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Deterrence Theory: Key Findings and Challenges

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Governments regulate for many reasons, and deterring future undesirable acts is surely one of them. Economists have much to offer to deterrence-minded regulators. Economics studies how people respond to incentives, so economists can tell regulators *how* to deter. Economics also aspires to offer a rigorous definition of desirable behavior, so economists aim to tell regulators *what* to deter and *why*.

This Chapter focuses on the economic analysis of deterrence. This analysis is not tied to any particular body of law. If we consider voluntary agreements among individuals—the subject of contract law—deterrence aims to induce efficient contracting, including efficient breach. If we focus on accidental harms governed by tort law, deterrence refers to assuring efficient levels of care and activity by tortfeasors and victims. And if we consider public enforcement of law—government enforcement of rules ranging from criminal law to banking, securities, competition, tax, environmental, labor, and safety regulation among others—deterrence refers to preventing future socially harmful conduct.

Each area just mentioned has been extensively studied, and comprehensive reviews are available for each (Hermalin, Katz, and Craswell 2007 for contracts, Shavell 2007 for accidents, Polinsky and Shavell 2007 for public enforcement of law). Given the space constraints as well as the continuous growth and importance of government regulation, this Chapter focuses on public enforcement of law.

No attempt is made here to replicate Polinsky and Shavell's (2007) masterful review of the economic theory of public enforcement of law, also known as the theory of optimal deterrence. That review excels in presenting a cohesive theoretical framework that answers many basic questions of law enforcement. Rather, this Chapter outlines the key findings of the deterrence theory and highlights the remaining challenges.

The theory of optimal deterrence investigates how the government may achieve its objective given the individual decisionmaking strategy. The government objective is to maximize what deterrence scholars often refer to as social welfare. The meaning of that term, however, is typically restricted to efficiency or just to net gains. Thus, Polinsky and Shavell (2007) define social welfare as "the benefits that individuals obtain from their behavior, less the costs that they incur to avoid causing harm, the harm that they do cause, the cost of catching violators, and the costs of imposing sanctions on them (including any costs associated with risk aversion)" (Polinsky & Shavell 2007:406). As for the individual decisionmaking strategy, the theory generally assumes informed, rational agents who act if their actions yield private benefits (certain or expected) in excess of all costs of acting (certain or expected). Some privately beneficial acts, however, give rise not only to private costs and benefits, but also to external harms—harms (net of external gains) that individuals do not take into account absent government intervention. The

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deterrence theory posits that when the act's external harm exceeds its private gain, the act is socially undesirable and should be deterred at the lowest social cost.

The government deters individuals by imposing sanctions. In the basic setup, sanctions take the form of either fines (viewed as costless for the government to impose) or imprisonment (viewed as costly for the government to impose). Whatever the sanction's form, the regulator must choose its magnitude. And given that most violations are not detected with certainty, the regulator must also choose the probability with which the sanction will be imposed. Moreover, the regulator must decide whether to sanction all individuals causing external harm (by setting up a strict liability regime) or only those whose actions cross some government-determined threshold (by enacting what is often called a fault-based or negligence regime).[1] The theory of optimal deterrence has made much progress in explaining how the government should make all these choices. Yet conceptual issues remain, as do challenges of reconciling theoretical prescriptions and predictions with real-world enforcement regimes and individual behavior.

The Treatment of Offenders' Gains

To start, recall the most basic proposition of the optimal deterrence theory: the government should deter private acts producing external harms in excess of private gains while allowing private acts for which the gains exceed the harms. This point, articulated in Becker's (1968) seminal article, was immediately challenged by Stigler (1970). The two Nobel laureates disagreed about whose gains ought to count. Becker's answer was "everyone's." Stigler's view was "certainly not!" "What evidence is there that society sets a positive value upon the utility derived from a murder, rape, or arson?," he asked incredulously (Stigler 1970:527). The "society has branded the utility derived from such activities as illicit," Stigler added, without offering any evidence that society recognizes as much as the concept of utility, let alone brands some kinds of utility as different from others.

