

# Escalations of Domestic Violence\*

March 11, 2022

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## Abstract

We study the trade-off between deterrence of domestic violence and its escalation. Enforcement initiatives, (i) by increasing punishment for violence at an early stage of any disharmony, and (ii) by lowering costs of victims reporting, may lower the onset of violence but open up the door for violence escalation. On the other hand, increasing punishments at a later stage of the violence chain always de-escalates long-conflicts.

The policy directive is thus one of reserving big punishments for more sustained violence. One reason why, to lower the root conflict at the start of the chain, easing of victims reporting might be favored is that the alternative of big punishment contravenes the basic principle of justice: punishment must fit the crime. Also, facilitating victims reporting is more pro-active in changing social norms towards zero tolerance for domestic violence.

*JEL Classification:* D02, J12, J16, J18, K14, K42.

**Key Words:** Domestic violence, long-conflicts, zero tolerance, social norms, victims reporting, female police officers, penalty, de-escalation, marginal deterrence, strategic complementarity, policy substitutes.

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\***Acknowledgements:** We thank Seema Jayachandran, Vijayendra Rao, and Anup Sinha for their comments. The remaining deficiencies are ours.

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# 1 Introduction

An essential feature of domestic violence (DV) is its sustained nature. Both theoretical and empirical literatures tend to neglect this aspect, treating violence as a one-shot, static decision. In this tradition, Rao (1997), and Bloch and Rao (2002) analyze violence as a bargaining instrument for husbands and their families to extract dowry money from the wives' parents. Earlier, Tauchen et al. (1991) studied domestic violence as a source of male gratification and instrument for controlling wife's behavior.<sup>1</sup> Departing from these static formulations, we consider DV as an extensive-form game between husband and wife (or cohabiting partners).

The violence may start out of a direct economic motive such as dowry money. Or, patriarchal norms (WHO, 2009) with a culture of male dominance, men restricting women's freedom within the households and marriages, give rise to power imbalance, which is a breeding ground for DV. Such violence confers the male perpetrator a satisfaction to which one can similarly impute a monetary value. After the initial dispute and violence due to a variety of reasons,<sup>2</sup> the perpetrator (husband) and the victim (wife) can progress, in a society with its strict laws and enforcement, to further conflicts – due to the victim attempting to *report the violence* and the former *escalating violence* to prevent reporting. While there can be, and often are, further economic motives to escalations, we will abstract and focus on the interaction between reporting (for pecuniary and other gains, damage limitations, etc.) and escalations (to avoid punishments). We pursue this narrative of violence – a violence chain in its entirety. In particular, we will be interested in what can law enforcement do to break the chain at its root or at the interim before escalations become extreme.

With the extensive-form modelling, we ask can the penalties at various stages of the violence chain be raised to deter violence as in Becker (1968)? Should the State facilitate easier reporting by the victims, say by appointing more female officers at the front end of taking complaints about violence or even in subsequent investigation (Miller and Segal, 2019)? Predictions of how these prescriptions work under the threat of violence escalation are by no means obvious.

The aforementioned measures are typically viewed as *policy substitutes* (Becker, 1968). But the first measure (of raising penalties) may lessen the incremental penalty for more violence and thus encourage the perpetrator to escalate violence in response. The second measure forces conflicts out in the open as victims find it easier to report incidents which,

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<sup>1</sup>Karlekar (1998) confirms a similar view in the Indian context. For an extensive account of gender-based violence, gender inequality in decision making in the household and related issues in developing economies, and the role of cultural norms, see Jayachandran (2015).

<sup>2</sup>Domestic disharmony can be solely between the two parties or triggered by other members and events not modelled explicitly, for example, in-laws and siblings, infidelity, etc.

in turn, makes the perpetrators more desperate to escalate violence. In short, attempts to correct one wrong may open the door for greater conflicts. The two measures that might be helpful in deterring the primary violence could end up contributing to its escalation.

This paper is about the tradeoff between deterrence and escalation in a continuing relationship between a male (perpetrator/husband) and a female (victim/wife). To model varying degrees of violence and differing penalties, we consider a three-level violence chain – a primary violence ( $h_1$ ) followed by further two stages of escalation (accumulated harms  $h_2$  and  $h_3$ ).<sup>3</sup> Each escalation is triggered as the victim threatens to report the atrocities committed so far. Otherwise escalation has no direct value to the perpetrator.

Setting penalties in our model requires more careful consideration than in one-shot models – the possibility of escalation will affect the incentives for victims reporting that, in turn, will influence the incentives for the primary violence. While escalation can lead to severe physical harm, the primary violence can be over a sustained period of time damaging the victim psychologically if not in less obvious physical torture.

The empirical literature on DV does not consider the problem of escalation and the associated hurdles of reporting simply because it requires panel or recall data tracking partner actions over time which is difficult to collect. Our analysis is the first theoretical study on the *dynamics* of DV that, we hope, would shed some light on the policy side.<sup>4</sup>

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<sup>3</sup>In California, a charge of DV is either for “Corporal injury to a spouse, which is tried as a felony,” or “Spousal battery, which is tried as a misdemeanor”. Penalties for felony domestic violence governed by California domestic abuse Penal code 273.5 state,

*“If you are charged with a felony, you will serve up to 4 years in state prison. The sentence could be longer depending on the seriousness of injuries you inflicted. Additionally, you will have to undergo a mandatory domestic violence class.*

*“If you have committed other acts of domestic violence, sexual assault, assault with a weapon or attempted assault within the last 7 years, you may receive a longer sentence of up to 5 years and pay fines up to \$10,000. Other factors in your criminal history may affect sentencing as well.*

*“Severe bodily injury on the victim could also result in the addition of consecutive prison sentences.”*

Penalties for misdemeanor domestic violence state,

*“If charged with domestic battery, you will be required to pay a fine of \$2000 and/or serve a prison sentence in county jail for up to 1 year.*

*“An attorney could get charges for Spousal battery reduced to lower or no prison time and fines. If the court agrees to no jail time, it might grant a probationary sentence, which might also include counselling.”*

Source: <https://www.californiacriminaldefender.com/felony-domestic-violence.html>. Punishments for domestic violence in most countries differ according to its severity; for legal provisions in the United States, United Kingdom and India see the discussion in the Appendix.

<sup>4</sup>There remains a parallel and important question of repeat violence motivated by dowry at the time of marriage and post-marriage continual monetary extortion by the groom from the bride’s family that we do not analyze. Calvi and Keskar (2021) carry out an empirical analysis of the impact of an anti-dowry law in India, Dowry Prohibition Act between 1985 and 1986, and its effect on DV in an incomplete information bargaining game where husbands learn the respective match qualities only after their arranged marriages. The bargaining model is ‘static’ in nature in the sense that the violence

We start by presenting a complete characterization of the violence and reporting equilibrium for exogenous penalties at different levels of violence by varying the victim's cost of reporting over four different ranges, from very high, high, moderate and then to low costs (Proposition 1). As reporting costs decline, more victims come out with reporting that in turn gives rise to violence escalation by the perpetrators. Except for the very high cost range, there is an equilibrium (under appropriate conditions) in which the violence is escalated all the way to the maximum level (level 3) with positive probabilities. Reporting occurs with victim compensation in mind and knowing this the perpetrator cannot resist escalation. That is, the victim cannot commit not to report, triggering escalation.<sup>5</sup> Reporting and escalation are thus *strategic complements*.<sup>6</sup>

The first enforcement we consider is the *lowering of costs of victims reporting*. This policy has been recently analyzed by Miller and Segal (2019) but without the consideration of violence escalation.<sup>7</sup> What we find is that while facilitating reporting indeed lowers the incidence of the primary harm,  $h_1$ , it also initiates violence escalation by the undeterred perpetrators (Proposition 2). The escalation is triggered by the prospect of reporting: the victim now sees the expected future gain from reporting, along with the accompanying violence escalation risk, rather than silently tolerating the torture, exceeds the cost of conflict. If for each extra deterrence resulting from increased conflict there remains multiple undeterred cases, the additional social costs of violence escalation can be significant to which the enforcement authority cannot turn a blind eye. Apart from the additional harm caused to victims due to violence escalation, inclusion of the additional costs of investigating and prosecuting perpetrators, along with the costs of incarceration, further increases the societal costs of violence escalation.

Another approach is to increase punishments. If the punishment for the initial harm ( $f_1$ ) is increased, the tension between deterrence and escalation resurfaces. Say,  $f_1$  is increased to  $f'_1$  while keeping the other penalties  $f_2$  and  $f_3$ , corresponding to harms  $h_2$  and  $h_3$ , the same. Then for a perpetrator who still sees violence  $h_1$  to be profitable, his marginal gain from violence escalation (to prevent reporting of  $h_1$ ) could be worth the risk of the incremental penalty,  $f_2 - f'_1$ , which is lower than  $f_2 - f_1$ . (This is only a rough intuition because the perpetrator will have to think about future reporting and the possibility of having to scale up the violence to  $h_3$  and the risks of the high penalty  $f_3$  as

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committed by the husband is a one-off event mainly to signal his dissatisfaction in the marriage to renegotiate a better share of the material gains from marriage.

<sup>5</sup>Baliga and Ely (2016) pointed out the difficulty of using torture on a suspected terrorist to induce revelation of information about a pending attack due to the interrogating officer's inability to commit *not to escalate* punishment after getting some revelation that need not be full revelation.

<sup>6</sup>It is much like in Baliga and Sjoström (2004), where countries accumulate arms in anticipation of growing conflicts. See also Bac (2010).

<sup>7</sup>To be precise, the authors do consider violence escalation but one that is very different from the escalation triggered by reporting. Instead, they look at retaliation by males (or defendants) in case the court dissolve trials finding no evidence to back up victim complaints.

well.) This encourages undeterred perpetrators to scale up violence. Of course, due to the increase in  $f_1$ , some perpetrators would drop out from inflicting the primary violence. This tradeoff is summarized in Proposition 3.

In contrast, raising punishments  $f_2$  or  $f_3$  sufficiently predictably curb violence escalation but will have little to no deterrence effect on the primary violence. The resulting de-escalation also comes with the victims *not* reporting their initial harms. Victims escape further harms but the downside is that the perpetrators go unpunished. These results appear in Propositions 4 and 5. In summary, a policy of *zero tolerance* to domestic violence by raising  $f_2$  and  $f_3$  is effectively a policy of *damage limitation using iron hands* when most incidents of the primary harm have to be kept under the carpet as a result. On the other hand, implementing zero tolerance by increasing  $f_1$  substantially is not a non-controversial solution either due to the inevitable escalation.

Propositions 4 and 5 involve more subtleties. The related observations should also guide policy makers interested in limiting high levels of violence, in our analysis  $h_2$  and  $h_3$ . In Proposition 4, we show that by eliminating escalation from an intermediate to the highest level of violence by increasing  $f_3$  will ensure that there is *no* escalation beyond the primary incident ( $h_1$ ), and victims whose cost of reporting are not too high will successfully report the primary incident. Deterring escalation of violence from  $h_2$  to  $h_3$  removes the incentive to escalate violence from  $h_1$  to  $h_2$  – the perpetrator and the victim know that the former cannot credibly commit to escalating violence to the highest level; hence, there is no use of escalating to the intermediate level. The elimination of this type of escalation can also be achieved by making punishment for the *intermediate* level of violence,  $f_2$ , sufficiently high (Proposition 5).

To summarize, promoting victims reporting, with its prediction that it mitigates primary violence  $h_1$ , might be seen as a positive armoury in violence prevention. This policy initiative alone can be useful in a standard one-shot violence (Miller and Segal, 2019), but in the extended dynamic model the marginal benefit of deterrence has to be set against the additional harms due to escalation. While we do not engage in an explicit normative (or welfare-based) cost-benefit analysis, our analysis still offers the following guidance. First of all, deterrence through improved monitoring (i.e., easing victims reporting), rather than increasing penalty  $f_1$  for the primary harm  $h_1$ , should be a better approach for two reasons: (i) accelerated penalty contravenes the doctrine of ‘punishment fitting the crime’ which is a basic principle in criminal justice (e.g., Andreoni, 1991), (ii) encouraging victims reporting can initiate a change in social norms from acceptability of wife-beating to greater awareness of women’s rights in the society and having the courage to say ‘no to domestic violence’. Second, while promoting victims reporting is an aggregative measure, it is likely to have differential impacts for different groups based on the victims’ education, employment, social standing, etc. If easing of reporting helps to shift a moderate

(reporting) cost group to the lower cost range, then such a policy will have the benefit of deterrence without worsening escalations and combined with greater punishments for more violent abuses will be the ideal deterrence/de-escalation policies.<sup>8</sup> See more on the implications of monitoring vs. punishment following Corollaries 1 and 2.

