OPTIMAL MAGNITUDE AND PROBABILITY OF FINES WHEN COURTS DISLIKE PUNISHMENT

- *Nuno Garoupa*[*]

I. INTRODUCTION

The proposition that crime rates respond to risks and benefits is called the deterrence hypothesis in the economic literature. It asserts that individuals respond significantly to the incentives created by the criminal justice system. If so, increasing the resources that society devotes to the arrest, prosecution, conviction, and punishment of criminals will reduce the amount and social cost of crime.

Suppose that there is a particular offense that we wish to deter, say, illegal parking or a specific unlicensed activity. It might be possible to eliminate them, or very nearly eliminate them, by imposing a severe punishment with high probability. However, deterring illegal parking or unlicensed activities in this way may run into a cost problem. Apprehending, prosecuting, and punishing offenders can be significantly expensive. Policy-makers need to balance these costs against the advantages of reducing illegal parking (Garoupa 1997, Polinsky and Shavell 2000).[1]

In this essay, we reconsider the high fine-low probability result by Becker (1968): When deciding whether or not to commit an act, an individual compares the benefit from the act with the expected punishment.[2] The expected punishment is given by the probability of detection and

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[1] Garoupa, N., 1997. The theory of optimal law enforcement, Journal of Economic Surveys 11, 267-295.
Polinsky, A. M., and Shavell, S., 2000. The economic theory of public enforcement of law, Journal of Economic Literature 38, 45-77.

[2] Becker, G. S., 1968. Crime and punishment: an economic approach, Journal of Political Economy 76, 169-217.

punishment times a monetary sanction. A fine is a costless transfer from the convicted offender to the government. In contrast, detection is expensive. Consequently, the government should set the fine equal to an offender's entire wealth and complement it with the appropriate probability in order to achieve optimal deterrence. This high fine-low probability result suggests the following corollary: If the agents' wealth goes up, the government should increase the sanction and, at the same time, reduce the probability of detection. That way the government still provides for optimal deterrence, but saves resources on law enforcement.

I have already shown that this intuitive corollary (the substitutability between fine and probability) only holds if the social optimum involves nearly or is close to full deterrence.[3] If there is substantial under-deterrence (the expected fine is significantly less than the social damage caused by the offense), then there is a complementary relationship between the two variables. When the fine goes up, so should the probability of detection.

In order to understand this result, consider a rather extreme case where the agent's wealth is zero. In this case, fines are zero and the deterrent value is zero. Thus, it makes absolutely no sense to spend money on enforcement. When wealth goes up, so do fines. Now it becomes worthwhile for the government to engage in some detection and punishment.

As a consequence, we have a complementary relationship between fine and probability when there is substantial under-deterrence (alternatively, when offenders are poor and monetary sanctions are very low). This contrasts with the conventional substitutability which holds if the expected sanction is close to the social damage caused by the offense (that is, when offenders are wealthy and monetary sanctions are severe).

The standard analysis implicitly assumes that courts are willing to implement Beckerian fines. Suppose, however, that courts dislike severe punishment. Maximal sanctions could induce a countervailing effect. Courts might opt for acquittal rather than punishment with an extremely

[3] Garoupa, N., 2001. Optimal magnitude and probability of fine, European Economic Review 45, 1765-1771.

severe punishment. They could also consider conviction for a less severe crime in order to modulate the magnitude of punishment. Clearly, in these situations, severe punishment is no longer effective. Fines should be lower to take into account court preferences. The impact on the probability follows the analysis of 2001 study.[4]

A numerical example can illustrate the insight of the present analysis. Suppose a particular crime generates harm of 100. The maximal sanction is 2,000. Under the multiplier principle (which eliminates under-deterrence), the probability should be 5%. However, notice that the optimal probability should be less than 5% due to enforcement costs. In a world where courts dislike punishment and can opt for acquittal rather than conviction, the maximal sanction cannot be effectively implemented. Let us assume that the maximal sanction courts are willing to implement is 500. Under the multiplier principle, now the probability should be 20%. We show in this essay, following my 2001 study, that the optimal probability could be less than 10% due to enforcement costs. When such result occurs, not only the severity of punishment goes down due to court preferences, but the probability also goes down in order to maximize social welfare. As a consequence, we can say that when courts dislike punishment, substantive under-deterrence can take place.