Adopting Becker's view leads to the inescapable conclusion that society should allow efficient crimes (as well as efficient torts)—the result that at least in some cases economists find to be distasteful (Curry and Doyle 2016, Dharmapala and Garoupa 2004). Adopting Stigler's view leads to an uncomfortable realization that society's "branding" of "illicit utility" is quite contingent. Acts that society "branded … as illicit" and criminalized just a few short decades ago are now constitutionally-protected fundamental rights (same-sex relationships, interracial marriages, and so on). Likewise, acts that society brands as "illicit" and criminalizes today used to be acceptable not long ago (for example, marital rape (Bennice and Resick 2003, Hasday 2014)).

The Becker-Stigler debate has not been resolved, but scholars have found ways to advance the theory while avoiding the issue. Curry and Doyle (2016) formalize Posner's (1985) suggestion

[1] Threshold-based regimes are typically referred to as fault-based (Polinsky and Shavell 2007) or negligence (Craswell 1999:2215-18) regimes. The latter definition is less than ideal because it confuses an economic concept of a socially-optimal threshold that may exist in any area of the law with a legal concept in tort law. The former definition is unfortunate because the term fault implies blameworthiness based on one's mental state. No such connection between government-set thresholds and the offender's mental state exists as a general matter. Threshold simply means a (socially optimal) line separating behavior subject to sanctions from that not subject to sanctions. Moreover, as discussed below, the deterrence theory has had very limited success in accounting for offender's mental state.

that criminal law aims to induce putative criminals to achieve their objectives through voluntary market exchanges—a notion that is easier to accept for some crimes (property theft) than others (rape or battery). When market exchange is added to the choice between committing a crime or doing nothing, Curry and Doyle (2016) show, maximizing social welfare becomes equivalent to minimizing the cost of crime. Because the offender's gain is not part of this cost, there is no need to decide whether gains of some offenders should count or not. Curry and Doyle's (2016) analysis explains several features of criminal law such as the use of criminal history in sentencing and the necessity defense.

Raskolnikov (2014) avoids the same question by focusing on a subset of socially undesirable acts where the offender's gain is always equal to the victim's harm. These acts—ranging from price fixing to market manipulation, securities churning, and insider trading—are all intentional, nonconsensual transfers of money, they are quasi-theft. While the transfer itself neither adds nor detracts from social welfare, victims incur defensive costs to prevent these transfers while offenders incur costs to carry them out. These costs make all such quasi-theft acts unambiguously inefficient whether or not the social welfare function includes the offender's gain. Focusing on these acts allows Raskolnikov (2014) to evaluate the efficiency of some common penalty structures and mental state inquiries, as discussed below.

While some scholars deal with the "illicit gain" problem by narrowing the acts under consideration, others deal with the same issue by considering both alternatives. Mungan (2019) builds a case for rewarding individuals who abstain from engaging in criminal acts while either including the utility of criminals in the social welfare function or ignoring it. The results, it turns out, do not depend on the inclusion of the offender's gains (Mungan 2019:11). Mungan (2014) follows the same strategy with the same indifference result in his analysis of escalating sanctions. Miceli and Bucci (2005) also consider both alternatives in their study of escalating penalties, but their result holds only if the offenders' gains are excluded (Miceli and Bucci 2005:77-78). Finally, one can avoid the "illicit gain" problem by switching from normative to positive analysis and focusing on how society can deter offenses without asking what offenses should be deterred, as discussed at the end of this Chapter.

The Design of Sanction Multipliers

Both positive and normative analyses of deterrence take account of the obvious fact that many offenses are not observed by the regulators. Ex ante, the probability of facing sanctions—which is often called the "probability of detection" as a shortcut—is less than one.[2] The standard response to the problem of imperfect detection is to increase the nominal (that is, statutory) sanction by the so-called multiplier, making sure that the expected sanction equals the act's external harm. If the offender's gain is not available to pay the fine (that is, if the offender keeps the gain even if he is caught and convicted), the multiplier is simply the inverse of the probability of detection, p , or $\frac{1}{p}$ (Polinsky & Shavell 2007). If the fine includes the gain (as is the case, for example, for tax fines), the multiplier is $\frac{1-p}{p}$ (Leung 1991).

[2] The probability of facing sanctions is a compound probability that the offense is detected, that the enforcement agents decide to litigate / prosecute the case (rather than to ignore it in order to focus on other, more severe violations), and that the parties do not resolve the controversy through settlement which may or may not include a payment.

