.htm

scrutiny beyond reasonable doubt. To further rectify the problem, not only must police priors become aligned with facts but the drop out rate of complainants must also be dramatically reduced.

The exogenous component of the drop-out or attrition problem is essentially one of contracting. There is no mechanism to ensure that the complainant will not drop the charges later or withdraw from the proceedings altogether. Feist et al (2007) examine rape case files drawn from eight police forces from England and Wales in 2003/04. In their sample of 569 cases that made it without being 'no-crimed', they found the attrition rate to be 39%.[54] The dropping of charges, strictly speaking, is actually the responsibility of the prosecutors but even if they refuse to drop the charges the chances of making them stick will be negligible if the complainants do not cooperate.

I make one further observation here. With regard to the incidence of false allegations of rape, Saunders (2012) has attempted to understand why there is a disparity between academic researchers and practitioners in the criminal justice system. On investigating a small sample of the latter in Britain, she identifies an important reason: academic researchers and practitioners in the CJS do not mean the same thing by the concept of "false allegation". The former assume it means that no rape has occurred, whereas the latter do not mean that no rape occurred but, rather, that there are falsehoods in the account. These falsehoods or inaccuracies are important because they can make successful prosecution and conviction difficult or even impossible, but the suggestion is not necessarily that no rape has occurred. We may conjecture that, if the inaccuracies are such that the probability of conviction by the jury is low, complainants may drop out of the proceedings or may even be encouraged to do so by the police and prosecutors, as is well documented. It is possible that this attrition of complainants as the cases go through the CJS is conflated by the police with the incidence of false allegations because in both cases the outcome is the same: convictions are very unlikely.

10 An Illustrative Example

I show here the results for a case where the subgame perfect equilibrium can be explicitly solved for, and illustrate the potential consequences of imposing a punishment on women who are deemed to have reported falsely. The cost function $C(.)$ is assumed to be linear in its argument, with unit slope, and the following probability functions are posited:

$$\begin{aligned} A(s) &= a_0 + (1-a_0)(1-e^{-\mu s}), \quad 0 < a_0 < 1, \quad \mu > 0 \\ N(s) &= n_0 e^{-\mu s}, \quad 0 < a_0 < 1 \\ F(v) &= f_0 + (1-f_0)(1-e^{-\lambda v}), \quad 0 < f_0 < 1, \quad \lambda > 0 \\ T(v) &= t_0 e^{-\lambda v}, \quad 0 < t_0 < 1. \end{aligned}$$

The probability of convicting a sexual predator, $A(s)$, is increasing and concave in the suspect-targeted evidence, s; the probability that this evidence would convict an innocent man, $N(s)$, is decreasing and convex in s. The probability of exposing a fake report of sexual

[54] The drop-out rate is particularly high when the victims know their perpetrators [Gregory and Lees (1996)].

assault, $F(v)$, is increasing and concave in the victim-targeted evidence, v; and the probability that this evidence would mislabel a true victim's report as false, $T(v)$, is decreasing and convex in v. The strong sufficient but not necessary Assumptions 1 and 2 are satisfied if $a_0 > n_0$ and $f_0 > t_0$, respectively.

Assume that the police prior is $\pi = 0.4$. Other parameter values are $\mu = \lambda = 1, \rho = 0.75, J = 1.0, S = 0.8, c = 0.1$,and $a_0 = 0.5$, $n_0 = 0.25$, $f_0 = 0.3, t_0 = 0.2$.

When there is no punishment for reports deemed false, the subgame perfect equilibrium is a pooling equilibrium in which the probability that a victim would report is 0.623 and the probability that a woman would lodge a false report is 0.141. The measure of women sexually assaulted is 0.101 and the measure of women who receive justice (through convictions) is 0.039, so that the measure of women victims who do not receive justice is the difference 0.062. Around 40% of the victimized women do not see justice in this equilibrium. In this equilibrium, the measure of men who are falsely convicted is 0.012.

To force the separating equilibrium in which false reports are shut down, the punishment that needs to be inflicted for reports deemed false is $\overline{P} = 0.52$. In the resulting equilibrium, the measure of women assaulted is 0.223 and the measure of women who receive justice is 0.072, so that the measure of victimized women who do not see justice is 0.151. In this separating equilibrium, compared to the pooling equilibrium with no punishment for lying, more than double the number of women are sexually assaulted and only 32% of the victims see justice.

In the pooling equilibrium, the measure of men who are falsely accused of sexual assault is 0.012. This is around 12% of the number of women victimized by sexual assault (a rather large percentage, given what we know about false convictions). This injustice to men is eliminated in the separating equilibrium. So, in going from the pooling equilibrium to the separating one by imposing the punishment $\overline{P}$ for false reporting, the measure of men who are falsely convicted declines by 0.012, while the measure of victimized women more than doubles *and* the proportion of women who do not get justice rises from 40% to 68%.