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The Theory of Penalties and the Economics of Criminal Law

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This paper presents a model of penalties that reconciles the conflicting accounts of optimal punishment by Becker, who argued penalties should internalize social costs, and Posner, who suggested that penalties should completely deter offenses. The model delivers specific recommendations as to when penalties should be set to internalize social costs and when they should be set to completely deter offensive conduct. One basic recommendation is that whenever the cost of transacting with respect to some entitlement is less than the cost of enforcing the right to that entitlement, penalties should be set to completely deter. I use the model to generate a positive account of the function and scope of criminal law doctrines, such as intent, necessity, and rules governing the distinction between torts and crimes. The model is also consistent with the history of criminal penalties set out by Adam Smith.

1. INTRODUCTION

Criminal law is heavily steeped in the language of morals, and both the teaching and writing on the subject have been dominated for many years by lawyers who fancy themselves moral theorists. Small wonder, then, that so few economists have cracked open the law reports to try to gain a functional understanding of the legal formulae in the case law. The only article, of which I am aware, that offers a positive economic theory of the substantive criminal law is that of Posner (1985).¹

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1. Before Posner's article, the chapter titled "The Criminal Law" in Holmes (1881:39-76) might be described as the first application of economic reasoning to criminal law doctrine — i.e., using economic reasoning to explain criminal law. Holmes sets out a deterrence-based theory of criminal law, which he uses to explain nuances in criminal intent doctrine. He describes intent doctrine as "an index to the probability of certain future acts which the law seeks to prevent" (1881:74). In the same journal as the Posner article, Shavell (1985) applies economics to criminal law doctrine. Shavell's analysis of the function of nonmonetary sanctions has implications which are broadly consistent with

My aim in this paper, which in large part formalizes and extends Posner's, is to show that one can use economics to explain some fundamental doctrines of criminal law. One implication is that the language of morals is unnecessary if we want to gain an understanding of the function of basic criminal law doctrines, such as criminal intent.² The analysis here suggests that these doctrines play an important role in guiding courts to channel criminal penalties toward conduct that should be completely deterred – for criminal law adopts a policy of prohibition; it does not seek to constrain murder, theft, or rape to “optimal” levels. This view of the function of doctrine suggests that there is no essential evil or “vicious will” that the criminal law targets. Rather, the notion of vicious will is simply a handy legal construct that helps courts target criminal penalties to the proper categories of conduct.

My argument begins with an examination of the economic theory of penalties, as set out in Becker (1968) and Posner (1985). I offer a model that reconciles the conflicting accounts of Becker, who argued for penalties that internalize social costs,³ and Posner, who suggested that penalties should completely deter offenses.⁴ The model delivers specific recommendations as to when penalties should be set to internalize social harms and when they should be set to completely deter offensive conduct.⁵ One basic recommendation is that whenever the cost of transacting with respect to some entitlement is less than the cost of enforcing the

key parts of criminal law doctrine, though Shavell does not claim to be offering a positive theory of the doctrine. A more recent application of economics to criminal intent doctrine appears in Parker (1993).

2. Holmes (1881) makes this point. After Holmes, the key contributions that an economic treatment of criminal law could offer are in specifying with greater precision the types of conduct appropriate for criminal rather than tort liability. Posner (1985) does precisely this. The goal of this paper is to continue in the same line.

3. Becker is the first to have argued that penalties should aim to internalize social costs. However, the internalization theory makes some appearances in Bentham (1781), though Bentham's presentation is in some respects confused. Bentham starts with the proposition that penalties should be set in order to eliminate gain to the offender. He then makes several suggestions for increasing (or decreasing) the penalty based on external costs (see, for example, the discussion of “danger” and “alarm” factors in Bentham (1781:153-154)).

4. The view that criminal penalties should completely deter crime by eliminating the prospect of gain on the part of the offender, known as the “classical deterrence” view, was first set out by Beccaria (1764) and later by Bentham (1781). Beccaria was writing at a time, the mid-eighteenth century, when the death penalty was a common punishment. He saw himself as offering a rigorous case for more moderate punishments, and his argument was picked up and advanced by Blackstone (1769).

5. Shavell (1985) applies the theory of penalties to criminal law, and in this respect this paper is similar to his – both papers begin with an analysis of penalties and work “backward” to examine legal doctrine. However, Shavell focuses on the theoretical case for nonmonetary penalties, while this paper focuses on the factors that make complete deterrence preferable to internalization of costs.

right to that entitlement, penalties should be set to completely deter. I use the general recommendations of the model to offer a positive account of the function and scope of criminal law doctrines, such as criminal intent, necessity, and rules governing the distinction between torts and crimes. As the final application of the model, I use it to provide a thumbnail sketch of the history of punishment as set out by Adam Smith in his *Lectures on Jurisprudence* (1763).

2. BACKGROUND ON THE THEORY OF PENALTIES

The economic theory of criminal penalties has been set out primarily in Becker (1968) and Posner (1985).⁶ Hence, I will not pretend to present a new economic theory of penalties in this section; there is no “new” theory to present. However, there has not previously been, to my knowledge, any formal connection demonstrated between the analyses in the Becker and Posner papers, which offer conflicting prescriptions.

Becker develops the case for using criminal penalties to internalize the social harm of criminal conduct. Posner, in contrast, argues that criminal penalties should be set to completely deter crime, by eliminating the prospect of gain on the part of the offender. The informal analysis in this section shows how these two approaches can be reconciled within the same framework.⁷

I will examine optimal penalties under two scenarios. One is the case in which the market is not available – in other words, transaction costs are high. The other is the case in which the market is available – transaction costs are low. In both scenarios I assume property rights are enforced by the state, which incurs a cost whenever it tries to apprehend an offender.

2.1. BICYCLES AND THIEVES: AN EXAMPLE

2.1.1. *Market Not Available (High Transaction Costs)*

I will consider a simple example that illustrates Becker’s approach to penalties. Suppose the victim owns a bicycle worth \$75 to him. There are potential offenders (thieves) who will steal the bicycle if they meet up with the victim. Assume that there is a mix of high and low-valuing offenders. One type of potential offender

6. See also Shavell (1985). Becker’s article provides the core framework for the modern analysis of penalties. Posner’s article, as I hope to make clear in this part, significantly extends Becker’s by introducing transaction costs as a factor in the analysis of penalties. Long before the modern literature, we have Beccaria (1764) and Bentham (1781).

7. For an alternative approach, see Polinsky and Shavell (1994), who examine the implications of error for the choice between internalizing and gain-eliminating penalties.

values the bike at \$100, the other type of offender values the bike at \$25. Suppose further, that if a theft occurs, the state will apprehend the offender at a cost of \$10.

The optimal penalty equates the offender's liability with the marginal social harm of his conduct. Since the marginal social harm is the sum of victim's loss and society's enforcement cost, the optimal penalty is simply \$85. Offenders who value the bicycle at \$100 will continue to steal bicycles, while those who value the bicycle at \$25 will be deterred. This is economically efficient, because high-valuing thieves produce a social dividend of \$25 ($\$100 - \75) every time they steal a bicycle, so we don't want to discourage them. The low-valuing thieves, however, produce only a social loss, so we do want to discourage them. The optimal penalty deters only the low-valuing thieves because it is designed to internalize the social harms due to theft.