■ **Literature review.** There is an early literature on deterrence of repeat offenders; see Rubinstein (1980), Polinsky and Rubinfeld (1991) and the follow-up works, e.g., Polinsky and Shavell (1998), Emons (2007). The focus of this literature is whether repeat offense should be penalized more heavily or less than first-time offense with the perpetrator targeting different victims. In contrast, we focus on the strategic interaction of reporting and escalation between the same perpetrator–victim pairs over time.

Victims reporting is an important issue especially in the context of DV because personal ties between perpetrators and victims naturally call for compromises. And compromises do not help deterrence. Two contributions have studied victims reporting. Aizer and Dal Bó (2009) analyzed the issue in a one-shot violence model. The authors identify what prevents victims of DV from reporting: self-aware victims with time-inconsistent preferences know that eventually they would drop charges and so they might as well not report. In contrast to Aizer and Dal Bó’s one-shot model, in our multi-stage model victims have time-consistent preferences. The possibility of violence escalation, an aspect not considered by Aizer and Dal Bó, may also prevent victims from reporting.

Miller and Segal (2019) study the effect of integration of female police officers in the United States between late 1970s and early 1990s on the reporting of DV. The authors observe that the integration improved reporting significantly. They further observe (see page 2222, 2nd para): “Increased reporting of DV and more effective police handling of reported cases should in turn reduce DV incidence and escalation and, ultimately, lower intimate partner homicide (IPH) rates. Crime incidence will decrease if potential offenders are deterred by their greater chances of incurring police involvement and criminal penalties or if direct police intervention in households with abuse changes the behaviour of offenders or victims.” Our analysis suggests that increased reporting is likely to come at a cost of increased escalation in conflict and the resultant bigger harms to many female partners. Accounting for this cost needs a proper evaluation empirically to assess the full impact of reporting-friendly policy reforms.<sup>9</sup>

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<sup>8</sup>Recently, Singapore carried out a comprehensive assessment of how to tackle DV, summarized in a 62 page document, under the joint initiative of members from social service agencies, non-governmental organisations, the Courts, hospitals and Government agencies. The unit set up in 2020, called the ‘Taskforce on Family Violence’, places a great deal of emphasis, among others, on facilitating reporting (see Recommendations 10B and 10C) together with suitable increase in penalties (Recommendations 11A) and more power to Courts (Recommendations 11B and 11C). Source: <https://www.mha.gov.sg/docs/default-source/default-document-library/family-violence-taskforce-report.pdf>.

<sup>9</sup>In Miller and Segal, the male partner can escalate violence after the case settled in favor of the alleged perpetrator. So as such there is no escalation dynamic to be comparable with ours.

On violence escalation, Bloch and Rao (2002) explain in the Indian context how husbands may escalate violence and abuse on the wives to repeatedly extract monetary transfers from their parents to continue the marriage. Indian data shows that women from richer families are more likely to be abused for extraction of higher transfers. In our model, partners from richer backgrounds are not only more likely to face violence as in Bloch and Rao, they are also more likely to face escalations due to more frequent reporting for lower costs of reporting (better support system).

Focusing on the costs of victims, Brassiolo (2016) considers a bargaining model of spousal conflict – the husband uses violence to increase his surplus within the marriage when outside options are private information. Easing divorce laws lowers the wife’s cost of separation and increases her net outside option, thereby improving her bargaining position.<sup>10,11</sup> Spanish data verifies that such changes in divorce laws reduce domestic abuse. Easier procedure makes the threat of leaving more credible and deters abuse. We analyze not only the role of lower costs for victims, but also the role of punishment at different stages in deterring abuse and its escalation. The possibility of escalation of violence can prevent successful reporting (probabilistically). Hence, reduction of victims’ separation costs alone may not reduce abuse, *ex post*. Our analysis, thus, calls for more empirical works testing potentially different implications of reduced separation costs for primary violence and its escalation.

There are a number of empirical papers, including ones based on randomized studies, looking at the relationship between the effect of mandatory arrest warrant laws and intimate partner violence.<sup>12</sup> The findings are inconclusive with Sherman and Berk (1984) pointing out a deterrence effect, Berk et al. (1992), Pate and Hamilton (1992), and Sherman et al. (1992) all indicating an increase in violence (sometimes in specific subgroups of population studied), whereas Chin and Cunningham (2019) observe that discretionary arrest statues decreased violence. Zelcer (2014), on the other hand, found that mandatory arrest laws can lead to a decrease in reporting by the victims.

Finally, a connection can be made to why sometimes non-Beckerian type less-than-maximal penalty could be optimal in other applications. For example, Heyes (1996) observed that in accidental release of environmental pollutants, “how the violator acts *after* the violation matters since a prompt response (a ‘clean-up’) could truncate the flow

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<sup>10</sup>Lowering of separation cost can be lumped into our lowering ‘victims cost of reporting,’ broadly defined. Sharma (2011), Ragavan et al. (2015), and Pachauri (2018) document psychological and social costs of partner violence and separation on women.

<sup>11</sup>Pollak (2004) looks at an intergenerational model of domestic violence in which the background of an individual determines the man’s propensity of being abusive and the woman’s likelihood of tolerating abuse. In Tauchen et al. (1991), women with higher incomes face a lower risk of violence. In Farmer and Tiefenthaler (1996), the use of shelters is a signal of a woman’s tolerance towards violence.

<sup>12</sup>Mandatory warrants, as opposed to discretionary warrants, mean in our model greater expected compensation for the victims, for given reporting costs. Effectively, this should encourage victims reporting unless the victims do not want arrests of their abusive partners.

of damage. This means that the regulator must have regard for the adequacy of *post-* as well as *pre-*accident incentives.” This is similar to our enforcement dilemma, deterrence vs. escalation tradeoff, should the penalty for the primary harm  $h_1$  be hiked up.

In the next section, we present the reporting–escalation game and characterize the equilibrium. Our main issues of interest, the comparative static effects of reduction in victims’ cost of reporting and increases in punishments for different levels of violence, are analyzed in Section 3, followed by conclusions. An Appendix contains the proofs of Propositions 3–5.

## 2 Model

### 2.1 The game form

A mass of partners are locked in potential DV, or simply, violence. In each pair, player 1 (male) is the likely perpetrator and player 2 (female) is the potential victim.

Perpetrators start by inflicting harm  $h_1$  in their initial act. Then they can escalate the harm to  $h_2$  and  $h_3$ :

**Assumption 1 (Escalating harms)**  $0 < h_1 < h_2 < h_3$ .

In fact,  $h_{i+1}$  subsumes  $h_i$ ,  $i = 1, 2$ , so that the law enforcement authorities can infer the level of accumulated violence without tracing the entire history. We treat  $h_2$  to be non-life-threatening physical/psychological damage as would happen from battering and beating up, and  $h_3$  more extremes such as permanent bodily harm, e.g., losing one’s eye, burns, causing the death of a fetus of a pregnant woman, attempt at poisoning or strangulation, among others.<sup>13</sup> Establishing  $h_3$  might be easier in the court of law than  $h_2$  or  $h_1$ .

Denote by  $v$  the (indirect) utility that a perpetrator can expect to obtain from the primary violence. We assume  $v \in (0, \bar{v}]$ , which depends on the perpetrator’s (or husband’s) dissatisfaction in the marriage ( $\theta \in \{0, 1\}$ , where 0 means dissatisfaction and 1 means satisfaction), tendency for violence ( $\tilde{v}$ ), perpetrator’s wealth ( $w_p$ ), and the wealth of the victim’s (wife’s) family ( $w_v$ ). Following Bloch and Rao (2002), we assume only  $\theta = 0$  types, i.e. dissatisfied husbands, will inflict violence and this type is common knowledge after the couples have spent some time in the marriage (or even at an early stage after marriage). Effectively we are considering a *complete information* variant of Bloch and Rao’s perpetrator. Also, the utility  $v$  is in net value terms, which is the dowry transfer

<sup>13</sup>World Health Organization (WHO, 2013) describes different levels of violence: “being slapped or having something thrown at you that could hurt you, being pushed or shoved”; “choked or burnt on purpose, and/or being threatened or having a weapon used”; “female homicide committed by partner”. These usually occur in sequence – it is unlikely that one causes grave harm to his partner without any previous incident having occurred.

from the wife's family (in the near short term when the marriage is seeing turbulence) net of any psychic cost to the perpetrator of committing the violence/atrocity; the psychic cost is as in Bloch and Rao and will be different from any penalty that the enforcement authority may inflict on the perpetrator. Alternatively,  $v$  can denote gratification utility where violence is seen as a way to control wife's behavior by the husband (Tauchen et al., 1991).

To capture the above utility representation we write  $v = \psi_P(\tilde{v}, w_P, w_V)$ , with  $\theta = 0$  suppressed. It is natural to impose the following sign restrictions:  $\frac{\partial v}{\partial w_P} \leq 0$ ,  $\frac{\partial v}{\partial w_V} \geq 0$  and  $\frac{\partial v}{\partial \tilde{v}} \geq 0$ ; that is, perpetrators with higher wealth have less to gain (from transfers from the victim) but expect higher transfers from wealthy in-laws, and intrinsically violent perpetrators are likely to gain higher utility from inflicting violence, e.g., due to less psychic costs or even positive satisfaction from wife beating.

The primary violence,  $h_1$ , spans the entire phase of dissatisfaction in the marriage, extortion of dowry money using threats and torture, etc. We condense it into a single stage (stage 1 in Fig. 1) with the perpetrator having already extracted utility  $v$ . At this point the victim may choose not to tolerate the ill-treatment received so far and attempt to report it to the police, in anticipation of which an escalation chain may be triggered which we analyze below.

For the focus of this paper, we assume that the perpetrators commit subsequent offenses – levels 2 and 3 – *only* to prevent the victim from reporting earlier offenses. We do not consider escalation as compulsive behavior or carefully orchestrated tactic to extract more and more dowry money.<sup>14</sup> Rather, escalation is initiated principally to lower the chance of reporting and prosecution.

The perpetrator, if convicted, faces punishment  $f_i$  corresponding to the  $i^{\text{th}}$  level of violence,  $i = 1, 2, 3$ , with the following restriction:

**Assumption 2 (Penalty fitting crime I)**  $f_1 \leq f_2 \leq f_3 \leq \bar{f}$ , where  $\bar{f}$  is the maximum possible punishment.

It is impossible to completely deter violence, i.e.,  $\bar{f} < \bar{v}$ .<sup>15</sup>

Further, on successful conviction, a proportion  $\beta_i$  of the perpetrator's wealth,  $w_P$ , is transferred to the victim, with  $\beta_i$  satisfying the following assumption:

**Assumption 3 (Penalty fitting crime II)**  $0 \leq \beta_1 < \beta_2 < \beta_3 \leq 1$ .

The transfer of wealth can be considered a compensation to the victim following divorce,

<sup>14</sup>This alternative approach, while important, would be no different from other existing models of repeat extortions, e.g., Baliga and Ely (2016).

<sup>15</sup>Even if  $\bar{f}$  were sufficiently high such that  $\bar{v} < \bar{f}$ , there would not necessarily be complete deterrence since the expected punishment may be lower than  $\bar{v}$  due to less than certain chance of being detected or successfully prosecuted, which will be expanded on later.

say. Hence, the total punishment for the  $i^{\text{th}}$  level of violence is  $f_i + \beta_i w_p$ , a monetary equivalent of nonmonetary as well as pecuniary penalties whichever is applicable.

The inflicting of harms and reporting proceed as in Fig. 1.

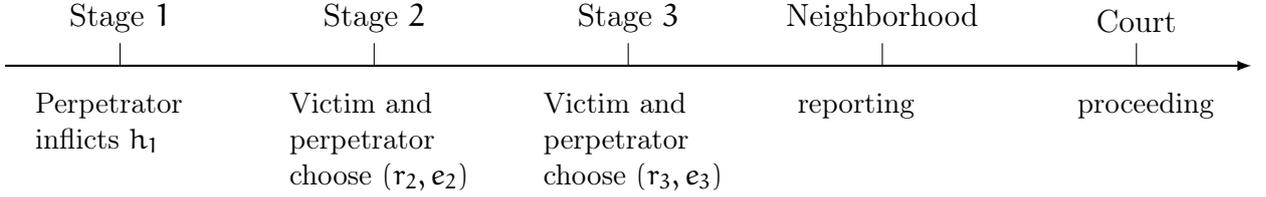


Figure 1: Time line

After harm  $h_1$  has been inflicted in stage 1, in stage 2 the victim chooses between two alternatives,  $r_2 \in \{0, 1\}$  – try to report  $h_1$  to the authorities ( $r_2 = 1$ ) or not do anything ( $r_2 = 0$ ). Anticipating such reporting, the perpetrator chooses whether to escalate to harm  $h_2$  or not,  $e_2 \in \{0, 1\}$ , to foil reporting ( $e_2 = 1$  means escalation). Thus, in stage 2, the victim and the perpetrator move *simultaneously*. The probability of the victim successfully reporting is  $\Phi_2(r_2, e_2)$  with  $0 = \Phi_2(r_2 = 0, e_2) < \Phi_2(r_2 = 1, e_2 = 1) \equiv \phi_2 < \Phi_2(r_2 = 1, e_2 = 0) = 1$ .