In principle, the government can choose both the nominal sanction and the probability of detection. So one of the key payoffs of the optimal deterrence theory is identifying the optimal combination of the two. That combination depends on many factors, including the wealth of offenders, their risk preferences, errors in determination of liability, the cost of imposing fines, whether sanctions are based on risky acts or actual harms, and other considerations (Craswell 1996, Polinsky and Shavell 2007). But whatever the case, the basic approach remains the same: set the expected sanction to equal the external harm (possibly adjusted, most often downwards, to account for a number of factors), determine the probability of detection, and then set the optimal nominal (statutory) sanction using the multiplier.

While much of the deterrence literature follows this logic, this approach faces long-known challenges. The standard approach is static—it is based on a one-period model. In reality, offenses happen over time. Leung's (1991) adaptation of the standard deterrence model to infinite horizon yields multipliers where the probability of detection is replaced by the hazard rate of detection, which may or may not be constant over time.[3] Moreover, Craswell (1999) notes that the simple multiplier formula relies on three critical assumptions. First, sanctions are based on the external harm. Second, sanctions are set on a case-by-case basis. And third, the offender's behavior does not affect the likelihood of detection—egregious violations are as likely to be punished as the minor transgressions are.[4]

In reality, law enforcement agencies often target particularly egregious behavior, sanction multipliers are set at the same level for all offenses of a given type, and sanctions take the form of schedule-based fines rather than of damages based on external harms. Craswell (1999) shows that all these real-world deviations from the basic model make the multiplier approach "useful, and [possibly] even dominat[ing] the alternatives, in a fairly small set of cases. In other cases, however, the balance of advantages and disadvantages is harder to assess" (Craswell 1999:2189). The analysis of multipliers has seen little progress since Craswell's (1999) contribution.

Optimal Deterrence in Optional Regimes

The optimal deterrence theory separates all legal regimes into strict liability and threshold-based types. The theory reveals many differences between the two. Each type has some theoretical advantages.[5] But in practice, threshold-based regimes are much more pervasive.[6]

[3] While the hazard rate, strictly speaking, is neither a probability nor a density function, it may be understood as the probability that an event occurs in a particular infinitesimally small time period *given that* the event has not happened prior to that period (Kim 1996).

[4] What terms like "egregious" mean is more complicated than it appears, as discussed below. In Craswell's (1999) analysis, egregious means producing a great external harm.

[5] Strict liability regimes require less information than threshold-based ones to determine liability. While the enforcer in both regimes needs to determine the external harm, the enforcer does not need to ascertain the private gain in a strict liability regime while such determination is necessary in a threshold-based one. Moreover, strict liability regimes lead to optimal incentives along two margins of behavior (typically referred to as the levels of activity and care) while threshold-based regimes do not. On the other hand, threshold-based regimes have an advantage over strict liability ones if sanctions are costly to impose. This advantage arises because if one assumes that the threshold is set optimally, enforcement is perfect, and all individuals know the law, no one would ever violate the threshold, so the sanctioning costs would never arise. In reality, of course, none of these assumptions hold, so the advantage of threshold-based regimes over strict liability ones is theoretical.

[6] Even legal regimes that are called "strict liability" are often threshold-based as these terms are used in the optimal deterrence theory. For example, strict liability for products with design defects really turns on the threshold of

Much of the optimal deterrence analysis focuses on creating incentives for potential offenders to make efficient decisions about whether or not to offend. Yet behavior in most threshold-based regimes varies along another margin as well. In addition to choosing whether to comply with the regime's requirements (the margin typically referred to as the level of care, precaution, or compliance), individuals also choose whether to participate in the regime at all (the margin often referred to as the level of activity or participation).

One of the key insights of the optimal deterrence theory is that threshold-based regimes lead to excessive participation while strict liability regimes do not. If a threshold-based regime is perfectly enforced, individuals who comply with the threshold face no risk of legal liability even though their actions give rise to some risk of external harm (albeit the risk viewed as acceptable by the threshold-setting regulator). Rational individuals ignore this risk, leading to excessive participation. In a strict liability regime, in contrast, all individuals causing harm face sanctions, so they take account of all risks that they create.