Now consider the case in which there are only low-valuing thieves. In this case, the internalizing penalty of \$85 will suffice as a deterrent. However, since there is no social dividend produced by thefts in this case, there is no reason to stick with the internalizing penalty. We could just as well choose a penalty of \$1 million. Indeed, any penalty greater than \$25 works equally well as a deterrent from the perspective of social welfare. Rather than aiming to internalize social losses, the optimal policy in this case is to completely deter offenses by eliminating the offender's gain.

This example yields two approaches to criminal penalties; the internalization, or harm-based approach, and the complete deterrence, or gain-eliminating approach. If some theft is efficient, then the optimal policy is to set the criminal penalty in order to internalize the social losses from theft to the offender. If all theft is inefficient (all potential offenders attach valuations lower than the victim's), then the optimal policy is to set the criminal penalty in order to completely deter theft, and this is guaranteed by setting the penalty at a level that eliminates the offender's expectation of gain. Becker's analysis strongly suggests that the internalization approach is preferable because it serves as an optimal deterrent in the regime in which some theft is efficient, and in the regime in which all theft is inefficient.

2.1.2. Market Available (Low Transaction Costs)

Now let us assume that an offender could easily bargain for and purchase a bicycle from the victim, rather than steal it from him. Suppose further that the costs of such a transaction amount to only \$1 for each party (potential offender and victim). If a high-valuing offender purchases a bicycle, his surplus will be \$100 less the sum of his transaction cost (\$1) and the price he pays for the bicycle. The surplus to the potential victim is equal to the price he receives less the sum of his reservation price (\$75) and his transaction cost (\$1).

Posner (1985) argues that the optimal penalty in this case is the full deterrence, or gain-eliminating penalty. This is so even in the case in which some theft would be efficient (because the offender's gain, \$100, exceeds the victim's loss, \$75). Note that this differs from Becker's prescription.

What explains the difference between Posner's recommendation and Becker's? Suppose all bicycle trades occur through voluntary bargains. Then the social dividend from each transaction will be $\$100 - \$75 - \$2$.

In contrast, suppose bicycle transfers occur through theft. Suppose, moreover, that the state enforces property rights and imposes the internalizing penalty of \$85. Only high-valuing thieves will steal bicycles. In each case of a theft, the difference between the offender's gain and the victim's loss is \$25, which suggests that the social dividend could be positive. But we don't want to allow these thefts anyway. The reason is that although the social dividend from theft may be positive, it is smaller than the social dividend from voluntary transactions. The social dividend from theft is the difference between the offender's gain and the victim's loss, \$25, *less* the enforcement cost of \$10. The social dividend from a market transaction is the difference between the offender's gain and victim's loss, \$25, *less* the transaction cost of \$2. Hence, society prefers voluntary transactions over theft, and should therefore set the penalty at a level that completely deters it, in order to force every potential offender to use the market.

Kaplow and Shavell (1996) suggest that the fact that society prefers voluntary transactions does not immediately imply that the penalty should be set at a level that completely deters theft. If bargaining is successful, in the sense that the parties always reach a deal when there is a set of mutually beneficial potential agreements, thefts will not be observed even when the penalty is set at the internalizing level. To see this, suppose the penalty is set at the internalizing level, \$85. The maximum gain the offender can get from a theft is \$15 ($\$100 - \85). The maximum gain the offender can get from a bargain is $\$100 - \$1 - \textit{price demanded by victim}$. Under these conditions he may prefer to bargain. If the victim sets his price at \$76 (just enough to cover the value of the bicycle and the transaction cost), the potential surplus the offender can get from a bargain will be \$23, and the offender will prefer to bargain. No enforcement costs will be incurred because all bicycle transfers will occur through bargains.

It should be clear, in light of Kaplow and Shavell (1996), that Posner's argument implicitly assumes that bargaining will not always be successful under the internalization rule (even though transaction costs are low). Alternatively, the argument assumes that bargaining will be less successful under the internalization rule than under the gain-elimination rule. There are good reasons to believe this is likely. First, under the gain-elimination rule, the total available surplus and the contract zone (the range of prices at which a transaction can occur) are both equal

to \$23. Under the internalization rule, the total available surplus remains \$23, while the contract zone shrinks to \$8 (because the offender will steal whenever the victim's demand price exceeds \$84).⁸ This suggests that successful bargains are less likely under the internalization rule. If, for example, a victim attempts to split the surplus with the bargaining offender, the bargain will fail.⁹ Alternatively, suppose victims have idiosyncratic components of value that average to zero, so that the internalizing penalty remains correct on average. Deals will fail more frequently under the internalization rule because of the shrunken contract zone.¹⁰

The foregoing suggests a simple condition under which gain elimination (or full deterrence) is preferable to harm internalization. *If, on the margin, the cost of transacting is less (greater) than the cost of enforcing legal entitlements, then the gain-eliminating penalty is preferable (inferior) to the internalizing penalty.*¹¹

This provides a simple answer to the question of why the state should prohibit theft even when the gain to the thief exceeds the loss to the victim. McChesney (1993) and Hasen & McAdams (1997) argue that "secondary costs," specifically, the costs of security and effort to avoid crime,¹² provide the strongest ground for enforcing a prohibition of theft. Tullock (1967), focusing on the resources devoted

8. When the demand price hits \$84, the total surplus from a bargain is $\$100 - \$1 - \$84 = \15 , at which point the offender is indifferent between a transaction and a theft.

9. Suppose, for example, the victim seeks to split the available surplus of \$23. He will demand a price of \$86.5 for the bicycle. The potential surplus to the offender from such a bargain will be \$11.5, which is less than the \$15 surplus from theft. The offender will take the bicycle in this case. One might argue that this is irrational on the part of the victim, given that he would be better off setting a price of \$80 and reaping a surplus of \$4, rather than suffering a theft and losing \$75. However, once the offender chooses to bargain with the victim, the victim may interpret the offender to have committed himself to bargain rather than steal. The offender, realizing that bargaining with the victim may signal a commitment to bargaining, may find it rational to take rather than bargain.

10. Suppose, for example, the idiosyncratic component of value is distributed normally about the average valuation of \$75. In this case, as the contract zone shrinks the number of failed bargains increases.

11. This condition is not explicitly stated in Posner (1985), but it is implied by the argument. One can view this condition as a minor extension of Posner's argument. For the technical statement and derivation of this condition, see Proposition 3 of the appendix. The appendix also examines the case of third party losses. I show that if the penalty does not internalize third-party losses (only direct victim losses), the gain-eliminating penalty is preferable whenever the transaction cost is less than the sum of enforcement and third-party costs. Since third-party costs – losses to employers, relatives, and friends of crime victims – are often quite large in connection to the worst offenses, this suggests a good reason to view gain elimination as the optimal policy.