At this point, more explanation is needed about exactly what a successful reporting  $r_2 = 1$  produces. If  $e_2 = 0$ , then  $r_2 = 1$  yields a preliminary evidence of  $h_1$ . If  $e_2 = 1$  and reporting succeeds then the resulting evidence is that of  $h_2$ . However, if reporting fails despite  $r_2 = 1$ , which can happen only when the perpetrator escalates violence to  $h_2$ , the victim gets another chance to report in stage 3: here the victim and the perpetrator play another *simultaneous* move game of reporting and escalation by choosing  $r_3 \in \{0, 1\}$  and  $e_3 \in \{0, 1\}$ . The probability of success of the reporting attempt is denoted by  $\Phi_3(r_3, e_3)$  with  $0 = \Phi_3(r_3 = 0, e_3) < \Phi_3(r_3 = 1, e_3 = 1) \equiv \phi_3 < \Phi_3(r_3 = 1, e_3 = 0) = 1$ .

Stage 3 is the final round of actions by the victim-perpetrator pair; if reporting at this stage is successful, it uncovers  $h_3$  if  $e_3 = 1$  or  $h_2$  if  $e_3 = 0$ .

It is logical to impose the following restriction:

**Assumption 4 (Escalating resistance)**  $0 \leq \phi_3 < \phi_2 < 1$ .

Thus, although  $e_3 = e_2 = 1$ , as pointed out earlier, the violence in the third stage is of a higher order than in stage 2, with premeditated execution by force to prevent all accumulated evidence of violence being successfully reported. Hence  $\phi_3 < \phi_2$ .

Besides victim reporting, it is possible that acts of extreme violence ( $h_3$ ) may eventually leak out through neighborhood reporting with an exogenous probability  $\mu \in [0, 1]$ . This possibility works as an implicit threat to the perpetrator even when he might be successful in silencing the victim.  $\mu$  depends on social norms – if ‘wife beating’ is accept-

able (as shown from the National Family Health Survey, 2005–2006, in India),  $\mu$  is likely to be low.

If reported or detected, the matter is taken up in courts; a verdict is in favor of the victim with probability  $\eta_i$ .<sup>16</sup> This parameter captures the *enforcement mechanism* within the justice system or how high the burden of proof is for the victim; high  $\eta$  implies efficient investigation and court procedures.<sup>17</sup> It is plausible to assume:  $0 \leq \eta_1 \leq \eta_2 \leq \eta_3 \leq 1$ . Hence, the *expected punishment*, when successfully reported for the violence  $i = 1, 2, 3$ , is

$$\hat{f}_i \equiv \eta_i(f_i + \beta_i w_p). \quad (1)$$

In reporting any incidence of violence, the victim incurs a *cost*,  $c > 0$ . This includes the psychological cost of being interrogated by the police officer and the burden of documentation necessary for the complaint. Naturally the cost will vary depending on the victim’s social condition such as friends and family support system, education, upbringing, prevailing norms, etc. Not all victims feel neutral to the type of interrogation faced. The enforcement department can partly lower the reporting cost by appointing more female officers (Miller and Segal, 2019).

Following successful court proceedings, the victim receives a compensation in proportion of the perpetrator’s wealth,  $\beta_i w_p$ .<sup>18</sup> Hence, the *expected compensation*, i.e., the expected transfer from the perpetrator, for the  $i^{\text{th}}$  level of violence is:

$$\hat{m}_i \equiv \eta_i \beta_i w_p, \quad i = 1, 2, 3. \quad (2)$$

Given our earlier ordering of  $\eta_i$ ’s and  $\beta_i$ ’s, we have:  $\hat{m}_1 < \hat{m}_2 < \hat{m}_3$ .

## 2.2 Solving the game

We will use backward induction to solve the game, and the equilibrium solution concept is *subgame perfect equilibrium* (or simply, equilibrium). To ensure sequential rationality, we need to identify Nash equilibria for each continuation game. While at each stage one or both players move, critical to the progression of the game through the subsequent stages is whether or not the perpetrator inflicts the harm relevant at the time of his move. Fig. 2 displays this feature: an inaction indicated by the ‘no’ move terminates the game, while ‘yes’ (i.e., escalate) move means the perpetrator and the victim becomes engaged in the next round’s simultaneous actions  $\{\text{escalate, no}\} \times \{\text{report, not report}\}$  game as earlier indicated in Fig. 1.

<sup>16</sup>The possibility that there is no investigation or investigation does not lead to prosecution is subsumed in the probability,  $1 - \eta_i$ , that the verdict may not be in favor of the victim.

<sup>17</sup>For instance, in India in 2013, 30.9% of reports of ‘cruelty by husband or his relatives’ were pending investigation, while 88.5% of such cases in courts were pending trial (INCRB, 2013) implying a low  $\eta$ .

<sup>18</sup>In the case of a divorce husband pays a certain percentage of his wealth or regular income as alimony.

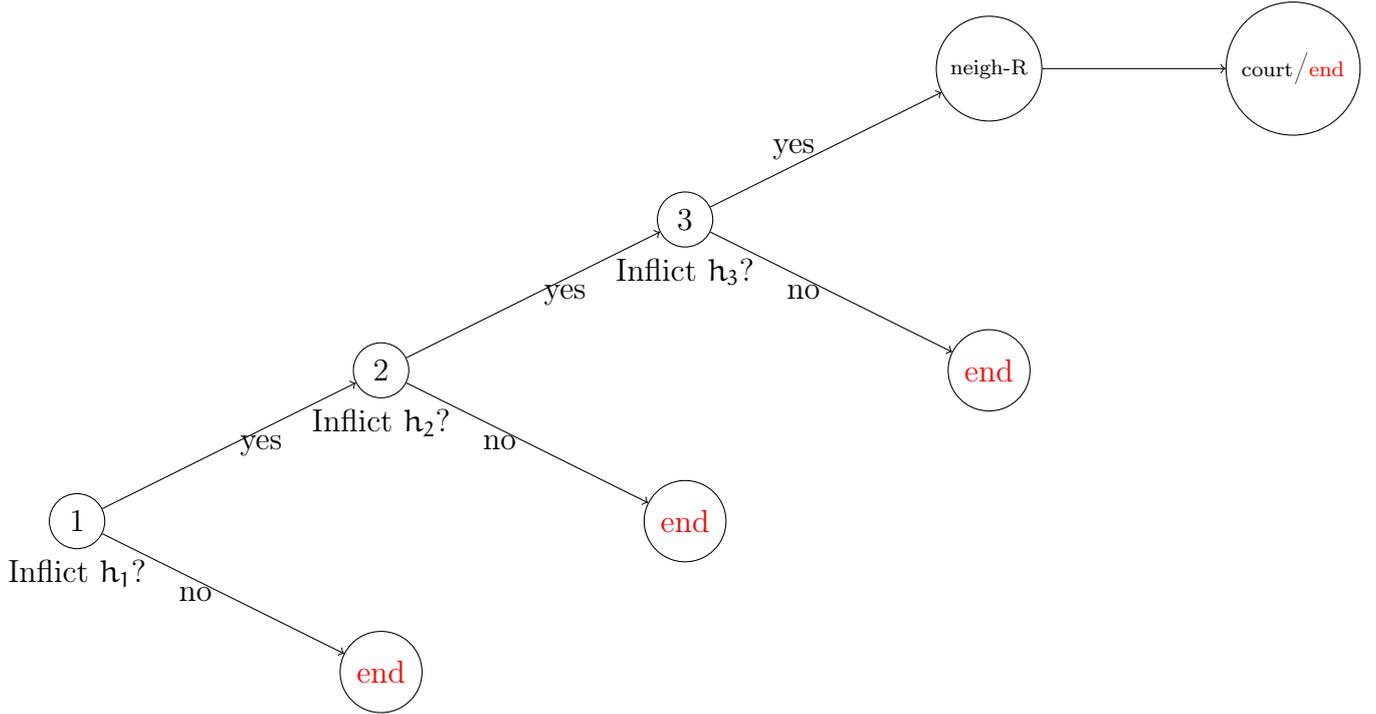


Figure 2: The nodes 1, 2 and 3 denote the stages. The game proceeds from stage  $i$  to  $i + 1$  provided the perpetrator inflicts  $h_i$ . The nodes, **end**, are terminal nodes. At stage 3, following escalation, an additional non-strategic neighborhood reporting is added, followed by court proceeding and the game ends.

### 2.2.1 The stage games

In *stage 3*, for any perpetrator-victim pair, reporting and escalation decisions can be derived by solving the following game, with the first and second terms in each cell representing the victim's and perpetrator's expected marginal payoffs respectively (Table 1):

Table 1: Stage 3 payoffs

	$e_3 = 0$	$e_3 = 1$
$r_3 = 0$	$0, 0$	$-(h_3 - h_2) + \mu(\hat{m}_3 - c), -\mu\hat{f}_3$
$r_3 = 1$	$\hat{m}_2 - c, -\hat{f}_2$	$-(h_3 - h_2) + \{\phi_3 + (1 - \phi_3)\mu\}(\hat{m}_3 - c), -\{\phi_3 + (1 - \phi_3)\mu\}\hat{f}_3$

We want to focus on equilibria with escalation to the highest level being a possibility. So in stage 3, for  $(r_3, e_3) = (1, 1)$  to be a Nash equilibrium (NE), we must have

$$\hat{f}_2 > \{\phi_3 + (1 - \phi_3)\mu\}\hat{f}_3$$

$$\text{i.e., } \eta_2(f_2 + \beta_2 w_P) > \eta_3[\phi_3 + (1 - \phi_3)\mu](f_3 + \beta_3 w_P), \quad (3)$$

$$\text{and } \hat{m}_3 - c \geq 0. \quad (4)$$

Condition (3) requires that the expected punishment for being reported for  $h_2$  exceeds

the expected punishment for  $h_3$ . A low  $\phi_3$  will keep the right-hand side of (3) small, if  $\mu$  is not too high. In the rest of the paper, we impose the following assumption:<sup>19</sup>

**Assumption 5** *Conditions (3) and (4) hold so that  $(r_3, e_3) = (1, 1)$  is an NE in stage 3.*

Fixing  $(r_3, e_3) = (1, 1)$  equilibrium in stage 3, the subgame for stage 2 onwards can be reduced as in Table 2. The explanations for the marginal payoffs follow the Table.

Table 2: Stage 2 onwards

	$e_2 = 0$	$e_2 = 1$
$r_2 = 0$	0, 0	$-(h_3 - h_1) + \{\phi_3 + (1 - \phi_3)\mu\}(\hat{m}_3 - c), -\{\phi_3 + (1 - \phi_3)\mu\}\hat{f}_3$
$r_2 = 1$	$\hat{m}_1 - c, -\hat{f}_1$	$-(h_2 - h_1) + \phi_2(\hat{m}_2 - c) + (1 - \phi_2)[-(h_3 - h_2) + \{\phi_3 + (1 - \phi_3)\mu\}(\hat{m}_3 - c)],$ $-\phi_2\hat{f}_2 - (1 - \phi_2)\{\phi_3 + (1 - \phi_3)\mu\}\hat{f}_3$

Consider  $(r_2 = 0, e_2 = 1)$ . The victim's net payoff in this case is  $-(h_2 - h_1) +$  continuation payoff in stage 3, where the first term is the marginal harm due to escalation from  $h_1$  to  $h_2$ . Writing the continuation payoff from stage 3, we have the net expected payoff for the victim as:  $-(h_2 - h_1) - (h_3 - h_2) + [\phi_3 + (1 - \phi_3)\mu](\hat{m}_3 - c) = -(h_3 - h_1) + \{\phi_3 + (1 - \phi_3)\mu\}(\hat{m}_3 - c)$ . Taking into account the continuation payoff, the perpetrator's expected marginal payoff can be written as:  $-\{\phi_3 + (1 - \phi_3)\mu\}\hat{f}_3$ .