Perfect enforcement, however, does not exist in the real world. Enforcement errors are inevitable, and Png (1986) showed that they have two effects. First, not only mistaken exonerations (mistaken failures to impose liability) reduce deterrence, but mistaken impositions of liability do so as well.[7] Second, a mistaken imposition of liability chills socially-desirable behavior. Individuals who would have complied with the threshold if enforcement were perfect abstain from engaging in the activity for fear of being found mistakenly liable. Png (1986) showed that regulators should increase sanctions to counter the first effect and introduce subsidies to counter the second.

Kaplow (2011a) extended Png's (1986) inquiry by considering a population of agents with varying benefits. Kaplow (2011a) focused on the implications of deterrence and chilling for the socially optimal burden of proof. He showed that the preponderance-of-the-evidence and other familiar proof thresholds are optimal only by chance, and that the optimal threshold depends on multiple factors in a complex way.[8]

Dari-Mattiacci and Raskolnikov (2019) investigate the interplay between deterrence and chilling more broadly, and they discover that neither higher sanctions nor a greater probability of detection unambiguously increase deterrence. The interaction of the deterrence and chilling effects is the reason. Higher expected sanctions induce some agents participating in the regime to switch from violations to compliance—the standard Becker (1968) result. However, higher

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whether the design is unreasonably dangerous (Craswell 1999). A "strict liability" tax penalty for transactions lacking economic substance (Thomas 2011) really turns on the threshold of whether the transaction has economic substance. And a "strict liability wrong" of copyright infringement arises only if the defendant produced something that is a copy, and in addition, if the defendant did so wrongfully (Balganesh 2018: 492).

[7] A mistaken imposition of liability reduces the expected benefit of complying with the threshold. This benefit reduction diminishes the difference in the payoffs from complying and violating, making violating less costly relative to complying.

[8] In related work, Kaplow showed how the burden of proof interacts with the optimal choices of sanctions and enforcement effort, and how changes to that burden affect participation by would-be-compliers and would-be-violators (Kaplow 2011b, Kaplow 2012). Mungan (2011) considered the same interactions and found that a heightened burden of proof is efficient in criminal but not civil settings. In contrast, Demougin and Fluet (2006) showed that when unbiased decisionmakers (who initially presume that the likelihood of defendant's guilt is fifty percent) determine liability in threshold-based regimes, a more-likely-than-not burden of proof maximizes deterrence.

expected sanctions also induce some previously complying agents to abstain from participation altogether. Depending on the relative magnitudes of the two shifts, higher sanctions may end up reducing both the number of compliers and their share of all participants. Given that individuals facing most real-world regulatory regimes do face both the choice of whether or not to participate and whether or not to comply, Dari-Mattiacci and Raskolnikov's (2019) findings raise new questions about the optimal design of optional regulatory systems.

Uncertainty About Uncertainty

These new questions add to another long-standing challenge. When Png (1986) considered the effects of mistaken exonerations and mistaken liability, he assumed that individual behavior is binary: "the motorist drives either with due care or does not" (Png 1986:102). Speed, of course, is a continuous variable, and as it increases from zero to the maximum possible, the chances of both types of enforcement errors change continuously. A mistaken liability for speeding is virtually impossible if a vehicle moves at 10mph; the same is true of a mistaken exoneration if the vehicle's speed exceeds 150mph.

Craswell and Calfee (1986) and Shavell (1987) showed that in threshold-based regimes where gradual changes in behavior lead to gradual changes in error rates, the magnitude of enforcement errors has an ambiguous effect on deterrence. If the enforcement uncertainty is not too great (error rates are not too high), overdeterrence results; otherwise Png's (1986) underdeterrence result holds. Craswell and Calfee (1986) and Kahan (1989) explained that overdeterrence occurs only if crossing the threshold leads to a discontinuous increase in sanctions—something that may not be the case in contract law or in tort law given the operation of its causation requirement. But in many regulatory regimes ranging from environmental protection to tax and securities regulation, sanctions are indeed discontinuous, so the uncertain conclusion about the effect of enforcement uncertainty remains.