12. The category of "secondary costs" includes a wide variety of costs connected to offensive conduct. McChesney (1993) and Hasen and McAdams (1997) focus on security and the costs of wasteful expropriative efforts. However, one can also include victim precaution costs in this category. On the economics of victim precaution, see Ben-Shahar and Harel (1995) and Hylton (1996).

to transfers as well as defensive expenditures, suggested the same, though with a more general application. In particular, Hasen and McAdams conclude that theft should be prohibited when the transaction costs of using the market are less than the secondary costs generated by a theft.¹³ The analysis here shows that there is a simpler rationale for completely deterring theft. If the costs of using the market for a given transaction are less than the enforcement costs generated by a theft used in place of the transaction, then the state should prohibit theft even when the gain to the thief exceeds the loss to the victim.¹⁴

2.2. SUMMING UP: THREE PENALTY CATEGORIES

This analysis suggests the following rules respecting penalties.

Category 1 (always socially undesirable conduct): Assuming transaction costs are high (exceed enforcement costs), if the offender's conduct is always socially undesirable or inefficient, in the sense that the offender's gain is never greater than the victim's loss, the optimal punishment policy is to eliminate the offender's prospect of gain.

Category 2 (potentially socially desirable conduct): Again, assuming high transaction costs, if the offender's conduct is potentially socially desirable, in the sense that the offender's gain may be greater than the victim's loss, then the optimal policy is to set the penalty at a level that internalizes society's losses.

Category 3 (market-bypassing conduct): If transaction costs are low, then the optimal punishment policy is to set the penalty at the full deterrence or gain-eliminating

13. I examine a model of secondary costs in working paper version (Hylton, 2005). The model is used to derive the penalty that internalizes secondary costs. The model formalizes the approach of McChesney (1993) and Hasen & McAdams (1997), and shows that secondary costs can (at least in theory) be internalized as part of the optimal penalty. In light of this, the presence of secondary costs suggests two possible reasons for prohibiting theft. One, following McChesney and Hasen & McAdams, is that the secondary costs (per transfer) may be greater than the transaction cost. The other is that penalties may systematically under-internalize secondary costs, given the difficulty of estimation. The treatment of secondary costs in the appendix illustrates the difficulties a punishment authority would encounter in trying to specify penalties that internalize both primary and secondary costs. In particular, a policy of varying fines according to the wealth of the offender appears to be optimal when secondary costs are taken into account. The reason for this is that the portion of the optimal penalty that takes secondary costs into account includes the probability of an offense, see appendix. See also, Hylton (1996) (examining optimal fine in victim precaution context). Since that probability will itself depend on the offender's wealth (because wealthy offenders will be willing to pay more for an object they desire), the optimal penalty in the presence of secondary costs may vary with the wealth of the offender. For an earlier analysis of the relation between optimal penalties and the wealth of offenders, see Friedman (1981).

14. This is similar to Calabresi and Melamed (1972), who argue that property rules are superior to liability rules when transaction costs are low. Here, however, the focus is on criminal penalties, and the prescription is more precise.

level. The reason is to force potential offenders to use the market. In the following section, I explore the implications of this rule for criminal intent doctrine.

3. TOWARD AN UNDERSTANDING OF CRIMINAL INTENT

My goal in this part is to translate the basic economic lessons on criminal penalties into fundamental requirements for the imposition of criminal sanctions. This is not a hard task. We need only consider a few concrete examples of always-socially-undesirable conduct (category one) or market-bypassing conduct (category three). Since criminal law aims to completely deter socially undesirable behavior, I will take the always-socially-undesirable and market-bypassing penalty categories as the general theoretical bases for criminal prohibitions. The remaining category, which includes conduct that may be socially desirable and high transaction costs, is not appropriate for criminal prohibition. For potentially desirable conduct, a policy of internalization, as expressed in tort law, is the appropriate policy.

For simplicity, let us start with the category of market-bypassing conduct (category three), which assumes low transaction costs. The penalty rule says that when the market is available, and transactions are cheap (relative to the cost of law enforcement), we should set the penalty in order to eliminate offenses. The bicycle theft example fits in this category easily, since most people interested in using someone's bicycle can purchase it or bargain for more limited use. Where such bargaining is impossible (i.e., transaction costs are high) and where the potential offender has a great need for the bicycle – as in the case of a person who steals a bicycle in order to deliver life-saving medicine – the law allows a necessity defense. Under the necessity doctrine, an offender may be held liable for the victim's losses (*Vincent v. Lake Erie Co.*, 124 N.W. 221 (Minn. 1910)), but will not be held criminally liable for his conduct.

Taking a more expansive view, one can treat a large number of crimes as falling within the market-bypassing category. Trespass to real property occurs in low transaction cost settings, the only exceptions arising in the necessity case. Trespass to the person, i.e., battery, typically occurs in low transaction cost settings. One could certainly bargain for permission to batter someone else. Posner (1985) puts rape in this category too, because it involves the deliberate bypassing of a type of exchange in the courtship market.

The first penalty category, encompassing always-socially-undesirable conduct, involves activities that occur in settings in which bargaining is costly or unlikely to occur, and which are generally socially undesirable. One example is reckless conduct, such as driving a car at a high speed through an area crowded with pedestrians. Assuming the driver does not have a pressing and socially justifiable

need to drive fast (e.g., he does not need to rush to save an even larger number of people than the group he puts at risk by his driving), his conduct is most likely inefficient. The social gain from his conduct is unlikely to exceed the losses imposed on others.

Another example that falls in the always-socially-undesirable activity category is allowing an incompetent to drive a car or a boat. For example, suppose a parent allows a young child to control the steering wheel of his car as he drives through an area crowded with pedestrians. Similarly, if an oil company were knowingly to allow a habitual drunk to pilot a supertanker, we should consider this an example of socially undesirable activity (*In re The Exxon Valdez*, No. A89-0095-CV (HRH), 1995 WL 527988 (D. Alaska Jan.27, 1995)).

Though often described as a departure from the rule of criminal intent, the felony-murder rule serves as another example of punishment within the socially undesirable activity category. Under the felony-murder rule, an offender who accidentally kills someone in the course of a robbery would be convicted of murder. Although the offender is not attempting to kill the victim, he is engaging in socially undesirable conduct that imposes a substantial risk of the very harm that occurs.

These examples suggest two general types of intent that justify criminal prohibition. One is intent *to expropriate or to force a change in endowments that could have been arranged through a consensual transaction*. Theft and rape clearly reveal this type of intent. Murder also reveals this type of intent. Although most would not voluntarily accept a deal for their own murder at any price, this does not suggest an exception to the rule against murder. Indeed, the rule should be solidified in this case because the gain to the offender is even less likely ever to exceed the victim's loss.

The other type of intent that justifies criminal prohibition is *indifference* toward the welfare of others, as exemplified in the case of reckless driving. Indifference is inferable from facts indicating conditions under which the offender should have foreseen or have been aware of the enormous risks his conduct imposed on others. In this case there is no direct effort to force a change in another's endowment. However, one engages in an activity, for example gun play, that obviously has a high risk of harming others and whose social utility is small.

One implication of this argument is that the doctrine of criminal intent is, on its own, an empty concept. Its key function is to serve as a label used to distinguish conduct that falls in the always-socially-undesirable or market-bypassing categories from conduct that is potentially socially desirable. Where the evidence suggests that the defendant's conduct falls in either the socially-undesirable or the market-bypassing category, we say that the offender had a criminal intent.