Now, consider  $(r_2 = 1, e_2 = 1)$ . The victim's expected marginal payoff is:  $[-(h_2 - h_1) + \phi_2(\hat{m}_2 - c) + (1 - \phi_2)[\text{continuation payoff}]]$ , where the first term is the marginal harm due to escalation, the second term is the expected payoff when reporting attempt succeeds and  $(1 - \phi_2)[\dots]$  is the expected payoff when reporting attempt at this stage is unsuccessful. Given the continuation payoff in stage 3, the expected marginal payoff to the victim can be written as:  $-(h_2 - h_1) + \phi_2(\hat{m}_2 - c) + (1 - \phi_2)[-(h_3 - h_2) + \{\phi_3 + (1 - \phi_3)\mu\}(\hat{m}_3 - c)]$ . Similarly, the perpetrator's expected marginal payoff can be written as:  $-\phi_2\hat{f}_2 + (1 - \phi_2)[\text{continuation payoff}] = -\phi_2\hat{f}_2 - (1 - \phi_2)\{\phi_3 + (1 - \phi_3)\mu\}\hat{f}_3$ .

However, if in stage 3,  $(r_3, e_3) = (0, 0)$  is an NE then Table 2 is modified as follows:

Table 3: Stage 2 onwards

	$e_2 = 0$	$e_2 = 1$
$r_2 = 0$	0, 0	$-(h_2 - h_1), 0$
$r_2 = 1$	$\hat{m}_1 - c, -\hat{f}_1$	$-(h_2 - h_1) + \phi_2(\hat{m}_2 - c), -\phi_2\hat{f}_2$

In stage 1, the potential perpetrator decides on whether to inflict  $h_1$  or not after taking into account the game's development from there on both on- and off-the-equilibrium path.

<sup>19</sup>Escalation might not happen in some of the equilibria even under this assumption, however.

### 2.2.2 Equilibrium analysis

Below we look at equilibria depending on the different ranges of costs faced by the victims. The cost ranges are divided with compensation to the victim ( $\hat{\mathbf{m}}_i = \eta_i \beta_i \omega_P$ ) in mind and hence depend on the perpetrator's wealth.

The equilibria will fall broadly into three categories: (i) the perpetrator commits the initial harm, followed by reporting and escalation in the subsequent stages, (ii) after the initial harm the victim and the perpetrator choose a conciliatory path with no reporting or escalation, and (iii) the perpetrator will stay away from violence in fear of the escalation to follow. Sometimes there will be multiple equilibria.

■ **Low cost of conflict:**  $\mathbf{c} < \hat{\mathbf{m}}_1$ . The possible equilibria are presented in Table 4.

With  $(r_3, e_3) = (1, 1)$  as the continuation equilibrium in stage 3 and correspondingly the payoffs in stage 2 given by Table 2,  $(r_2 = 0, e_2 = 0)$  cannot be an NE since  $\mathbf{c} < \hat{\mathbf{m}}_2$ .<sup>20</sup>

A victim's best response to  $e_2 = 1$  is  $r_2 = 1$ , if

$$\begin{aligned} & -(\mathbf{h}_3 - \mathbf{h}_1) + \{\phi_3 + (1 - \phi_3)\mu\}(\hat{\mathbf{m}}_3 - \mathbf{c}) \\ & < -(\mathbf{h}_2 - \mathbf{h}_1) + \phi_2(\hat{\mathbf{m}}_2 - \mathbf{c}) + (1 - \phi_2)[-(\mathbf{h}_3 - \mathbf{h}_2) + \{\phi_3 + (1 - \phi_3)\mu\}(\hat{\mathbf{m}}_3 - \mathbf{c})] \\ \text{i.e., } \quad \mathbf{c} < \hat{\mathbf{m}}_3 + \frac{(\mathbf{h}_3 - \mathbf{h}_2) - (\hat{\mathbf{m}}_3 - \hat{\mathbf{m}}_2)}{1 - \{\phi_3 + (1 - \phi_3)\mu\}}. \end{aligned} \quad (5)$$

Note that  $\mathbf{c} < \hat{\mathbf{m}}_1 < \hat{\mathbf{m}}_2 < \hat{\mathbf{m}}_3$ . Further,  $(\mathbf{h}_3 - \mathbf{h}_2)$  is the marginal harm due to escalation to the highest level of violence, while  $(\hat{\mathbf{m}}_3 - \hat{\mathbf{m}}_2)$  is the marginal monetary punishment. If penalty ought to fit the crime, the marginal monetary punishment is likely to be less than the marginal harm due to the non-monetary component of  $(\eta_3 f_3 - \eta_2 f_2) \geq 0$ . So,  $\frac{(\mathbf{h}_3 - \mathbf{h}_2) - (\hat{\mathbf{m}}_3 - \hat{\mathbf{m}}_2)}{1 - \{\phi_3 + (1 - \phi_3)\mu\}} > 0$ , making RHS of (5) to exceed  $\hat{\mathbf{m}}_3$ .<sup>21</sup>

**Assumption 6** Condition (5) is assumed to hold for all  $\mathbf{c} < \hat{\mathbf{m}}_3$ , assuming in the continuation stage 3 game the NE played is  $(r_3, e_3) = (1, 1)$ .

The strategy  $e_2 = 1$  is perpetrator's best response to  $r_2 = 1$  is if:

$$\hat{f}_1 > \phi_2 \hat{f}_2 + (1 - \phi_2)\{\phi_3 + (1 - \phi_3)\mu\} \hat{f}_3 \equiv \bar{\gamma}. \quad (6)$$

That is, the expected punishment for being successfully reported for  $\mathbf{h}_1$  (when not escalating) is higher than the expected punishment for escalating violence to  $\mathbf{h}_2$ , given the continuation game. Thus, under Assumption 6 and condition (6) the equilibrium of this stage-2 subgame is  $(r_2, e_2) = (1, 1)$ , resulting in escalation to  $\mathbf{h}_2$ .

<sup>20</sup>This will be an important difference from the other three cost of conflict scenarios to follow. In each of those,  $(r_2 = 0, e_2 = 0)$  is always going to be an NE inducing violence  $\mathbf{h}_1$ .

<sup>21</sup>For low  $\omega_P$  (wealth) perpetrators, for punishment to have any impact non-monetary punishment must exceed the monetary punishment.

Given the equilibrium in the continuation game under conditions (3)–(6), in stage 1, a perpetrator would inflict  $h_1$  if his  $v$  is sufficiently high, i.e.,

$$v > \bar{\gamma}. \quad (7)$$

This guarantees the full escalation equilibrium reported in the first row of Table 4.

Next suppose condition (7) fails:  $v \leq \bar{\gamma}$ . This implies the perpetrator’s cost of inflicting  $h_1$  does not justify the benefit, resulting in the nonviolence equilibrium in the second row of Table 4.

Now suppose (6) does not hold so that  $\hat{f}_1 \leq \bar{\gamma}$ . Then the perpetrator’s best response to  $r_2 = 1$  is  $e_2 = 0$ , implying an alternate stage-2 subgame equilibrium:  $(r_2 = 1, e_2 = 0)$ , i.e., successful reporting and no escalation beyond  $h_1$ . Given this stage 2 equilibrium, perpetrators with  $v > \hat{f}_1$  inflict  $h_1$ ; however, if  $v \leq \hat{f}_1$  then perpetrators choose not to inflict  $h_1$ . These last equilibria are reported in the last two rows of Table 4. It should be clear that within the class of potential full escalation equilibria, the characterization in Table 4 is exclusive and exhaustive. ||

Table 4: Equilibria under low cost of conflict ( $c < \hat{m}_1$ )

Stage 3 equilibrium	Stage 2 equilibrium	Stage 1 decision	Type of conflict	Conditions <sup>a</sup>
$(r_3 = 1, e_3 = 1)$	$(r_2 = 1, e_2 = 1)$	inflict $h_1$	escalation	{(3), (5), (6) & (7)}
not reached	not reached	not inflict $h_1$	nonviolence	{(3), (5), (6); (7) fails, i.e., $v \leq \bar{\gamma}$ }
not reached	$(r_2 = 1, e_2 = 0)$	inflict $h_1$	report, no esc.	{(3), (5); (6) fails & $v > \hat{f}_1$ }
not reached	not reached	not inflict $h_1$	nonviolence	{(3), (5); (6) fails & $v \leq \hat{f}_1$ }

<sup>a</sup> Condition (4) is automatically satisfied.

**Intuition and empirical link.** Table 4 outlines only the equilibrium path. A bit more introspection should help understand how nonviolence is linked to credible threats of future reporting and violence escalation. Consider the second row for example. Here if the perpetrator were to deviate and inflict  $h_1$ , conditions (3), (5) and (6) guarantee that  $(r_2 = 1, e_2 = 1)$  and  $(r_3 = 1, e_3 = 1)$  will ensue due to the victim’s low cost of conflict. This then confronts the perpetrator with an expected cost of conflict  $\bar{\gamma}$  that outweighs the benefit  $v$ , deterring the perpetrator from starting the conflict. This also speaks to many real-life scenarios where money-minded grooms may resist the temptation of demanding dowry money after marriage from their bride’s family because they anticipate that the

cost of conflict for the spouse, from wealthy backgrounds, could be low. Of course the cost of conflict may well depend on norms where even for brides with wealthy parents social cost of divorce could be high. Empirically, how stability of marriage and lack of dowry extraction is linked to brides' parental wealth should be an interesting study: money or wealth is both a temptation for, and a threat against, starting a conflict. While escalation data is difficult to track, data on stable marriages that can serve as a proxy for the discipline coming from the potential victims' low cost of conflict should not be difficult to gather. Even survey data can be useful to study the relationship between marriage stability and brides' parental wealth. ||

Table 5: Equilibria under moderate cost of conflict ( $\hat{m}_1 < c < \hat{m}_2$ )

Stage 3 equilibrium	Stage 2 equilibrium	Stage 1 decision	Type of conflict	Conditions <sup>a</sup>
$(r_3 = 1, e_3 = 1)$	$(r_2 = 1, e_2 = 1)$	inflict $h_1$	escalation	$\{(3), (5), (6) \text{ \& } (7)\}$
not reached	$(r_2 = 0, e_2 = 0)$	inflict $h_1$	no escalation <sup>b</sup>	$\{(3) \text{ \& } v > 0\}$

<sup>a</sup> Condition (4) is automatically satisfied.

<sup>b</sup> If (3), (5) and (6) hold but  $v \leq \bar{\gamma}$  which would be a violation of (7), a potential perpetrator would opt for violence  $h_1$  and trigger this second equilibrium (that always exists) instead of switching to nonviolence, because the former generates a positive payoff while the latter yields zero payoff.

■ **Moderate cost of conflict:  $\hat{m}_1 < c < \hat{m}_2$ .** For ease of reference, the possible equilibria are presented in Table 5. But let us start by noting that Tables 1 and 2 are still the relevant payoffs for the corresponding subgames, stage 3 and the one starting at stage 2 respectively, the latter converted to its normal form.

If the game proceeds to stage 3,  $(r_3 = 1, e_3 = 1)$  is the unique equilibrium;  $r_3 = 1$  dominates  $r_3 = 0$ , and  $e_3 = 1$  is perpetrator's best response to  $r_3 = 1$ .

In stage 2, as can be seen from Table 2, the best response of the victim to  $e_2 = 0$  is  $r_2 = 0$  since  $\hat{m}_1 < c$ , and the perpetrator's best response to  $r_2 = 0$  is  $e_2 = 0$ . Thus,  $(r_2, e_2) = (0, 0)$  is an NE in the subgame starting in stage 2 where stage 3 will not be reached.<sup>22</sup> Also, it is straightforward to verify that if, in addition, conditions (5) and (6) are satisfied, there is another equilibrium in the stage 2 subgame:  $(r_2 = 1, e_2 = 1)$ .

Now consider stage 1. Depending on the coordination in stage 2, either the primary violence  $h_1$  that is triggered for all  $v > 0$  ends with no further conflict (equilibrium in the second row of Table 5), or the primary violence is perpetrated only by high-valuation perpetrators,  $v > \bar{\gamma}$ , that cascades into continued conflicts of reporting and escalation in

<sup>22</sup>This replaces the equilibrium  $(r_2, e_2) = (1, 0)$  in the low-cost conflict case studied above.

the remaining two stages (first row of Table 5). Thus, an increase in costs of conflict, from  $c < \hat{m}_1$  to  $\hat{m}_1 < c < \hat{m}_2$ , can potentially stifle escalation though escalation still remains a possibility.