Baker and Raskolnikov (2017) point out that at least some effects of enforcement uncertainty become clear if the basic model is modified to account for a very common feature of numerous enforcement regimes—targeted enforcement. Enforcement agents have limited resources, and they often focus their efforts on the most egregious violators while ignoring minor transgressions (Baker and Raskolnikov 2017:283 and sources cited therein). When such targeting takes place, legal and factual uncertainty are unambiguously harmful even for risk-neutral agents. Whether the same two types of uncertainty reduce social welfare remains to be discovered.

Until now, the discussion highlighted some of the main results of the optimal deterrence theory and the challenges of deriving clear takeaways while modeling realistically complex legal regimes. We now turn to a different set of challenges. Many key features of actual legal regimes are inconsistent either with the deterrence theory's predictions or with its prescriptions.

The Compliance Puzzle and Compliance Behavior

The first such feature is the abnormally high levels of compliance with anything from drunk driving (Ross 1992:61-62), to burglary and corporate misconduct (Polinsky & Shavell 2007), to environmental regulation (Bose 1995). Perhaps the starkest example of this so-called compliance puzzle is tax. Setting aside the types of income subject to withholding or information reporting, compliance rates with tax obligations that may be enforced only during a highly unlikely audit

are much higher than the deterrence theory would predict. Nominal civil tax penalties are low; criminal tax penalties are extremely rare and can be avoided while taking very questionable positions (Raskolnikov 2017), so taxpayers earning income not reported to the government by third parties should pay almost not tax (Weisbach 2002). Yet this is not the case.

Granted, the deterrence model shows that risk-averse agents are more likely to comply than risk-neutral agents are, and it is plausible to assume that taxpayers are risk-averse. But the levels of risk aversion necessary to explain the observed levels of tax compliance are wholly implausible (Hashimzade, Myles, and Tran-Nam 2013, Luttmer and Singhal 2014). It is also true that the probability of detection that determines behavior is the perceived rather than the actual one. But while evidence suggests that taxpayers generally overestimate audit probabilities, it also suggests that taxpayers with a greater opportunity to evade have a more realistic view of audit coverage (Andreoni, Erard, and Feinstein 1998, DeBacker, Heim, Tran, and Yuskavage 2018, Scholz and Pinney 1995). The findings are similar with respect to other offenses (Apel 2013, Nagin 2013).

There has been a number of recent efforts to modify the basic deterrence model in a way that would resolve the compliance puzzle. These efforts extend the workhorse expected utility model to include social interactions, replace that basic model with more complex behavioral variants (including those with rank-dependent expected utility, ambiguity, regret and disappointment, first- and second-order risk aversion, and so on), or both. Some of the results do show that in theory, these models can predict the realistic level of compliance for reasonable parameter values (Hashimzade, Myles, and Tran-Nam 2013). The problem, however, is that these models do so either at a cost of great complexity that makes empirical testing all but impossible, or by relying on a parameter (such as the psychic cost of noncompliance or a reputational loss from it) that is both unobservable and drives the results (Hashimzade, Myles, and Tran-Nam 2013).

The compliance puzzle aside, a vast empirical literature investigates whether sanctions and detection probabilities affect behavior as predicted by the basic deterrence model. The short answer is "yes, but." Econometric studies of real-world effects of certainty and severity of sanctions do show that both instruments affect behavior as predicted by the model. But the relevant elasticities are small and their estimation is difficult (Chalfin and McCrary 2017). Moreover, there is some evidence that swiftness (or celerity) of punishment—a factor absent from most deterrence models—has a noticeable effect on behavior as well (Hawken and Kleiman 2009). Evidence also suggests that certainty and severity of sanctions are not (always) interchangeable—people respond to probabilities more than to the magnitudes of sanctions (Durlauf and Nagin 2011, Nagin 2013). The reasons for this differential responsiveness remain unclear (Mungan and Klick 2016).