Put another way, the doctrine of criminal intent serves a *channeling* function that permits us to distinguish the different sorts of conduct in order to allocate penalties appropriately. This is a different view from mainstream theory, which would argue that there is a certain bad intent or “vicious will” that must be punished with criminal penalties. The bad will justifies harsh penalties. The argument here is that the conduct justifies the harsh penalties, and vicious will is merely a legal construct that helps us, *ex post*, distinguish different types of conduct in order to apply the appropriate penalties. In the next part I use this framework to construct a positive theory of criminal law doctrines.¹⁵

4. APPLICATIONS

4.1. THE TORT-CRIME BOUNDARY

The easiest and most straightforward application of this model is to the boundary between torts and crimes in the common law. Recall that the categories of always-socially-undesirable and market-bypassing conduct form the bases for a policy of prohibition or full deterrence, effected through penalties that remove the prospect of gain from offenders. These categories span the areas in which criminal law operates. The remaining category, consisting of potentially socially desirable conduct, spans the area in which a policy of internalization is appropriate, and this is the area in which tort law alone should apply.

Since almost all crimes are also torts, there is really no such thing as a boundary between tort law and criminal law. The correct description of the separation between doctrines is that the categories of socially undesirable and market-bypassing conduct describe areas in which tort and criminal law co-exist, while the category of potentially socially desirable conduct is one to which tort law alone applies.

Given that tort and criminal law co-exist in the areas of socially undesirable (or reckless) and market-bypassing conduct, does this framework have any

15. Though simple, this framework is distinguishable from and more complicated than the reductive approach of Holmes (1881). Holmes argued that intent was simply a label the law fastened to conduct in cases where the likelihood of harm was extremely high (Holmes:53-68). The two “intent” categories identified by this framework fall within Holmes’ definition. However, Holmes’ approach loses some of its predictive power by failing to separate out the category of market-bypassing conduct. This paper’s model is also distinguishable from and more complicated than that of Posner (1985). Posner, complementing Holmes’s analysis, focuses on market bypassing as the central offense motivating criminal law, without separating out the category of always-inefficient or always-socially-undesirable conduct (e.g., reckless driving) as a special category for criminal prohibition.

implications for the particular tort rules that apply within these areas? Under tort doctrine, strict liability rules apply to these types of conduct. A defendant who acts recklessly is held liable without any inquiry into the reasonableness of his conduct or into the reasonableness of the conduct of his victims. Similarly, a defendant who bypasses the market by stealing the property of the victim is strictly liable under the tort of conversion.

Strict liability for reckless and market-bypassing torts internalizes the victim's harm to the offender. One might think, at first, that this is inconsistent with this paper's framework, because the framework suggests that penalties should aim to completely deter this sort of conduct rather than to simply internalize victim losses. However, on closer inspection the tort law rules appear to be surprisingly consistent with this paper's framework.

Consider, for example, strict liability for conversion. Traditionally, the plaintiff could elect to "force a sale" as the remedy for a conversion action, requiring the defendant to purchase the property at its full market price on the date of the conversion. This could be more costly to the defendant than a simple damages remedy. The traditional remedy had the effect of forcing the offender back into the very market that he had attempted to bypass.

For example, consider the case of digging gold out of the plaintiff's land (*Maye v. Tappan*, 23 Cal. 306 (1863)). An innocent converter, one who thought that he was really digging gold out of his own land, would be forced to pay a standard damages remedy – the value of the gold, less the benefit conferred on the victim by its removal. This internalizes the victim's loss to the innocent converter. However, where the converter acted in bad faith – he knew that he was digging gold from someone else's property – the rule governing the remedy is harsher. The defendant must pay the plaintiff the value of the gold, without any reduction for the benefit conferred by his labor (Epstein, 2000:12). This remedy goes beyond the mere goal of internalization and ensures that the defendant gains nothing from his conduct.

One might say, fine, these are particular rules covering conversion, but what about the more general case of an intentional or reckless tort? Punitive damages doctrine allows courts to impose remedies that go beyond internalization in these cases, and several cases suggest that courts are likely to impose gain-eliminating penalties in instances where the defendant's intentional tort could have been motivated by a gain that exceeds the plaintiff's loss (Hylton, 1998). In these instances, there is always the risk that the defendant would simply return to the offensive conduct after being required to pay compensatory damages, since his gain may have exceeded the plaintiff's loss.

Consider, for example, *Jacques v. Steenberg Homes* (563 N.W.2d 154 (Wis. 1997)). The defendant wanted to cut across the Jacques's property in order to deliver a mobile home to a customer. The Jacques refused. The only other way to deliver

the home would require digging through a narrow road with as much as seven feet of snow covering parts of it. The defendant cut across the Jacques's property. There was no substantial damage done to their property by this act. The court awarded the Jacques \$100,000 in punitive damages, a penalty that was sufficient to give the defendant an incentive to use the market in future transactions.

4.2. MORE ON INTENT DOCTRINE

One of the aims of this paper is to expose intent doctrine for what it is – a channeling rule that helps courts allocate the appropriate penalties, internalizing or gain-eliminating, to the appropriate conduct. There is no fundamental legal principle that punishes individuals for having a vicious will or for doing something that harms someone else with a vicious will. For example, an individual could, with an evil intent to harm, construct a building that blocks the sunlight from reaching an adjacent building, causing significant financial harm to the victim. Still, that individual will not be held liable under tort law,¹⁶ and there is no chance of a criminal prosecution.

Economists have found the notion of intent perplexing. A broad range of conduct that does not fall under the criminal prohibition could be carried out with intent to harm. Indeed, the notion of intent does not appear to be a useful way of distinguishing conduct that falls under the criminal law from conduct that falls under tort law exclusively. Someone who drives negligently has decided that the burden of taking extra care is too costly for him, even though his carelessness imposes a larger cost in terms of the risk of harm on others. In other words, the negligent driver saves \$1 in caretaking costs while imposing \$2 in risk on others. The thief, on the other hand, chooses to impose a loss of \$1 on another in order to gain \$1, or maybe less. The difference between the states of mind that would generate these patterns of conduct appears to be negligible.¹⁷

Under the framework of this paper, intent doctrine is merely a handy legal construct that helps us determine ex post when it is appropriate to apply penalties that seek to eliminate any prospect of gain to the offender. Resentment is strongly correlated with the conduct that is considered motivated by or evidence of criminal intent. However, the feelings of resentment probably have more to do with evolutionary conditioning that causes us to feel emotionally hurt upon observing serious offenses. The notion of a vicious will is too broad to be limited to the relatively small set of offenses that are deemed criminal.

Viewing criminal intent doctrine as a channeling rule, we see that its chief function is to police the boundaries between conduct that merits criminal (full

16. See, e.g., *Fontainebleau Hotel Corp. v. Forty-Five Twenty-Five, Inc.*, 114 So. 2d 357 (Fla. App. 1959).

17. Similar observations appear in Holmes (1881:53-57) and in Posner (1985:1221).

deterrence) sanctions and conduct that merits merely tort (internalizing) sanctions. Courts are instructed under this doctrine to uphold criminal convictions only when the evidence indicates that the offender's conduct was reckless or market-bypassing, and when the court (jury) probably found that it was.