Thus, the primary violence  $h_1$  will always be inflicted. As for escalation, either no escalation is the unique equilibrium (when  $0 < v \leq \bar{\gamma}$ ), or there are multiple equilibria with one involving full escalation and another without any escalation.  $\parallel$

**Comparison: moderate vs. low costs.** First, an observation:

*Because of  $(r_2 = 0, e_2 = 0)$  being always an equilibrium in the moderate cost case, the initial harm  $h_1$  is always inflicted whereas in the low cost case in Table 4 sometimes violence does not happen at all.*

This can be seen by comparing the second and fourth rows of Table 4 with the second row of Table 5. The intuition is that the increased cost of conflict restrains the victim from engaging in long-drawn conflict that, in turn, encourages the perpetrator to inflict one-off harm for the benefit  $v$ .

To probe a bit more, let us consider in the moderate cost case situations when no-escalation is a unique equilibrium. This happens if (6) holds but (7) fails, or (6) fails (i.e.,  $\hat{f}_1 \leq \bar{\gamma}$ ). As such these conditions do not directly involve the cost  $c$ . But suppose now that  $c$  is lowered from the moderate cost range to low cost range through some government initiatives. Then the equilibrium changes from the no-escalation unique equilibrium of Table 5 to either one of the two nonviolence equilibria or no-escalation equilibrium with reporting (last three rows of Table 4). To see why, return to Table 2 where, because now  $\hat{m}_1 - c > 0$ , the strategies  $(r_2 = 0, e_2 = 0)$  cannot be a Nash equilibrium anymore. Instead,  $(r_3, e_3) = (1, 1)$  is an NE in stage 3 (by condition (3)) and  $(r_2, e_2) = (1, 1)$  is an NE in stage 2 (because conditions (5) and (6) hold), and given these continuation equilibria, failure of (7) ensures that the perpetrator stays away from inflicting  $h_1$ . Note that, the lowering of the cost  $c$  and thus reviving  $(r_2, e_2) = (1, 1)$  and  $(r_3, e_3) = (1, 1)$  makes the threat of conflict escalation credible to sustain nonviolence, helping deterrence rather than fuelling escalation. On the other hand, suppose (6) fails (i.e.,  $\hat{f}_1 \leq \bar{\gamma}$ ). This case will have two possibilities:  $v > \hat{f}_1$  and  $v \leq \hat{f}_1$ ; in the first case  $h_1$  will be inflicted together with reporting but there won't be any escalation, whereas in the second case inflicting  $h_1$  is suboptimal for the perpetrator. So the change is for the better due to reporting (without escalation) and/or nonviolence.

■ **High cost of conflict:  $\hat{m}_2 < c < \hat{m}_3$ .** We will have Table 6 in the background. Start in stage 3. From Table 1, clearly  $(r_3, e_3) = (0, 0)$  is an NE. In addition,  $(r_3, e_3) = (1, 1)$  is an NE by Assumption 5.

Table 6: Equilibria under high cost of conflict ( $\hat{m}_2 < c < \hat{m}_3$ )

Stage 3 equilibrium	Stage 2 equilibrium	Stage 1 decision	Type of conflict	Conditions <sup>a</sup>
$\{(r_3 = 1, e_3 = 1), (r_3 = 0, e_3 = 0)\}$ , not reached	$(r_2 = 0, e_2 = 0)$ unique, fixing $(r_3 = 0, e_3 = 0)$	inflict $h_1$	no escalation	$\{(3), (5), (6) \& (7)\}$
$\{(r_3 = 1, e_3 = 1), (r_3 = 0, e_3 = 0)\}$ , not reached	$(r_2 = 0, e_2 = 0)$ fixing $(r_3 = 1, e_3 = 1)$	inflict $h_1$	no escalation	$\{(3), (5), (6) \& (7)\}$
$\{(r_3 = 1, e_3 = 1), (r_3 = 0, e_3 = 0)\}$ , reached	$(r_2 = 1, e_2 = 1)$ fixing $(r_3 = 1, e_3 = 1)$	inflict $h_1$	escalation	$\{(3), (5), (6) \& (7)\}$
not reached	$(r_2 = 0, e_2 = 0)$	inflict $h_1$	no escalation <sup>b,c</sup>	$\{(3) \& v > 0\}$

<sup>a</sup> Condition (4) is automatically satisfied.

<sup>b</sup> This equilibrium always exists under our Assumption 5.

<sup>c</sup> Here nonviolence does not arise for the same reason we provided in note [b] of Table 5.

Fixing the continuation equilibrium  $(r_3, e_3) = (0, 0)$ , the stage 2 game will be as in Table 3. It is easy to see that in stage 2  $r_2 = 0$  is a dominant strategy for the victim, so the perpetrator would choose  $e_2 = 0$  in response as there is no strict gain from deviating to  $e_2 = 1$ .<sup>23</sup> This implies in stage 1 all perpetrators with  $v > 0$  would inflict  $h_1$ . The resulting equilibrium is thus an initial conflict but with no further conflict down the chain.

On the other hand, if we fix stage 3 equilibrium at  $(r_3, e_3) = (1, 1)$ , stage 2 payoffs are the same as in Table 2. It is easy to see that  $(r_2, e_2) = (0, 0)$  is an NE. Fixing this equilibrium, in stage 1 perpetrators with  $v > 0$  would inflict  $h_1$ : the outcome is that of initial conflict with no further conflict down the chain. Also, it can be verified that under conditions (5) and (6), there is another stage 2 equilibrium:  $(r_2, e_2) = (1, 1)$ . Then in stage 1, perpetrators with  $v > \bar{v}$  (condition (7)) will choose to inflict  $h_1$ .

Finally, without imposing any of the restrictions (5), (6) or (7), above we have already shown that  $(r_2, e_2) = (0, 0)$  is an NE so that stage 3 will not be reached.

Thus, there will be multiple equilibria in the overall game – conflict with no escalation, and conflict with escalation.

To summarize, Table 6 shows that either no escalation is the unique equilibrium or there are multiple equilibria, one with escalation and another with no escalation. ||

<sup>23</sup>Of course  $(r_2 = 0, e_2 = 1)$  is another Nash equilibrium but we do not consider it to be a plausible description unless the perpetrator derives some extra ego utility from just inflicting violence.

**Comparison: high vs. moderate costs.** We start with an observation:

*Because  $(r_2 = 0, e_2 = 0)$  is an equilibrium in the high cost case, no escalation is possible even with conditions (3), (5), (6) & (7) being satisfied (the first two equilibria in Table 6). With lower cost, this no escalation equilibrium can be lost, moving to an escalation equilibrium (Table 5, first equilibrium).*

This is because the lower cost makes it more likely for the victim to report, to prevent which the perpetrator escalates violence.

Consider the (first two) no-escalation equilibria for high-cost victims. This requires that conditions (3), (5), (6) and (7) are satisfied; the equilibrium is predicated on  $(r_2, e_2) = (0, 0)$  as the second stage outcome. Suppose  $c$  is lowered from the high cost range to moderate cost range. Then the equilibrium changes from the no-escalation equilibrium to the escalation equilibrium (first row of Table 5).<sup>24</sup> Hence, some cases of no escalation will move to escalation as the costs are lowered from high to moderate. Hence, the change is for the worse as the possibility of escalation increases with lowered cost. Of course, accompanying escalation is the possibility of more, but not all, perpetrators being brought to justice.

■ **Very high cost of conflict:**  $\hat{m}_3 < c$ . Table 1 indicates that the victim's dominant strategy in stage 3 is  $r_3 = 0$ . Since  $-\mu\hat{f}_3 < 0$ , the unique NE in stage 3 is  $(r_3 = 0, e_3 = 0)$ . The relevant stage 2 subgame is same as Table 3, and the unique NE in stage 2 is  $(r_2 = 0, e_2 = 0)$ . Hence, in stage 1 perpetrators with  $v > 0$  choose to inflict  $h_1$  with no further reporting or conflict down the chain. ||

**Comparison: very high vs. high costs.** Note that:

*Lowering cost for very high cost victims brings about the possibility of escalating violence.*

To begin with, the unique equilibrium for very high cost victims is the no escalation equilibrium. This is regardless of conditions (5), (6) or (7) being satisfied. Suppose these conditions are satisfied. Lowering cost to move very high cost victims to the high cost range now brings the possibility of escalating violence (Table 6, third equilibrium). Hence, lower cost has the negative effect of increased possibility of escalation.

From the above analysis we will extract two main results. Our first main result stated below is on equilibrium characterization. We defer reporting the second result until the next section.

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<sup>24</sup>Of course, the possibility of the no-escalation equilibrium of Table 5 remains as it did in Table 6 regardless of whether conditions (5), (6) and (7) are satisfied or not.

**Proposition 1 (Violence escalation).** *Suppose Assumption 5 holds. Violence and reporting differ depending on the victim's cost (of reporting) classified above, as follows:*

- (a) *Very high cost victims: All perpetrators with  $v > 0$  inflict the initial harm  $h_1$ . However, there will be no reporting attempt by the victims nor violence escalation by the perpetrators.*
- (b) *High- and moderate-cost victims: The perpetrators always inflict the initial harm  $h_1$  on these victims (Tables 5 and 6). Further, there is always a no-escalation equilibrium, ruling out long-drawn conflicts. Additionally, under conditions (5), (6) and (7) that imply the perpetrators derive sufficiently high benefits  $v > \bar{\gamma} > 0$ , the initial harm leads to a full-escalation conflict.*
- (c) *Low-cost victims: Whenever the perpetrators inflict the initial harm  $h_1$ , the victims would always report. This leads to*

*either continuing conflict with the perpetrators attempting to inflict further violence to silence their victims and the victims fighting back by reporting it (i.e., full escalation) whenever the perpetrators derive sufficiently high benefits from the conflict,  $v$  exceeding  $\bar{\gamma}$ , as indicated in the first row of Table 4;*

*or the perpetrators abstain from further conflict beyond the initial harm for fear of continued victims reporting (third row of Table 4);*

*or the credible threat of reporting by the victim to continue the fights all the way up to stage 3 compels the perpetrators to choose nonviolence (second and fourth rows of Table 4).*

The Proposition highlights two very contrasting effects on violence as cost of reporting falls. The first is that there will be more reporting as one should expect. Increased reporting sometimes only adds to the conflict by converting one-off violence of  $h_1$  into a cascading chain of conflicts all the way up to  $h_3$  [*violence escalation*], or it may convert one-off violence of  $h_1$  into *nonviolence*. Social costs of escalation, the downside of any policy reform easing victims reporting,<sup>25</sup> must therefore be weighed against the upside of greater deterrence of the primary violence. This implies fewer victims and detection of a larger proportion of perpetrators, but greater intensity of violence among the remaining victims. Further, when there are multiple equilibria, if the victim and the perpetrator could coordinate on an equilibrium with no reporting attempt and no escalation, it would reduce the intensity of violence. For instance, for moderate or high cost of conflict, if they could coordinate on not reporting and no escalation in stage 2, then the intensity of violence drops.

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<sup>25</sup>We will study the implication of easing victims reporting more carefully in the next section.

Multiple equilibria such as the ones for high- and moderate-cost victims create heterogeneity of violence trajectory across characteristically identical cohort of partners. Thus it is reasonable to guess the presence of similar violence of the primary harm ( $h_1$ ) in households hidden from public records/surveys, due to voluntary non-reporting, for every case that comes to trial due to successful reporting. Any public awareness program encouraging reporting of DV can tilt aggregate behavior sharply with clear evidence of more discordant families, pushing up the divorce rate. Public awareness drive should effectively lower the stigma cost of conflict by mitigating any social disapproval of divorce. But the aggregate outcome can also go the other way: the credible threat of reporting itself may keep a large proportion of conflicts frozen, in our formulation in many unreported  $h_1$ . And this may even contribute to reduced happiness for females within the households.<sup>26</sup>

In case our results are wrongly perceived, we like to stress that a fall in victims' costs of reporting may also have a desirable impact: the victims' threat of fighting the battle of escalating violence may in fact lead to a harmonious relationship, i.e., complete nonviolence.<sup>27</sup> Also, lowering costs sufficiently can bring about lower violence rates along with more successful reporting. So any initiative, legal or social changes, lowering victims' cost of reporting should be assessed by a well-defined social evaluation objective. In this paper we abstain from proposing such welfare metric. Instead, we focus on highlighting that any policy reform to curtail domestic violence is never a quick fix solution due to its potential confounding implications.

### 3 Deterrence, Escalation and De-escalation

In this section, we carry out two types of comparative statics: the effects of lowering of cost of reporting and increasing punishments at different layers of the violence chain. While changing these policy parameters we still apply our equilibrium characterization in Proposition 1, specifically appeal to appropriate relevant details laid out in Tables 4, 5 and 6. The proofs for this section are therefore somewhat repeat arguments and included in the Appendix for completeness.