Extensions of the basic deterrence model explain the differential reactions to probabilities and magnitudes by turning the model from a static into a dynamic one and introducing myopic agents (Chalfin and McCrary 2017), by incorporating informal sanctions (Nagin 2013), or by introducing discounting of the future disutility of sanctions (Polinsky and Shavell 1999). Further extensions—developed mostly in accounting and finance literatures—introduce agency costs into the basic model and explore their implications. These range from the effect of corporate governance on (tax) compliance (Desai and Dharmapala 2006, Slemrod 2004) to the role of unions on (tax) aggressiveness (Chyz, Leung, Li, and Rui 2013, Hanlon and Heitzman 2010). Overall, the basic deterrence model clearly captures the essence of the incentive effects of sanctions, and the model's extensions bring theoretical predictions closer to observed behavior.

At the same time, the compliance puzzle is only the tip of the iceberg in terms of matching the key takeaways of the deterrence theory to real-world outcomes.

Why Gain-Based Sanctions?

The second pervasive feature of real-world regimes that is at odds with the basic deterrence model is the form of sanctions. Recall that the deterrence theory instructs the government to prevent socially undesirable behavior by forcing individuals to fully account for the external harms resulting from their acts. Naturally, sanctions in that theory are based on the external harm. But while harm-based sanctions exist in tort law, contract law, and in some modern regulatory schemes, vastly more widespread are sanctions based on the offender's gain. Gain-based sanctions are imposed for violations of securities laws, environmental laws, financial regulation, many forms of white-collar crime, and tax laws among others (Polinsky and Shavell 1994, Raskolnikov 2014), not to mention the disgorgement remedy in torts and contracts (Huang 2016).

The divergence between theory and reality of sanctioning regimes has not escaped deterrence theorists. Polinsky and Shavell (1994) acknowledge it, but highlight the inferiority of gain-based sanctions. A small underestimation of the offender's gain, they show, may lead to a misguided failure to deter an act producing the external harm greatly in excess of the offender's gain if sanctions are gain-based. In contrast, a small underestimation of the external harm will not lead to similar underdeterrence under harm-based sanctions. This is an intuitive and appealing argument. But its rigorous proof does not extend to realistic regulatory threshold-based regimes where legality thresholds are not set on a case-by-case basis (Polinsky and Shavell 1994:436). Moreover, enforcement costs may favor gain-based liability, with sanctions set to equal the offender's gain "plus an additional amount sufficient to ensure that deterrence will occur with a high probability even if the gain is underestimated" (Polinsky and Shavell 1994:436). Real-world sanctions calculated as multiples of the offender's gain reflect this approach (Raskolnikov 2014:1175 for examples).

Hylton (2005) explains gain-based sanctions by relying on Posner's (1985) conceptualization of criminal law as a system deterring market-bypassing transactions. Under this view, if a potential offender may purchase an item legally, obtaining the same item through a coercive transfer is a crime. Notably, it makes no difference in this case whether the offender's gain happens to exceed the victim's loss. The only certain way to induce the offender to use legal means is to impose a sanction that would deny the offender any gain from the coercive transfer.

Hylton (2005) argues that such gain-based sanctions are preferable to harm-internalizing sanctions "whenever the cost of transacting with respect to some entitlement is less than the cost of enforcing the right to that entitlement" (Hylton 2005:175). This explanation, however, does not apply to any crime for which no market-equivalent transaction is readily available. Moreover, gain-based fines are widely used to deter non-criminal regulatory violations not subject to Posner's (1985) market bypass theory. And in any case, the realism of that theory is left to the reader's own judgment.

Huang (2016) explains how gain-based sanctions may achieve optimal deterrence. He points out that substituting gain-based sanctions for harm-based sanctions "part of the time can emulate the incentive effect of using [harm-based sanctions] all of the time" (Huang 2016:1595). Notably,

the party doing the substituting must be the court or a public-minded enforcement agency. If, in contrast, victims are allowed to choose between harm- and gain-based sanctions, the result would be complete rather than optimal deterrence. While several real-world regimes allow victims such choice, few, if any, give that choice to a neutral (or public-minded) arbiter that Huang (2016) recommends. So just like the compliance puzzle, the pervasive use of gain-based sanctions presents a continuing challenge for the optimal deterrence theory.

The difficulty of explaining real-world sanctioning regimes goes beyond rationalizing gain-based sanctions. The deterrence theory offers no general explanation of why many sanctions depend on the offense history and on the legal aggressiveness of the act.