As an example of criminal intent doctrine's channeling function, consider *Regina v. Cunningham* (2 Q.B. 396 (1957)). The defendant went to the basement of 7A Bakes Street, which was being rented by his prospective mother-in-law, though it was at the time unoccupied, and tore the gas meter off the wall, causing coal gas to escape from the connecting pipe. The defendant did it because

I was short of money. I had been off work for three days, I got eight shillings from the gas meter. I tore it off the wall and threw it away (*Regina v. Cunningham*:398).

7A Bakes Street was separated from the house next door in which the victim lived only by a porous wall of "loosely cemented rubble" – the two houses had originally been one. The gas seeped through the wall, nearly killing Mrs. Wade, the tenant next door.

The injury to Mrs. Wade resulted from conduct that falls in the recklessness or indifference category. Still, the defendant's "reckless endangerment" conviction was overturned because the jury had not been instructed to determine whether the defendant "foresaw that removal of the gas meter might cause injury to someone but nevertheless removed it (401)." The jury had only been told that it was all right to convict the defendant if they felt he had acted wickedly.

If we are going to be careful about imposing criminal penalties only on conduct that should be completely deterred, then we must determine whether the defendant's conduct is reckless, in the sense of showing indifference to the welfare of others, or whether it bypasses the market. The term "wicked" is inadequate for this task in *Cunningham*. To be sure that it was appropriate to impose a sentence for endangerment, the trial court had to find that the facts justified the inference that the defendant had acted with indifference toward the welfare of Mrs. Wade. Since the jury had not clearly made that determination, it was consistent with the channeling function of intent doctrine for the court to overturn the endangerment conviction.

The typical felony-murder case is only slightly different from the gas meter case, and easily understandable within this framework. Though felony-murder may seem to be an abandonment of the requirement of finding intent to murder, it is better viewed as a presumption that the facts justify an inference that the defendant acted with indifference toward the welfare of his victim. Take the case of a robber who holds a loaded gun toward his victim's chest. The robber is startled by a noise and shoots, accidentally killing his victim. It would be absurd to overturn the robber's

felony-murder conviction because the jury had not been allowed to determine whether the robber foresaw that he might accidentally shoot his victim. Anyone who holds a loaded gun to a person should know that there is a risk that he may kill his victim by accident. A sensible (administrative cost saving) rule would adopt a presumption that the felony-murder met the intent requirement for conviction.

As for market-bypassing conduct, intent doctrine serves the same function of policing the boundaries of criminal law to ensure that penalties are applied only in those cases in which the evidence strongly supports the inference that the defendant tried to bypass the market. *Regina v. Smith (David)* (1 Q.B. 354 (1974)) serves as an example of this particular channeling function. The defendant, David Smith, had installed electrical wiring, roofing, wall panels, and floor boards in the apartment he was renting, all with the permission of the landlord. According to the law, these minor additions became property of the landlord. When he decided to leave the apartment he asked the landlord if his brother, who had been living with him, could remain as the tenant. The landlord refused, and David Smith damaged the roofing, wall panels, and floor boards in the course of taking out the electrical wiring. He argued in defense that he thought he was damaging his own property. The trial court judge told the jury that

belief by the defendant David Smith that he had the right to do what he did is not lawful excuse within the meaning of the [Criminal Damage] Act. Members of the jury, it is an excuse, it may be a reasonable excuse, but it is not, members of the jury, a lawful excuse, because, in law, he had no right to do what he did (*Smith (David)*:357-58.).

David Smith's conviction was overturned because the jurors were precluded from considering a valid legal defense—specifically that he did not have the market-bypassing intent required under criminal law.

The case of the person who digs gold out from a piece of property in the mistaken belief that the property was his own provides a considerably more persuasive case for excusing the defendant on the ground that he lacked criminal intent. *Smith (David)* is a weaker case because the defendant should have been aware that he was damaging the landlord's property by damaging accessions to it. Still, the case illustrates the strictness with which courts apply the intent requirement in order to channel penalties to the appropriate conduct. Criminal penalties should be applied to market-bypassing conduct only when the evidence indicates that the defendant intended to bypass the market. Therefore, convictions in criminal trials should be upheld, under the intent doctrine, only when it is clear that the jury found that the defendant tried to bypass the market. Since the jury had no opportunity to make this finding in *Smith (David)*, the appellate court's

decision to overturn the conviction is consistent with intent doctrine's channeling function.

4.3. NECESSITY

The role played by the doctrine of necessity, which excuses offenses carried out in lesser-of-two-evils situations, falls out of this analysis easily. Under this framework, criminal prohibition is not appropriate, and only tort (internalizing) penalties are appropriate, when transaction costs are high and the offender's gain probably exceeds the victim's loss.¹⁸ Viewed in economic terms, the necessity cases all seem to fit this general description.

There are several examples that courts have cited through the years as cases in which the necessity defense is allowed. One is that of the starving man, lost in the woods, who breaks into a cottage in order to steal bread. In this example, transaction costs are obviously high, since the starving man has no opportunity to offer a bid to anyone for permission to break into the cottage. The offender's gain is probably greater than the victim's loss, since the damage done to the cottage – a broken window or door – costs less than the alternative of letting a man starve to death.

Some other examples fit the same pattern. A driver whose bus is careening out of control turns toward the right, running over the victim, in order to avoid hitting a group of school children. Alan and Bob, both thrown overboard, swim for the same life jacket, which is large enough to support only one person. Alan gets hold of it first, pulling it out of Bob's reach. Another shipwreck example: the lifeboat is too small to support all of the people on board, so the crewmen decide to throw a few overboard.

The shipwreck cases are the most troubling. The case of Alan and Bob seems at first glance to barely fit within the framework of this model because the gain to Alan appears to equal Bob's loss. However, the proper focus should be on their aggregate welfare. Since the lifejacket is large enough to support only one person, the only question is whether Alan or Bob will benefit from the enhanced survival likelihood. As long as one of them gets to the lifejacket, their aggregate welfare has improved. However, it might be a different case if Alan were to draw a gun and shoot Bob in order to ensure his victory in the race for the life jacket, for then Bob's loss (certain death) would exceed Alan's gain (probable survival).

The case of the crew that throws several of the survivors off the lifeboat in order to prevent it from going under appears at first to be easily justifiable – i.e., the necessity defense should be allowed, since transactions costs are high and the

18. This rule is suggested (though not stated explicitly) in Posner's discussion (1985:1229). For the technical derivation of this rule, see Proposition 3 of the appendix.

social gain exceeds the loss. However, the best known case of this type, *United States v. Holmes* (26 F. Cas. 360 (C.C. Penn. 1842)), rejected the necessity defense. The court held that Holmes and his fellow crewmen should have first determined how many crewmen they had beyond the minimum necessary to navigate and maintain the lifeboat, and then drawn lots among that group of excess crewmen to determine which of them would get to stay in the lifeboat. Holmes and crew had not done this. They had decided to jettison men whose wives were not on the lifeboat. Eighteen of them had been cast off by the time the boat was rescued.