#### 3.1 Lowering victims' costs and connection to existing empirical research

Consider the effect of reducing victims' cost of reporting. This can be done by appointing more female police officers, providing better support for victims during court proceedings,

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<sup>26</sup>On a broader issue, Stevenson and Wolfers (2009) documented declining happiness of women in the United States since the 1970s despite expanded freedoms and economic progress "within both the family and market sphere".

<sup>27</sup>Analogy with the arms race (acquisitions of nuclear weapons) and its ambiguous implications for world or regional peace is notable.

running public campaign encouraging women not to tolerate DV, and removing social stigma for taking a stand against abusive partners; for the last two NGOs can play important roles (see <https://actionaid.org.uk/our-work/vawg/domestic-violence-and-abuse>).

Suppose costs for any range are reduced sufficiently so that the victim moves to the next lower cost range.<sup>28</sup> By combining the observations on comparisons between various cost ranges in the previous section, we have the following result.

**Proposition 2 (Effect of victim cost reduction).** *There are countervailing effects of lowering the cost of reporting faced by the victims:*

- (a) *From moderate to low cost range: The couples who were trapped in the unique no-escalation, no-reporting but  $h_1$  harm equilibrium under the moderate cost range will now transit to either (i) the nonviolence equilibrium, or (ii) no-escalation equilibrium but the victim reporting  $h_1$ .*
- (b) *From high to moderate cost range: The conflicts involving  $h_1$  but no escalation and no reporting under high costs now change into full-escalation conflicts with reporting at every stage but also with the collateral damage of more serious harms to some of the victims.*
- (c) *From very high to high cost range: The couples trapped in the unique no-escalation, no-reporting but  $h_1$  harm equilibrium under the very high cost range will now transit into full-escalation conflicts.*

This comparative static exercise predicts the heterogeneity in women's responses to any social (or government) program aimed at empowering their voice against violence from their partners. If we consider moderate and low costs of conflict/reporting to be associated with, for example, (i) more independent women with education and earning potential in the labor market,<sup>29</sup> (ii) parents of wealthier backgrounds with a good family and social network,<sup>30</sup> and (iii) a minimal confidence and belief in one's rights, our analysis suggests their husbands are likely to abstain from the path of conflict and violence. So any female empowerment drive will reinforce this pattern and lower violence by eliminating it at its root, or at least there will be more reporting without actual violence escalation (part (a) above).

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<sup>28</sup>It can be checked from the analysis in the previous section that cost reduction that keeps the victim in the same cost range does not affect the equilibrium outcomes.

<sup>29</sup>See Anderson and Eswaran (2009) on the importance of women's autonomy, measured by *earned income* potential as opposed to unearned income, in giving a greater voice in household decision-making. The authors studied household survey data (survey conducted in 1996) in a rural subdistrict of Bangladesh. While their application is different, our result that the relatively low cost of reporting, that can come from greater autonomy and confidence in self-worth, as an enforcer in keeping domestic violence in check derives from the same principle: the credible threat of costly conflict increasing women's implicit bargaining power within the household.

<sup>30</sup>Kimuna et al. (2012) find that, in India, violence is negatively associated with the wife's wealth index and education.

In contrast to the beneficial impact discussed above, any lowering of the costs from high to moderate, and very high to high category, leads to conflict escalation. This is the *adverse side* of facilitating an increase in the reporting of violence (parts (b) and (c)).<sup>31,32</sup>

### 3.2 Increasing punishments

■ **Initial incidents.** Now, suppose that the authorities increase punishment early in the violence chain, for the initial harm  $h_1$ . Such an approach can be viewed as being tough on crime, or what politicians project as *zero tolerance to violence*. We find that while there is some deterrence, it is also likely to lead to violence escalation.

**Proposition 3 (Mixed effect of early high punishment).** *Suppose  $f_1$ , punishment for the early stage violence  $h_1$ , is increased. The effects are summarized as follows:*

- (a) *Zero effect. This has no impact on the perpetrators' decisions to inflict  $h_1$  or its escalation when the victims involved have very high costs of reporting.*
- (b) *Adverse effect. Starting from the unique no-escalation equilibrium for high- and moderate-cost victims (under appropriate conditions detailed in the proof), with an increase in  $f_1$ , the equilibrium set expands to multiple equilibria: {no escalation, escalation}. This may lead to some pairs now choosing a path of escalating violence.*
- (c) *Mixed effect. For low-cost victims, the possibility of reporting with no escalation is lost. Some of these pairs move to the escalation equilibrium (adverse effect), while the rest move to nonviolence; the threshold  $v$  for perpetrators choosing violence also increases (beneficial deterrence).*
- (d) *Actual and observed violence. Overall, actual and observed incidents of violence of  $h_1$  without further escalations decline, while actual and observed incidents of escalating violence,  $h_2$  and  $h_3$  combined, increase.*

Thus, the Beckerian prescription of higher punishment to thwart crime at the initial stages and nip violence in the bud does not always work in our extensive form setup. Violence escalation becomes more likely. For example, for low-cost victims, the increased punishment can remove the (reporting, no-escalation) equilibrium as perpetrators facing the higher punishment now are willing to escalate violence to try to avoid the punishment.

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<sup>31</sup>Sahoo and Raju (2007) find that in India, working women face more violence as compared to rural women. However, it is not possible to disentangle whether this is due to male backlash or because economically active women are better informed and, hence, report more incidents.

<sup>32</sup>Note that increased escalation is accompanied by more reporting attempts by victims, some of which are successful. However, since all reporting attempts are not successful and even successful attempts may not generate a desirable outcome for the victim in the courts, we are implicitly implying that non-escalating violence without reporting attempt is 'better' than reporting attempts with escalation. Any welfare ranking, inevitably, is going to be subjective. Of course, in an ideal world, all reporting attempts would be successful and court proceedings would always uncover the truth.

Also, notice that for moderate-cost victims (in part (b)) increase in punishment may lead to escalating violence, whereas in Proposition 2(a) we had the result that a reduction in victims' reporting cost (from moderate to low cost) either eliminated violence altogether or increased reporting without violence escalation. Thus for this group the two policies of improved monitoring (through lowered cost of reporting<sup>33</sup>) and increased punishment are not only *not* substitutes but have diametrically opposite impacts on violence. This contrasts with the conventional wisdom, originating in Becker (1968), that for crime deterrence monitoring and punishment are *substitutes*.

On the other hand, for high-cost victims (again, in part (b)) increase in punishment may lead to escalation, which is similar to the effect of reduction in victims' cost of reporting in Proposition 2(b) (from high to moderate). Thus, here the two instruments – monitoring and punishment – work as substitutes.

Based on the above discussion, we can summarize the comparative static effects of the two instruments on violence, i.e. *deterrence vs. escalation*, as follows:

**Corollary 1 (Tradeoff I: monitoring vs. punishment)**

<i>initial cost \ instruments</i>	<i>improved monitoring (c ↓) vs. increase in punishment f<sub>1</sub></i>
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<i>moderate cost</i>	<i>pull in opposite directions ⇒ non-substitution<sup>a</sup></i>
<i>high cost</i>	<i>substitution (Beckerian)</i>

<sup>a</sup> *Non-substitution, or un-Beckerian, for lack of a better terminology.*

Framing the enforcement problem as one of minimizing the cost of achieving a target level of expected fines for risk-neutral criminals (pf), Becker (1968) had observed that the maximal penalty/low monitoring is the optimal mechanism for crime deterrence. That is, the two instruments – monitoring and punishments – serve the same

<sup>33</sup>We equate the two policies because to lower the cost of reporting the government requires various initiatives such as improving victim awareness of their personal rights through public campaign (such as TV advertising), appointment and training of more female police officers, a system of dealing with complaints if any reporting of violence by the victims to the local police authorities go unheeded, etc. It is well-known that the police department may be reluctant to formally record complaints as it involves following through that requires efforts and resources (moral hazard problem in enforcement). Some examples of public awareness campaigns are <https://assets.publishing.service.gov.uk/media/57a08abde5274a31e0000750/60887-PartnerViolenceEvidenceOverview.pdf> (“What works to prevent partner violence: An evidence overview” in the UK), <https://www.msd.govt.nz/documents/about-msd-and-our-work/publications-resources/research/campaign-action-violence-research/an-innovative-approach-to-changing-social-attitudes.pdf> (“An innovative approach to changing social attitudes around family violence in New Zealand: Key ideas, insights and lessons learnt - The Campaign for Action on Family Violence”), <https://www.zerotolerance.org.uk/about-our-prevention-campaign/> and <https://www.zerotolerance.org.uk/annual-reports/> (“Annual reports 2020-2021”), [http://www.scf.gouv.qc.ca/fileadmin/Documents/Violences/plan-violence18-23-access\\_en.pdf](http://www.scf.gouv.qc.ca/fileadmin/Documents/Violences/plan-violence18-23-access_en.pdf) (“Government Action Plan on Domestic Violence: 2018-2023” in Canada).

deterrence objective although at different costs.<sup>34</sup> In this spirit, lowering cost of reporting for moderate-cost victims is equivalent to increasing monitoring which, as we have noted in Proposition 2(a), helps deterrence/reporting of  $h_1$ ; increasing punishment  $f_1$  on the other hand increases escalation. Thus, we no longer have the uniformity of outcomes of the two instruments, and a sensible policy could be to facilitate reporting and avoid increasing  $f_1$ . For high-cost victims, either mechanism encourages reporting but also leads to more possibilities of escalation. So overall, for the primary violence, improving monitoring dominates the policy of increasing punishments purely from the deterrence vs. escalation perspective.

**Further on monitoring vs. early stage punishment.** Continuing from the above discussion, we want to delve a bit more into the deterrence of the primary harm  $h_1$  by contextualising the relationship between the characteristics of couples involved and their responsiveness to reforms. Propositions 2 and 3 show that there are two ways to achieve deterrence: (i) either by improving monitoring by lowering the victims' cost of reporting from the moderate to a low cost range, or (ii) by increasing  $f_1$  for pairs where the victims already have a low cost of reporting.

Improvement in monitoring is a policy initiative that is unlikely to impact uniformly across all victim groups. Imagine a policy reform where law enforcement authorities employ more female officers and also run a campaign to increase self-esteem of women who should say 'no' to domestic violence by actively reporting abuse by their partners. Which class of victims are likely to respond to such initiatives? More likely that women with relatively higher income or education will take up the risks because they are relatively independent. Such women may also be more willing to bring up their children alone, outside of an abusive relationship, than make themselves and the children suffer in such a relationship. In contrast, those whose costs of reporting were high or very high to begin with might not take up such options: their costs were high because they may not have had sufficient human capital or income; hence, they may not be receptive to the reforms.

Now in case (i), deterrence happens because before the reform the male partners knew their partners wouldn't report but after the reform the same partners would take a different view of the abuse and report, resulting in escalation by perpetrators. In such cases, instead of lowering reporting costs if the authorities increased the penalty  $f_1$ , the victims will continue not to report and thus the higher penalty  $f'_1$  will not make any difference to the perpetrators' decision to inflict the violence  $h_1$ . Clearly, improved monitoring dominates.

In case (ii), the victims already have low cost of reporting before any reform and they would report the perpetrators who would inflict  $h_1$  and not escalate because their

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<sup>34</sup>Easing victims reporting requires the State to incur direct resource costs. Increased punishment, on the other hand, apart from increased cost of incarceration, also increases the cost of miscarriage of justice due to type I error (false positive).

benefits  $v$  exceed the penalty  $f_1$ ; it is an easy surplus for these perpetrators. This group of couples seems a rarity for the following reasons: a low cost victim is likely to be one with better family network, better educated and independent. With this relatively better human capital such women are likely to assortatively match with partners with high  $w_p$ . So these perpetrators will have relatively less to benefit from inflicting violence due to our assumption that  $\frac{\partial v}{\partial w_p} \leq 0$ .<sup>35</sup> Although  $\frac{\partial v}{\partial w_v} \geq 0$ , on balance these perpetrators may not have a high  $v$  to risk having to pay high compensation in divorce (because of high  $w_p$ ). Hence, we do not consider case (ii) to be a compelling description of matching to make punishment to be an attractive avenue to achieve better deterrence of  $h_1$ . Based on this reasoning we can make the following informal observation:

**Observation 1 (Benefits of monitoring).** *Improving monitoring by lowering the cost of victims reporting for the originally moderate cost group to low costs is a better mechanism for the deterrence of the primary violence  $h_1$  than the alternative route of increasing punishment  $f_1$ .*

■ **Higher levels of violence.** Suppose that, starting from the equilibria presented in Section 2, *ceteris paribus*, the authorities increase punishment for the highest level of violence,  $f_3$ , sufficiently such that

$$\hat{f}_2 < \hat{f}_3[\phi_3 + (1 - \phi_3)\mu], \quad (8)$$

i.e., condition (3) does *not* hold. This generates an overall de-escalation effect:

**Proposition 4 (De-escalation I).** *Suppose punishment ( $f_3$ ) for the highest level of violence is increased sufficiently such that condition (8) holds, i.e., (3) does not. Then compared to the scenarios presented in Proposition 1:*

- (a) Very high cost victims: *There is no change in equilibrium violence or reporting.*
- (b) High-cost victims: *The escalation equilibrium does not survive; the no-reporting equilibrium remains the only equilibrium.*
- (c) Moderate-cost victims: *Only the no-escalation equilibrium survives.*
- (d) Low-cost victims: *The escalation equilibrium does not survive, but the reporting and no-escalation equilibrium, along with nonviolence, survive. Some perpetrators with relatively low valuations, who were previously engaging in escalations, will switch to nonviolence.*

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<sup>35</sup>This is especially important for the case of dowry-related violence.