The Role of Offense History

The dependence of sanctions on the offense history has puzzled economists for some time. "*At the very best* the literature … has shown that under *rather special circumstances* escalating penalty schemes *may be* optimal" (Emons 2003, emphasis added). Researchers offered multiple explanations for higher sanctions for repeat offenders.

Mungan (2014) identifies three main types of explanations: the stigmatization effect of the first penalty, the variation in offender's propensity for crime, and the offender's learning how to escape punishment (Mungan 2014:190-91 citing sources). Curry and Doyle (2016) show that higher sanctions for repeat offenders are optimal if these offenders have a market alternative to achieving their criminal objectives, and if criminal history reveals that the offender cannot be cheaply deterred. Miceli and Bucci (2005) show that if the criminals' opportunities to earn income legally decline as they commit more crimes, sanctions should be higher for repeat offenders under some restrictive assumptions. Mungan (2014) offers a behavioral justification for escalating penalties based on the assumption that potential offenders are "weak-willed ... [meaning that they] ordinarily possess self-control, but [ ] may lapse into committing crime" (Mungan 2014:190). These individuals may rationally abstain from committing a profitable offense in order to avoid a higher penalty for a future offense which they may commit in their weak-willed state. Other recent efficiency-based justifications of escalating penalties for repeat offenders include Endres and Rundshagen (2016) and Müller and Schmitz (2015). Although none of these contributions offer a general theory, it appears that higher sanctions for repeat offenders may be efficient in so many different, albeit specific, cases, that they may also be efficient overall, at least on average.

Why Greater Sanctions for More Aggressive Violations?

Aggressiveness-based graduation of sanctions presents a tougher challenge for the deterrence theory. Not only is it not well-explained, it is poorly recognized in the literature. The likely culprit of this inattention is the assumption that aggressiveness is equivalent to harmfulness. Sometimes it is. Faster driving is a more aggressive violation of the "reasonable speed" threshold, in a sense that it is a greater deviation from the line separating legal and illegal conduct. Faster driving also gives rise to a greater expected harm both because it makes accidents more likely and because it makes damages from accidents more severe. So for speeding, it appears to make perfect sense that more aggressive (or egregious) violations are subject to higher sanctions.

This highly intuitive explanation runs into two problems. First, a more aggressive (in a legal sense) behavior is more likely to trigger an enforcement action. Very aggressive speeding is easier to detect. A patrol officer is more likely to pursue an egregious speeder upon detection. And a court is more likely to convict an offender whose actions deviated greatly from the legal norm. A greater likelihood of sanctions for any of these reasons leads to higher expected sanctions for more aggressive speed limit violators even if the statutory fines do not vary with speed. So why do they?

Raskolnikov (2014) offers two possible explanations. Perhaps, as the conduct becomes increasingly aggressive, the external harm increases faster than the probability of sanction does. It is also possible that that the external harm continues to increase after the probability of sanction approaches its upper bound. In both scenarios higher nominal sanctions for more aggressive violations may reflect optimal deterrence. However, the empirical validity of these conjectures has never been tested.

The second and more challenging problem is that in some areas such as tax, aggressiveness is not equivalent to the magnitude of harm (Raskolnikov 2016). A barely plausible (very aggressive) tax position may involve a trivial dollar amount; a plausible though not unassailable (moderately aggressive) position may involve billions. The former would be sanctioned, the latter would not. Given that the social harm of tax noncompliance is the cost of raising the lost revenue elsewhere, variations in the external harm do not explain this structure of sanctions. The deterrence theory is still searching for a general explanation of aggressiveness-based sanctions graduation.

The Perplexing Importance of the Offender's Mental State

The theory's next challenge is to explain the relevance of another legal distinction that is both pervasive and important—the offender's mental state. From the *mens rea* requirement in criminal law, to the willful breach doctrine in contract law, to tests based on knowledge, purpose, and good faith in environmental regulation, securities regulation, corporate governance, and taxation, the offender's mental state determines both the existence of liability and the severity of sanctions (Raskolnikov 2016). Yet "economic analysis of law has expressed puzzlement at the intent rules in the law …. Under the standard economic approach, which focused on internalization of external costs, the actor's intent would appear to be irrelevant" (Hylton 2010:1242). It is revealing that Polinsky and Shavell's (2007) comprehensive review of the optimal deterrence theory makes no mention of the offender's mental state despite discussing such subjects as social norms and fairness.