Although the decision in *Holmes* seems initially to be inconsistent with this paper's account of necessity doctrine, there is a simple economic principle that allows us to make sense of it. The court's decision introduces a new rule that says that crewmen must not arbitrarily prefer themselves over passengers in a shipwreck. This is a sensible rule, given the moral hazard that would be encouraged under a rule that allowed crewmen to prefer themselves over the passengers. If crewmen could choose to save themselves ahead of the passengers, they would be insured, to some extent, against losing their lives in most shipwreck settings. The crew would know that in the event of a shipwreck, they could anticipate having a better sense of where the lifeboats are, how much weight they can support, and so on. Given this informational advantage, the crew could be relatively sure that it would be passengers, not crewmembers, who would perish in a shipwreck. This could dull their incentives to minimize the risk and severity of a shipwreck – relative to a norm requiring the crew to be the first to be sacrificed or to go down with their ship.¹⁹

The court in *Regina v. Dudley and Stephens* (14 Q.B.D. 273 (1884)), though rejecting *Holmes* as suitable precedent, interpreted it as consistent with a rule rejecting the necessity defense in the case of the self-preferring shipwreck victim who kills and eats another victim in order to save himself from starvation (*Regina v. Dudley and Stephens*:285). This is a harsh rule, because survival cannibalism had become an accepted practice among seafarers (Simpson, 1984:145). Indeed, Dudley and Stephens had made no effort to keep secret the fact that they ate Richard Parker (Simpson, 1984:10), though norms of decency developed in seafaring communities had kept most shipwreck survivors from talking openly about cannibalism.²⁰

19. There are recorded instances in which this norm has been followed rigorously. Simpson (1984) reports the sinking of the troop ship *Birkenhead* on February 26, 1852, resulting in the loss of 454 lives. "[T]he men of the 74th Highland Regiment stood at attention on deck, the band playing, while the women and children were saved, and the captain very properly went down with his ship" (1984:97).

20. For example, the cannibalism that occurred after the sinking of the whaleship *Essex* in 1820 had been whispered about, but not openly discussed, for generations on Nantucket (Philbrick, 2000:217-218).

But if we keep in view the moral hazard principle that justifies the decision in *Holmes*, we see that the rule announced in *Holmes* is much more limited than that of *Regina v. Dudley and Stephens*. Moreover, the *Dudley and Stephens* rule against self-preference is hard to reconcile with the economic basis for a necessity defense. The facts suggested that Dudley, Stephens, and Brooks survived because they ate Parker, who had been severely weakened by famine and by drinking sea water before they killed him. To force them to prove that they knew with near certainty, *ex ante*, that the social gains would exceed the loss, which is implicitly what the decision in *Dudley and Stephens* requires, would be an impossible burden, equivalent to rejecting the necessity defense as a matter of law in the survival setting. This is undesirable because it probably would not deter cannibalism on the high seas, and if it did would only lead to more losses. The function of the necessity defense is to prevent the law from producing this worst-of-two-evils outcome.

4.4. HISTORY OF CRIMINAL PENALTIES

This paper's framework provides a simple explanation for the general historical pattern of criminal penalties and law enforcement. Recall that, under this model, internalization is the best policy if the cost of a voluntary transaction is greater than the enforcement costs generated by an offense, and the offender's gain is probably greater than the victim's harm. Full deterrence or gain elimination is the appropriate policy in the other two scenarios: (1) the cost of a transaction is less than the enforcement cost, or (2) the offender's gain is less than the victim's harm.

This scheme is consistent with Adam Smith's description of the history of criminal penalties, set out in his *Lectures on Jurisprudence* (1763). Smith explains that in the earliest governments, the state sought largely to act as a mediator in disputes between clans. Thus, if one clan had expropriated the land of another, or murdered a member of the other, the state would intervene to bring about a cessation of hostilities through some form of compensation.

The reason of this was the weakness of government in those early periods of society, which made it very delicate of intermeddling with the affairs of individuals. The government therefore at first interposed only in the way of mediator, to prevent the ill consequences which might arise from those crimes in the resentment of the friends of the slain. For what is the end of punishing crimes, in the eyes of people in this state? The very same as now of punishing civil injuries, viz the preserving of the publick peace. The crimes themselves were already committed, there was no help for that; the

main thing therefore the society would have in view would be to prevent the bad consequences of it (Smith, 1763:106).²¹

Smith offers several examples of the compensation approach of ancient societies.

There are several instances of it in Homer. Nestor tells Achilles that presents appease everyone; for presents a father forgives the death of his son (1763:108).

This appears to have been the practice of the barbarian ancestors of all the nations of Europe, in one generall manner. In the laws of every one of these nations we find a particular estimation set upon each particular member. Thus in the laws of the Lombards if one drives out 1 of those teeth which appear in the laughter he paid 2 shil.; if 1 of those which do not, that is a jaw tooth, 1sh; if 2 of the former, 4sh; if 3, 6sh; if two of the latter, 2sh; if 3, 3sh... But after they had given as many as came to 18sh they paid no more, the rest being taken into the bargain; for otherwise one might be ruined by giving an other a very hearty drubbing (1763:117).

The compensation or internalization approach taken by ancient societies allowed crimes to occur on the same basis on which torts occur today. The wealthy would not be deterred by the criminal laws, for they could buy off their victims.

In more advanced governments, the state sought to prohibit almost all criminal acts by announcing extremely high sanctions, such as the death penalty, for almost all crimes. As these states advanced toward the most advanced states, penalties fell, though not for every crime. Smith said that penalties fell first for those crimes that could be easily detected. The death penalty (or some other extreme sanction) remained for those crimes that could not be easily detected (or for which the opportunities for commission were numerous relative to the opportunities for detection).²² According to Smith,

History affords us many instances of this. The laws of the 12 Tables, which were made about the time of the declension of compensation, punished many of the slighter crimes with death. A libell, as we observed, was

21. I have copied the original spelling.

22. For example, under the Roman Twelve Tables, theft was punished in most cases with restitution of double, while theft of the instruments of husbandry (plows, etc.) was punishable with death (Smith 1763:132). Anyone who has passed through a farming community knows that these instruments sit out unattended in the fields. No farmer could make a living if he had to suffer his instruments being stolen every time he left them unattended. The Twelve Tables also imposed the death penalty on one who cut down another's crops in the night, or pastured his animals on another's land in the night.

capitally punished. But afterwards the praetors changed these punishments into milder ones, more suited to naturall equity. In the same manner the first laws that the Athenians had after the method of compensation had been laid aside were those of Draco, the most bloody ones imaginable. Death was the punishment of the smallest as well as of the greatest crimes; so that [Solon] says that he punished in the same manner the stealing of a cabbage as he did sacrilege or murder. These were afterwards succeeded by the mild and equitable laws of Solon. In the same manner also in Britain almost all crimes of moment were considered as treasonable; the killing of any person, at first and afterwards the husband and wives killing the other, robbery, and theft in some cases, as that before mentioned, even the non payment of debt, were considered treasonable, and punished accordingly. We already observed that this has been in some measure taken away as with regard to theft... The first punishments after compensation is laid aside are always the most severe and are gradually mitigated to the proper pitch in advances of society (Smith, 1763:130-131).