(e) **Actual and observed violence.** *Overall, actual and observed incidents of escalating violence decline. Observed incidents of non-escalating violence decline, but the actual incidents may increase or decrease depending on the relative size of the low-cost group (where these decline) to the moderate- and high-cost groups (where these increase but are not reported).*

Deterring escalation to the highest level of violence by increasing  $f_3$  prevents escalation from the  $h_1$  to  $h_2$  as both the perpetrator and victim know that the former cannot benefit from escalating violence to the highest level, risking the heavier punishment. Hence, there is no gain from escalating from the initial to the intermediate level of violence and risk the relatively higher punishment. However, this prevention of escalation comes at a cost in the case of all victims who are *not* of the low-cost type – their perpetrators are never brought to justice as there is no reporting.

Next, we analyze whether relying on higher punishment for the intermediate level of violence, rather than the highest level of violence, has any advantage in mitigating escalation. This could be considered as one might believe that waiting for the violence to reach the highest level is leaving things for too late.

Consider, again, the equilibrium considered in Section 2, i.e., in Proposition 1. Now suppose that punishment for the intermediate level of violence is increased such that:

$$\hat{f}_1 < \phi_2 \hat{f}_2 + (1 - \phi_2) \hat{f}_3 [\phi_3 + (1 - \phi_3) \mu_3] \equiv \gamma',^{36} \quad (9)$$

i.e., condition (6) is *not* satisfied.

**Proposition 5 (De-escalation II).** *Suppose that punishment ( $f_2$ ) for the intermediate level of violence is increased sufficiently such that condition (9) holds, i.e., condition (6) does not. Then compared to the scenarios presented in Proposition 1:*

- (a) **Very high cost victims:** *There is no change in outcomes.*
- (b) **High-cost victims:** *The escalation equilibrium is eliminated. Only the no-escalation equilibrium remains.*
- (c) **Moderate-cost victims:** *The escalation equilibrium does not survive; only the no-escalation equilibrium survives.*
- (d) **Low-cost victims:** *Only the reporting and no-escalation equilibrium, along with non-violence, survive. Some low-valuation perpetrators, who were previously engaging in escalations, will switch to nonviolence.*

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<sup>36</sup>Note that  $\gamma' > \bar{\gamma}$  since  $f_2 \uparrow \Rightarrow \hat{f}_2 \uparrow$ , i.e., the RHS is evaluated at different values of  $\hat{f}_2$  than in condition (6).

(e) **Actual and observed violence.** Overall, actual and observed incidents of escalating violence decline. Observed incidents non-escalating violence decline, but the actual number of such incidents can increase or decline depending on the relative size of the low-cost group (where these decline) to the moderate- and high-cost groups (where these increase but without reporting).

This highlights the role of increased punishment at the intermediate level of violence in reducing the escalation of violence. It can also promote successful reporting by low-cost victims. However, for other victims, while this rules out violence escalation, it simultaneously results in perpetrators not being punished as they are not reported.

Based on Proposition 2 and Propositions 4 & 5, we can draw the following conclusion about the comparative static effects of the two instruments on violence escalation:

**Corollary 2 (Tradeoff II: monitoring vs. punishment)**

<i>initial cost \ instruments</i>	<i>improved monitoring (<math>c \downarrow</math>) vs. increase in punishment <math>f_2</math> or <math>f_3</math></i>
----- <i>moderate cost</i>	----- <i>increased reporting vs. de-escalation (via more reporting following off-equilibrium escalation)</i>
<i>high cost</i>	<i>opposite effects (but due to more reporting on- : escalation vs. de-escalation or off-the-equilibrium path)</i>

**Policy discussion.** Our results indicate that increasing punishments for the higher levels of violence have the advantage of uniformly de-escalating conflicts due to more reporting off-the-equilibrium path; easing reporting, on the other hand, may lead to more conflict escalations (see the second row in the table for Corollary 2). Combined with our discussion following Corollary 1, it follows that in the aggregate the law enforcement authority should focus on easing reporting where it is likely to make the biggest impact, i.e., for educated working women who will be able to access the better facilities of reporting (lowering their reporting cost from a moderate range), and supplement it by increasing punishments for the higher levels of violence.

As for the choice between whether to increase punishments for the medium level harm  $h_2$  or extreme violence  $h_3$ , the ‘penalty fitting the crime’ doctrine (Andreoni, 1991) suggests the authorities might prefer to hike up punishment for the latter. However, politicians may opt for the former in an attempt to appear tough and align more with the ‘zero tolerance’ narrative.

Social norms, when it comes to domestic violence, also play a significant role; see, among others, Jayachandran (2015). In India, a country with high prevalence of DV, the National Family Health Survey, 2005-2006, indicates that wife-beating is considered acceptable by both men and women. Akerlof (1980) points out customs/norms that

might harm an individual can receive support from the very individual due to the threat of loss of reputation if the norm is violated. This can partly explain the female support for DV.<sup>37</sup> Young (1998) observes that conventions can coordinate expectations within the society. However, he goes on to note that social change can be precipitated by the actions of influential people, which in some cases, can be political figures.<sup>38</sup> Kubler (2001) suggests two paths for changing norms – incentives through punishing or prohibiting certain behaviors (in our context, punishing DV) and convincing individuals that the norm is inappropriate (in our context, promoting victims reporting). Note that, for domestic violence, the first cannot really work without the second; in fact, the latter is a necessary condition for the former to have a bite – increasing punishment has no effect if there is no reporting. WHO (2009) highlights cultural and social norms in many countries, including India, Pakistan, China and South Africa, that support DV (see Box 1). They go on to point out the role of media campaigns to challenge norms that support violence against women, and the use of laws to signal to society that the norm of violence is not acceptable. Linos et al. (2013) also suggest the role of social norms to end spousal violence in Nigeria. In the context of our model, any long-term agenda in changing social norms on DV may start with easing victims reporting.

**Complexity of social welfare evaluation.** We have deliberately stayed away from the normative welfare-based analysis. One of the reasons is that any welfare accounting must also take into account the perpetrators' welfare that would be anti-thesis to any program on fighting DV. So let us side-step this conventional total welfare analysis and instead focus only on the victims' welfare. Implicit in our analysis is the position that escalation of DV is wrong and should be avoided. But we also acknowledge that victims reporting is essential to have any hope of deterrence. Escalation is undertaken to prevent reporting; we therefore need a more balanced view. So we ask the question again, can violence escalation be welfare-enhancing?

The answer to the last question above is *yes*, if the escalations happen off-the-equilibrium path and as a result the primary violence is deterred: we avoid the deadweight loss of the marginal  $h_1$  harms.<sup>39</sup> But how about escalations along the equilibrium path? Accepting

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<sup>37</sup>In India, the majority of married couples live with the male partner's parents and siblings under the same roof. Any discord between husband and wife inevitably brings the larger family into the dispute, to the detriment of the wife. Reforms easing the burden of victims reporting may help change social attitudes towards wives' complaints against abusive husbands. There is likely to be a multiplier effect as society at large, and women in particular, come to recognize from actions of women in similar positions that reporting is not a bad behavior and does not bring personal shame. Awareness programs of saying 'no to domestic violence' endogenously bring about improved monitoring. It will have a direct effect on core deterrence than an increase in punishment.

<sup>38</sup>A female chief minister or premier can be instrumental to bring about the costly reforms such as easing of victims reporting.

<sup>39</sup>If for some groups, at the same time, there happens to be new escalations along the equilibrium path, then one has to weigh the gains from improved deterrence against the losses (inclusive of law enforcement costs) from additional escalations. On this point, see further discussion below.

situations when the primary harm is inevitable, any equilibrium escalation must imply the victims must be making strictly positive gains in the post- $h_1$  subgame, because otherwise they won't report and in response the perpetrators won't escalate. So escalations along the equilibrium path must be shifting benefits away from the perpetrators towards the victims. Why is this not to be looked upon favorably? The reasoning is very basic: additional conflicts (post primary violence) would mean on successful reporting the courts and law enforcement authorities will have to spend resources to adjudicate on the disputes, apart from the costs of incarceration, which are costly. We assume this resource cost to be substantial to outweigh any benefits to the victims from conflict escalation, thus lowering any measure of social welfare (ignoring the perpetrators' payoffs); hence increased escalations must be avoided resulting from any policy initiative, if, in return, there is not enough improvement in the volume of deterrence of the primary harm  $h_1$ . This is precisely what our policy discussion above prescribes – about improving monitoring to lower the incidence of  $h_1$  in combination with increases in punishments for the higher level offenses that help in the de-escalation of conflicts.

Finally, any welfare assessment of anti-DV drives is going to be complex because of the long-term effects on social norms. Thus our analysis should be viewed primarily as answers to *what happens* following standard policy initiatives, rather than taken as a definitive normative guide.

## 4 Conclusion

Our findings in this paper suggest that despite social commentators, the media or NGOs demanding greater punishment for perpetrators at lower levels of the crime, one needs to look beyond the isolated problem of early deterrence. Domestic violence is not a one-shot problem but one that may start off with an initial incident with possible escalations. It may not be realistically possible to deter all incidents. Hence, authorities need to consider both deterrence of initial incidents and ensuing violence escalation.

The standard substitution between monitoring and punishment as policy prescriptions for crime deterrence cannot be applied in a blanket manner when dealing with the long-conflict aspect of domestic violence. Facilitating reporting, i.e., an improvement in monitoring, may have countervailing effects by improving deterrence in the initial stage of violence but may also fuel escalation. An increase in punishment for the early stage of violence may similarly escalate violence but in the later stages it helps to de-escalate conflicts. Sometimes monitoring and punishment work in unison, at other times the two measures have the opposite effects. Overall, domestic violence viewed as an extensive-form conflict chain between partners produces several novel insights not previously observed in the theoretical and empirical literatures that are predominantly based on static models.

# Appendix

■ **Laws against domestic violence.** Punishments for domestic violence in most countries differ to fit the seriousness of crime. In the United States, *18 U.S. Code § 2261 - Interstate domestic violence* states the following (source - <https://www.law.cornell.edu/uscode/text/18/2261>):

“A person who causes a spouse, intimate partner, or dating partner to travel in interstate or foreign commerce or to enter or leave Indian country by force, coercion, duress, or fraud, and who, in the course of, as a result of, or to facilitate such conduct or travel, commits or attempts to commit a crime of violence against that spouse, intimate partner, or dating partner, shall be punished as provided in subsection (b).

(b) **Penalties.** – A person who violates this section or section 2261A shall be fined under this title, imprisoned –

(1) for life or any term of years, if death of the victim results;

(2) for not more than 20 years if permanent disfigurement or life threatening bodily injury to the victim results;

(3) for not more than 10 years, if serious bodily injury to the victim results or if the offender uses a dangerous weapon during the offense;

(4) as provided for the applicable conduct under chapter 109A if the offense would constitute an offense under chapter 109A (without regard to whether the offense was committed in the special maritime and territorial jurisdiction of the United States or in a Federal prison); and

(5) for not more than 5 years, in any other case, or both fined and imprisoned.

(6) Whoever commits the crime of stalking in violation of a temporary or permanent civil or criminal injunction, restraining order, no-contact order, or other order described in section 2266 of title 18, United States Code, shall be punished by imprisonment for not less than 1 year.”

In the UK, charges range from threatening behavior with the intention to cause injury to murder/manslaughter charges in case of victim’s death (see <http://www.cps.gov.uk/publications/prosecution/domestic/domv.html#a20>). For India, see <https://wcd.nic.in/sites/default/files/wdvact.pdf>.