Deterrence theorists have offered several explanations of the role of the offender's state of mind, all limited to certain doctrinal areas and all lacking rigorous empirical support. Posner (1985) suggests that the intent requirement in criminal law is a proxy for the probability of apprehension and conviction, a proxy for the offender's responsiveness to punishment, or a means of identifying what he calls pure coercive transfers. Shavell (1985) links the same requirement to the probability of harm and the likelihood of escaping from sanctions. Parker (1993) argues that the *mens rea* requirement in criminal law relates to a putative offender's cost of acquiring information about the nature and consequences of his actions. Hylton (2010) posits that intent requirements in tort law contribute to cost internalization and reduce transaction costs.

Raskolnikov (2014) identifies cases where the intent requirement is not limited to criminal or tort law and has a direct and obvious connection to both efficiency and legality. He points out that inefficient and illegal acts ranging from insider trading to naked price fixing, securities churning, embezzlement, and others all have efficient and legal counterparts that differ from their illegal "twins" only in the actor's mental state. If companies in the same industry raise prices because raw materials have become more expensive, the act is both efficient and legal. If the same companies raise prices collusively, the act is both inefficient and illegal. If someone takes twenty dollars out of my wallet without my knowledge while thinking that I owe him twenty dollars, there are no negative consequences in terms of either efficiency or legality. If someone does the same while thinking that the money is mine, the act is both inefficient and a crime. The role of the offender's mental state in identifying and deterring all these inefficient and illegal forms of quasi-theft is obvious and intuitive. But while Raskolnikov (2014) offers many examples of quasi-theft, these examples are just a tiny fraction of all possible illegal acts. Deterrence theorists are yet to offer a general explanation of why the offender's state of mind matters in so many legal regimes.

Deterrence versus Compliance

This Chapter's final point addresses neither the findings nor the challenges of the deterrence theory, but rather its limitations. Optimal deterrence aims at maximizing efficiency or, if distributional and some other considerations are ignored, social welfare. But many real-world regulatory regimes—both the substantive rules and the enforcement provisions—cannot be plausibly viewed as efficiency-maximizing. Tax is the most obvious example (Raskolnikov 2013), but hardly the only one. Optimal deterrence theory does not have much to say in the analysis of all those decidedly non-optimal regimes.

But economic theory certainly does. Whatever the merits of a particular rule or sanction, economics studies how rational agents respond to incentives, including those created by law. So law-and-economics can and does shed light on compliance decisions even with laws that the optimal deterrence theory can neither endorse nor explain. Deterrence theorists often use the terms compliance and deterrence interchangeably. But in general, the two terms have very different meanings. Deterrence (meaning optimal deterrence) is an economic concept referring to welfare (or efficiency) maximization. Compliance is a legal concept referring to actions that do not violate legal commands, however efficient or inefficient these commands happen to be.

The same question may produce different answers from the deterrence and compliance perspectives, as Raskolnikov (2017) demonstrates in his study of legal uncertainty. Reproducing and expanding Craswell and Calfee's (1986) simulations, he shows that while lower uncertainty has an ambiguous effect on behavior (such as the speed of drivers facing an uncertain "reasonable speed" standard), lower uncertainty leads rational actors to take increasingly less aggressive positions (meaning positions with a greater likelihood of success) in a great majority of realistic scenarios. Lower legal uncertainty may or may not be good for deterrence, but it is good for compliance. More generally, any time a deterrence analyst studies individual's responses to rules or sanctions while taking the law as given (or, equivalently but somewhat misleadingly, assuming that the law is socially optimal), the analyst undertakes the economic analysis of compliance rather than deterrence.

The first Part of this Handbook makes it plain that compared to deterrence, compliance is a much broader concept. The theory of deterrence is not the only approach to the study of compliance decisions. Nevertheless, it is an important and insightful approach. So while the deterrence theory faces some persistent challenges discussed in this Chapter, it has, over the past several decades, produced numerous findings of great value for policymakers who design, reform, and enforce legal regimes.

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