In the earliest stages of government, the expected cost of enforcing the law against any forced transaction (e.g., theft of personal property) was probably low, because the probability of enforcement was miniscule. No doubt the act of enforcing was expensive, but it was so unlikely to occur in response to any particular offense that the expected cost (the probability multiplied by the actual enforcement cost) was tiny. On the other hand, the cost of transacting may have been substantial in a developing economy with a weak market infrastructure and in which markets for many goods were thin. The model of this paper implies that internalization was the economically efficient policy, and Smith's account says that early governments essentially adopted a policy of internalization.

As government advances, the cost of a transaction falls relative to that of enforcement. Although the cost of the act of enforcing probably did not rise by much, the number of enforcers increased with the size of government. As this raised the probability of enforcement, the expected cost of enforcement increased along with it. The first response of governments in this period was to set up a system of harsh sanctions in order to force people—rich and poor alike—into voluntary transactions. The harsh sanctions could be justified by the need to encourage voluntary transactions and the need to offset the low probability of enforcement with a high sanction.

In the third stage described by Smith, government and its enforcers grew to a size that would generate a substantial probability of enforcement. For those crimes that could be detected most easily, the penalties fell. For those that could not be detected easily, the harsh penalties remained. Of course, in all cases penalties were kept sufficiently high to induce people to bargain and bid rather than take what

they wanted. This explains why capital punishment remained the common penalty for market-bypassing crimes such as rape, while penalties were lower for offenses such as manslaughter or killing "chance medley" (respectively second degree murder or involuntary manslaughter today). As one of several examples of the connection between penalties and the ease of detection, Smith tells us that "the lesser frauds are generally obliged to be recompensed by the deceiver and are besides punished with a fine (Smith, 1763:131)," while insurance fraud was punished with death because "as the detection of such transactions is very difficult, and great profits might be made by it, the temptation to commit such a fraud is very great and consequently the punishment must be high (Smith, 1763:132)."

5. CONCLUDING REMARKS

My goal in this paper has been to set out a simple, spare economic framework that explains the key features of criminal law and reconciles the seemingly conflicting approaches taken by Becker (1968) and Posner (1985). Becker's analysis delivers a recommendation for internalization as the goal of law enforcement generally, with specific recommendations on the optimal penalty. Posner, in contrast, says that criminal penalties should fully deter in order to encourage use of the market. The framework in this paper includes both approaches as special cases. Moreover, this paper's framework provides a positive theory for doctrines governing criminal intent, the necessity defense, the distinction between torts and crimes, as well as being consistent with the general pattern of criminal punishment over the centuries.

Appendix

In this part, I present a formal model backing up the arguments in Part 2 of the text. Assume all actors are risk neutral and victims are the only parties who suffer loss. The state attempts to apprehend an offender only after an injury has occurred. The state is successful in each attempt to apprehend an offender. However, the state does not attempt to apprehend the offender in each instance of an offense, and therefore the probability of apprehension given an offense is less than one.

Let z = probability of attempted apprehension, $0 < z' < z < z'' < 1$. Let c_s = the state's cost of apprehending the offender, $c_s > 0$; v = the loss suffered by a victim, $v > 0$; F = fine imposed on offender; M = the gross gain to the offender from committing an offense, $M > 0$. M is randomly distributed across potential offenders according to the probability distribution function H , with corresponding density function h , where $h(M_0) > 0$ for any $M_0 > 0$ and $h(M_0) = 0$ otherwise, and where there is an upper support M^u . Since the offender will commit an offense if $M > zF$, the probability that the offender does not commit an offense is $H(zF)$.

If $M^u \leq zF$, no crimes will be committed. Thus, $F = M^u / z$ is both the minimum penalty level that achieves complete deterrence and the level that eliminates the expectation of gain to the offender.

Market Alternative Unavailable

Suppose the market is unavailable, so that in order to enjoy his gain M , the actor must commit an offense. The optimal punishment policy is the combination of the fine and the probability of apprehension that minimizes

$$(1) \quad C = (1-H(zF))(v + zc_s) + H(zF)E[M | M < zF]$$

where the latter term is the expected forgone profit (or forbearance cost) and E is the expectation operator.

Proposition 1: Suppose the offender cannot satisfy his preferences through the market.

(A) If $M^u > v + z'c_s$, then the optimal policy is to set the fine so that it satisfies

$$(2) \quad F = F^* \doteq v/z' + c_s,$$

which implies that the probability of apprehension should be set at the minimum level z' .

(B) If $M^u \leq v + z'c_s$, then the optimal policy is to set the fine so that it satisfies

$$(3) \quad F \geq M^u/z,$$

where the optimal level of the probability of apprehension, z , is indeterminate.

Proof: The first-order condition with respect to F is

$$(4) \quad \partial C / \partial F = zh(zF)(v + zc_s - zF) = 0.$$

The first order condition with respect to z is

$$(5) \quad \partial C / \partial z = Fh(zF)(v + zc_s - zF) + (1 - H(zF))c_s = 0.$$

From (4), there are two potential sets of solutions to the optimal fine problem: $F^{**} = \{F: F \geq M^u/z\}$ and $F^* = v/z + c_s$. If $F \in F^{**}$ is the solution, $\partial C / \partial z$ is zero, whatever the value of z . If F^* is the solution, $\partial C / \partial z = (1 - H(zF))c_s > 0$. Thus, if $M^u > v + z''c_s$, the optimal fine is F^* , and if $M^u < v + z'c_s$ the optimal level of the penalty is any $F \in F^{**}$. Figures 1 and 2 illustrate the solutions by showing level curves for fixed values of z . Now consider the case where $v + z'c_s < M^u < v + z''c_s$. If one starts with an initial value of z such that $z > (M^u - v)/c_s$, then the social welfare function has the shape shown in Figure 2; so a local optimum can be reached at $F \in F^{**}$. On the other hand, one should prefer to reduce z to z' and set the fine at F^* . It should be clear from Figures 1 and 2 that F^* is the global optimum. To show this, let C'' be the value of the social cost function when $F \in F^{**}$, and let C' be the value of the social cost function when $F = F^*$. It is straightforward to show that $C'' = E(M)$. Substituting F^* into C , we have $C' = (1 - H(z'F^*))(v + z'c_s) + H(z'F^*)E(M | M < z'F^*)$. Taking the difference, we have $C' - C'' = (1 - H(z'F^*))(z'F^* - E(M | M > z'F^*)) < 0$, and the result follows. ■

In case A, the offender's maximum gain exceeds the marginal social harm of his conduct, evaluated at the minimum capture probability. F^* internalizes to the offender the social costs of an offense. Since additional enforcement does not enhance welfare, the optimal policy is to set the capture probability to its lowest level in order to minimize enforcement costs.