## ■ Proofs of Propositions 3–5.

*Proof of Proposition 3.* (a) Start with *very high cost victims* ( $\hat{m}_3 < c$ ). Following an increase in  $f_1$  all perpetrators with  $v > 0$  choosing  $h_1$  with no subsequent reporting attempt or violence escalation continues to be the only SPE. There is no change in observed or actual violence relative to the initial (benchmark) equilibrium of Proposition 1.

(b) For *high-cost victims* ( $\hat{m}_2 < c < \hat{m}_3$ ), Table 6 indicates that the escalation equilibrium is predicated on condition (6) being satisfied. As increasing  $f_1$  makes it more

likely that condition (6) is satisfied, this equilibrium is unaffected. The first two (non-escalation) equilibria are also unaffected. Suppose, to start with, condition (6) is not satisfied, so the unique SPE is that of no escalation. Then a sufficiently large increase in  $f_1$  will satisfy condition (6), giving rise to the possibility of the escalation equilibrium.<sup>40</sup> Hence, both observed and actual escalations may increase; while actual cases of non-escalating violence decline (since some shift to escalation), their observed numbers stay unchanged at zero because none are reported.

Consider pairs with *moderate-cost victims* ( $\hat{m}_1 < c < \hat{m}_2$ ). Suppose initially the no-escalation equilibrium in Table 5 is unique, i.e., condition (6) is not satisfied but conditions (5) and (7) hold. Now a sufficiently high increase in  $f_1$  makes condition (6) hold, thereby bringing in the possibility of the escalation equilibrium. While there is no change in observed incidents of violence with no escalation, their actual numbers decline as some shift to escalation. Both observed and actual cases of escalation may increase.

(c) Table 4 reports the possible equilibria for *low-cost victims* ( $c < \hat{m}_1$ ). While the escalation equilibrium will not be affected, the reporting with no-escalation equilibrium (predicated on condition (6) not holding) can be lost if the increase in  $f_1$  is sufficiently high, thereby moving to the escalation equilibrium. In the reporting with no escalation equilibrium, perpetrators with  $v > \hat{f}_1$  choose  $h_1$ ; in the escalation equilibrium, perpetrators with  $v > \bar{\gamma}$  choose to inflict violence  $h_1$ . Since  $\hat{f}_1 < \bar{\gamma} < \hat{f}_1^*$  (where  $\hat{f}_1^*$  is due to the accelerated penalty), the threshold  $v$  for perpetrators choosing violence goes up, although now there is also escalation. Hence, both observed and actual incidents of  $h_1$  without escalation decline, while both observed and actual cases of escalating violence will increase. The nonviolence equilibrium is unaffected (since  $v \leq \hat{f}_1 \Rightarrow v < \hat{f}_1^*$ ). **Q.E.D.**

*Proof of Proposition 4.* (a) When victims have *very high costs* ( $\hat{m}_3 < c$ ), with the increased punishment, the stage 3 subgame is still represented by Table 1. The NE in this subgame is, as before,  $(r_3 = 0, e_3 = 0)$ . The stage 2 subgame is represented in Table 3, with the equilibrium unchanged from earlier –  $(r_2 = 0, e_2 = 0)$ . Hence, in stage 1, perpetrators with  $v > 0$  choose to inflict  $h_1$ , following which there is no attempt at reporting nor any escalation; thus there is no change from the original equilibrium.

(b) For *high-cost victims* ( $\hat{m}_2 < c < \hat{m}_3$ ), Table 1 shows the stage 3 subgame. Before the increase in the penalty there were two Nash equilibria of this stage game:  $(r_3 = 0, e_3 = 0)$  and  $(r_3 = 1, e_3 = 1)$  (Proposition 1). But after the increase in  $f_3$ , the new condition (8) eliminates the latter equilibrium, leaving  $(r_3 = 0, e_3 = 0)$  as the only NE. Moving to stage 2, Table 3 indicates that the victim's dominant strategy is  $r_2 = 0$ , implying that the stage 2 NE is  $(r_2 = 0, e_2 = 0)$ . Hence, perpetrators with  $v > 0$  choose to inflict  $h_1$  in stage 1. Compared with the equilibria in Table 6, we can see that increased punishment

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<sup>40</sup>Note that there is a likely movement from the unique no-escalation (last) equilibrium in Table 6 to one of the first three equilibria, as some pairs may choose different coordinations.

for  $h_3$  leaves this no-escalation equilibrium as the only SPE. However it simultaneously removes the possibility of the perpetrator being reported and brought to justice. Thus, while both observed and actual escalations fall (to zero), observed incidents with non-escalating violence ( $h_1$ ) is unchanged, due to non-reporting, but their actual numbers must have gone up with escalations replaced by silently suffering victims.

(c) Table 1 depicts the stage 3 subgame for *moderate-cost victims* ( $\hat{m}_1 < c < \hat{m}_2$ ). Following the increase in  $f_3$ , the victim's dominant strategy is still  $r_3 = 1$  (since  $c < \hat{m}_2 < \hat{m}_3$ ). But the perpetrator's best response is now changed to  $e_3 = 0$  due to the new condition (8); hence, the altered stage 3 NE is  $(r_3 = 1, e_3 = 0)$ , replacing the earlier NE  $(r_3 = 1, e_3 = 1)$ . This implies, should the game reach stage 3, the new payoffs of the victim and the perpetrator are, respectively,  $\hat{m}_2 - c$  and  $-\hat{f}_2$ . So the stage 2 subgame summarized in Table 2 will be modified as follows (explanations follow):

Table 7: (Table 2 modified – with higher  $f_3$ ) stage 2 onwards

	$e_2 = 0$	$e_2 = 1$
$r_2 = 0$	$0, 0$	$-(h_2 - h_1) + (\hat{m}_2 - c), -\hat{f}_2$
$r_2 = 1$	$\hat{m}_1 - c, -\hat{f}_1$	$-(h_2 - h_1) + (\hat{m}_2 - c), -\hat{f}_2$

The victim's and the perpetrator's payoffs for  $e_2 = 1$  are the same regardless of  $r_2$ . If the perpetrator escalates to  $h_2$  by choosing  $e_2 = 1$  and the victim chooses not to report in this stage (i.e.,  $r_2 = 0$ ), given the next stage equilibrium of  $(r_3 = 1, e_3 = 0)$ , the victim's marginal harm is  $(h_2 - h_1)$  and her marginal benefit is  $(\hat{m}_2 - c)$ , while the perpetrator faces the punishment of  $\hat{f}_2$ . In case of  $(r_2 = 1, e_2 = 1)$ , the victim faces the marginal harm of  $(h_2 - h_1)$  and with probability  $\phi_2$  her reporting attempt is successful, while with the residual probability her attempt will be unsuccessful and the game progresses to the next stage; so, her marginal benefit is  $\phi_2(\hat{m}_2 - c) + (1 - \phi_2)(\hat{m}_2 - c) = (\hat{m}_2 - c)$ . The perpetrator's expected punishment is  $\phi_2\hat{f}_2 + (1 - \phi_2)\hat{f}_2 = \hat{f}_2$ . It is now easy to see that the perpetrator's dominant strategy is  $e_2 = 0$ . The victim's best response to  $e_2 = 0$  is  $r_2 = 0$  (since  $\hat{m}_1 < c$ ), implying the NE in stage 2 subgame is  $(r_2 = 0, e_2 = 0)$ . Hence, in stage 1, perpetrators with  $v > 0$  choose to inflict  $h_1$ , with no reporting attempt nor escalation thereafter. Compared to the initial equilibria presented in Table 5, with an increase in  $f_3$  the only surviving SPE is the no-escalation equilibrium. Thus, observed incidents of  $h_1$  with no escalation is unchanged, while actual number of such cases must have increased.

(d) For pairs with *low-cost victims* ( $c < \hat{m}_1$ ), following the increase in  $f_3$ , stage 3 NE changes to  $(r_3 = 1, e_3 = 0)$  (see Table 1); the perpetrator will now have a dominant strategy,  $e_3 = 0$  due to condition (8), and the victim's best response is  $r_3 = 1$ . The stage 2 subgame is represented in Table 7. The perpetrator's dominant strategy is  $e_2 = 0$  and the victim's best response is  $r_2 = 1$ , implying stage 2 NE:  $(r_2 = 1, e_2 = 0)$ . This,

in turn, implies that the perpetrators with  $v > \hat{f}_1$  will choose violence in stage 1. But before the increase in punishment, only the perpetrators with  $v > \bar{\gamma}(\hat{f}_3)$  were inflicting  $h_1$  (in the escalating equilibrium, the first row of Table 4). By condition (6),  $\hat{f}_1 > \bar{\gamma}(\hat{f}_3)$ . So the perpetrators  $\bar{\gamma}(\hat{f}_3) < v \leq \hat{f}_1$  will drop out and thus the probability of the primary violence is reduced; moreover, escalations have been eliminated in equilibrium with the hike in  $f_3$ . Thus, observed and actual incidents of violence  $h_1$  with no escalation will have fallen; actual incidents of escalating violence dropped to zero. Only the nonviolence, and the reporting of  $h_1$  with no escalation, equilibria survive.

(e) The observations follow intuitively from what we already verified above in parts (a)–(d) and the contrasting results on non-escalating violence for the low-cost group vis-à-vis moderate- and high-cost groups. **Q.E.D.**

*Proof of Proposition 5.* (a) For *very high cost victims* ( $\hat{m}_3 < c$ ), with the increase in punishment  $f_2$ , the stage 3 subgame is still represented in Table 1; the NE in this subgame is same as before:  $(r_3 = 0, e_3 = 0)$ . From Table 3, it is clear that the stage 2 NE is  $(r_2 = 0, e_2 = 0)$ , implying that perpetrators with  $v > 0$  will choose to inflict  $h_1$ . Hence, the increased punishment has no impact.

(b) In the case of *high-cost victims* ( $\hat{m}_2 < c < \hat{m}_3$ ), the stage 3 subgame equilibria are the same as discussed in Table 1. For the  $(r_3 = 0, e_3 = 0)$  continuation equilibrium, it can be checked using Table 3 that the NE in stage 2 subgame is  $(r_2 = 0, e_2 = 0)$ . However, for the other stage 3 equilibrium, i.e., when  $(r_3 = 1, e_3 = 1)$ , Table 2 shows the relevant stage 2 payoffs. The perpetrator's dominant strategy now is  $e_2 = 0$  since condition (9) implies that condition (6) is *not* satisfied. The victim's best response is  $r_2 = 0$ , implying the stage 2 NE:  $(r_2 = 0, e_2 = 0)$ . This deters escalation from  $h_1$  to  $h_2$  and perpetrators with  $v > 0$  will choose to inflict violence  $h_1$ . Overall, by comparing with Table 6, we can see that the escalation equilibrium does not survive. Thus, observed incidents of violence  $h_1$  with no escalation is unchanged (due to non-reporting), while actual number of such incidents must have increased (due to switch from escalation to non-escalation).

(c) For *moderate-cost victims* ( $\hat{m}_1 < c < \hat{m}_2$ ), the stage 3 NE is  $(e_3 = 1, r_3 = 1)$  (Table 1), while the stage 2 subgame is represented by Table 2. The perpetrator's dominant strategy is now  $e_2 = 0$  since condition (6) is no longer satisfied. The victim's best response is  $r_2 = 0$  and the stage 2 NE is, thus,  $(r_2 = 0, e_2 = 0)$ . This, in turn, implies that in stage 1, perpetrators with  $v > 0$  will choose to inflict  $h_1$  and there is no further escalation nor any attempt at reporting. Hence, higher  $f_2$  eliminates the escalation equilibrium. Thus, observed incidents of violence  $h_1$  with no escalation is unchanged, while actual number of such incidents must have increased.

(d) Finally, in the case of *low-cost victims* ( $c < \hat{m}_1$ ), Table 1 shows that, as before, the stage 3 NE is  $(r_3 = 1, e_3 = 1)$ . Table 2 indicates that the perpetrator's dominant strategy is  $e_2 = 0$  (since the increase in  $f_2$  means that condition (9) holds). The victim's

best response is  $r_2 = 1$ ; hence, the NE in stage 2 is  $(r_2 = 1, e_2 = 0)$ , i.e., reporting but no escalation. Thus, potential perpetrators with  $v > \hat{f}_1$  will choose to inflict violence  $h_1$ . Compared to the earlier equilibria (for lower  $f_2$ ) summarized in Table 4, the escalation equilibrium does not survive. Hence, the probability of violence  $h_1$  will decrease, because the original perpetrators who were in the range  $\bar{\gamma} < v \leq \hat{f}_1$  now switch to nonviolence. Thus, observed and actual incidents of  $h_1$  with no escalation will drop.

(e) Combining what we verified in parts (a)–(d), the claim follows in the same manner as in part (e) of Proposition 4. Q.E.D.

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