Now consider case B, where the offender's gain is always less than the marginal social harm of his conduct evaluated at the minimum capture probability. The

optimal policy is to set the fine at a level no less than the minimum that eliminates the prospect of gain to the offender, M^u/\bar{z} . Gain-elimination emerges as the optimal policy because there is no efficiency rationale for allowing offenses to occur. Since all offenses are deterred when the fine is set at M^u/\bar{z} or higher, the optimal probability of apprehension is indeterminate. The only social costs in this regime are the forbearance costs of potential offenders

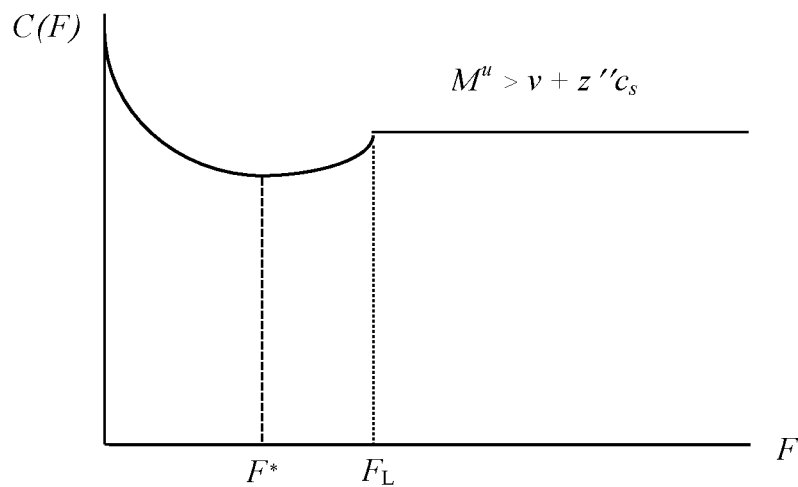


FIGURE 1

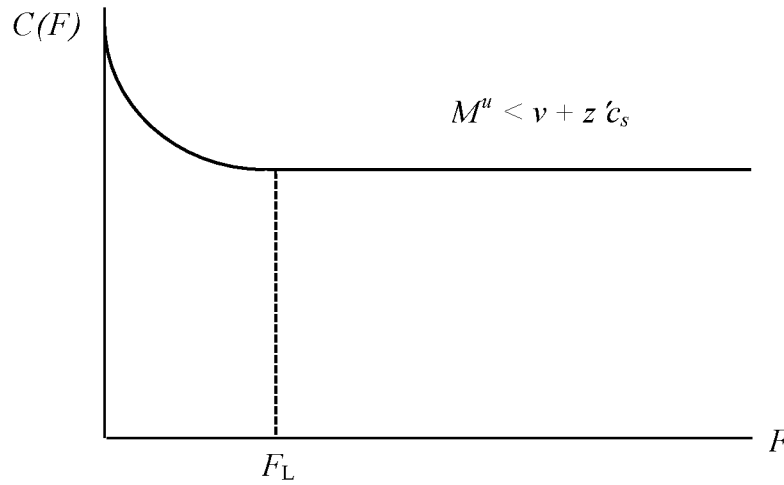


FIGURE 2

Market Alternative Available

Now assume that the offender can satisfy his preferences through the market, with no transaction costs. Whenever offenses are deterred, the offender who values the transfer sufficiently will arrange a consensual transfer with his intended victim.

All offenses will be deterred when $M^u \leq zF$. If $M > v$, the offender will arrange a consensual transfer, which generates a benefit for society equal to $M - v$.

If not all offenses are deterred, the offender may still arrange a consensual transfer. In particular, if the fine is not sufficient to deter all offenses, some offenders (those who are not deterred) will compare $M - zF$ with $M - p_d$, where p_d is price demanded by the victim. If $M - p_d > M - zF$, the offender will prefer to bargain rather than take, and conversely. Alternatively, if $p_d > zF$, the offender will take. To simplify, I will assume $p_d > zF$. The analysis remains the same as long as $p_d > zF$ for some subset of transactions.

The optimal policy is the combination of fine and apprehension probability that minimizes

$$(6) \quad C = (1 - H(zF))(v + zc_s) + H(zF) \{ \text{Prob}(M < v | M < zF) E[M | M < v, M < zF] \\ - \text{Prob}(M > v | M < zF) E[M - v | M > v, M < zF] \}.$$

The last term in (6) reflects the expected social gains from trade. This expression has the equivalent form

$$(7) \quad [1 - H(z^F)](v + z c_s) + \left(\int_0^{\min(v, z^F)} M h(M) dM - \int_{\min(v, z^F)}^{z^F} (M - v) h(M) dM \right).$$

Proposition 2 If the offender has the option of satisfying his preferences through the market, then the optimal policy is to set the fine so that it satisfies $F \geq M^u / z$, where the optimal level of the probability of apprehension is indeterminate.

Proof: To simplify the argument, I will treat z^F as a single variable. Assume $z^F < v$. Differentiating (7) with respect z^F , we have $-h(z^F)(v + z c_s - z^F) = 0$ as the first order condition. Given that $z^F < v$, $z^F = v + z c_s$ is not a solution. If $M^u < v$, then $M^u \leq z^F$ is a set of potential solutions. Now assume $z^F > v$. The derivative of (7) with respect to z^F is $-h(z^F) z(c_s + F)$, and setting this equal to zero, we see that since $z^F > v$ (by assumption), $M^u \leq z^F$ emerges as the only set of potential solutions. ■

EXTENSIONS: TRANSACTION COSTS AND THIRD PARTY COSTS

Transaction Costs

I reexamine Proposition 2 by considering a market in which transactions are costly. When transactions are costly it may no longer be true that the optimal policy encourages use of the market by potential offenders.

Suppose in order to carry out a trade, the “offender” must spend t_1 to reach his trading partner (who would otherwise be a victim), and his trading partner must spend t_2 . Thus, the offender's net gain from a trade is $M - t_1$. The trading partner, on the other hand, will ask for at least $v + t_2$. Trades will take place when $M > v + t$, where $t = t_1 + t_2$.

The social cost function is modified, given these assumptions, as follows

$$(8) \quad [1 - H(z^F)](v + z c_s) + \int_0^{\min(v+t, z^F)} M h(M) dM - \int_{\min(v+t, z^F)}^{z^F} (M - v - t) h(M) dM$$

Proposition 3 Suppose the market is available to the offender, and transactions are costly. If $M^u \leq v + z' c_s$, then gain-elimination is the optimal

policy. If $M^u > v + \kappa'c_s$ and $t \geq \kappa'c_s$, the internalization policy F^* is optimal.
 If $M^u > v + \kappa'c_s$ and $t < \kappa'c_s$, then gain-elimination is optimal.

The proof is a straightforward extension of those for the first two propositions. This result shows that when the marginal cost of using the market, t , exceeds the marginal cost of the enforcement process, $\kappa'c_s$, the internalization policy of Proposition 1 reemerges. The reason is that society no longer has a strong reason to encourage use of the market when transactions are extremely costly. The optimal policy encourages use of the market only as long as the marginal transaction cost is less than the marginal enforcement cost.

Third-Party Costs

Third-party costs can be incorporated by simply redefining $v = v_1 + v_3$, where v_1 is the loss to the victim and v_3 is the loss suffered by the third party. Trade will occur in the market whenever $M > v_1 + t$. However, every offense leads to social losses equal to $v_1 + v_3 + \kappa'c_s$. Thus, the relevant comparison now is between t and $v_1 + \kappa'c_s$. If $t < v_1 + \kappa'c_s$, that is, if transaction costs are less than the sum of third-party losses and enforcement costs, then the market is cheaper as a method of satisfying the offender's preferences, and should therefore be encouraged.

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