The essay is organized as follows: the result is formally derived in section two; applications and final remarks are addressed in sections three and four respectively.

II. THE MODEL

Risk-neutral individuals choose whether or not to commit an act that benefits the actor by b and harms the rest of society by h. The policy-maker does not know any individual's b but knows the distribution of parties by type described by a general density function $g(b)$ with support $[0, \infty)$, a cumulative distribution $G(b)$. Some acts are socially beneficial: $h < \infty$.

[4] Id.

The government chooses a sanction *f*and a probability of detection and conviction *p*. The expenditure on detection and conviction to achieve a probability *p* is given by *x(p)*, where *x'>0* and *x"≤0*. The maximum feasible sanction is *F*, which can be interpreted as the maximum wealth of individuals. We further assume that the sanction is costless to impose and collect.

The objective function to be maximized is the sum of individuals' benefits minus the harm caused by their acts and enforcement costs (Polinsky and Shavell, 2000).[5]

Risk-neutral individuals commit an offense if and only if *b≥pf*. Given each individual's decision to be honest or dishonest, social welfare is:

$$W = \int_{pf}^{\infty} (b - h) dG(b) - x(p)$$

The government maximizes the welfare function with respect to *f* (severity of punishment) and *p* (probability of punishment)subject to $f \leq F$. We study non-trivial solutions. Therefore, we ignore the following constraints: $f \geq 0$ and $0 \leq p \leq 1$. We assume that these constraints are not binding. The public sector budget is financed by lump-sum taxation.

Proposition 1

(1) The optimal fine is the maximal fine*F*.
(2) The optimal probability of detection and conviction *p**satisfies *F (h- p*F) g(p*F)= x'(p*)*.
(3) Some underdeterrence is optimal: *p*F < h*.

[5] Polinsky, A. M., and Shavell, S., 2000. The economic theory of public enforcement of law, Journal of Economic Literature 38, 45-77.

Proof of Proposition 1

See Garoupa (2001). QED

This proposition formally introduces Becker's argument.

Suppose now that courts are not willing to enforce a fine higher that F'. In other words, if the optimal fine is more than F', courts will prefer acquittal rather than conviction.[6]

Proposition 2

(1) The optimal fine is the sanctionpreferred by the court and equals F'.
(2) The optimal probability of detection and conviction p' satisfies $F'(h-p'F')\,g(p'F')=x'(p')$.
(3) Some underdeterrence is still optimal: $p'F'<h$.

Proof of Proposition 2

Suppose the government sets the maximal fine F. Then courts will acquit criminals and social welfare will be minimal, with expected fine equal to zero. As consequence, by the same reasoning of Proposition 1, the optimal fine should be F' and the probability adjusts appropriately. QED

The distaste for severe punishment exhibited by courts forces formal sanctions down. The remaining question is the extent to which the probability goes up to compensate. More fundamentally, is p^* more or less than p'?

We know from Garoupa (2001) that the optimal probability is not necessarily monotonically decreasing in the fine. Suppose for a moment that the marginal cost of punishment is zero. We know that $p^*F=p'F'=h$. Therefore, when the marginal cost of punishment is zero, it is necessarily

[6] This is a model of law enforcement with false negatives. Unlike previous literature (Polinsky and Shavell, 2000) where false negatives are exogenous, in this version they are endogenous to the sanctioning policy.

the case that $p^*<p'$. By the same reasoning, in order for $p^*>p'$ to be a serious possibility, it has to be the case that the value of the marginal cost of punishment is significantly relevant. As in Garoupa (2001), that could be the consequence of a reduction in fine making detection relatively more expensive.[7]

If the original fine is high, the level of deterrence is also high and the difference between full internalization of harm and optimal deterrence is small. When the fine is reduced, the probability p should increase, achieving the same deterrence level but at higher enforcement costs. This is Becker's trade-off.

However, if the new fine is very small, the level of deterrence is very low. In this case, a decrease in the fine diminishes substantially the value of deterrence for any given probability and thus makes it more profitable to simply reduce p. Thus, in this range of parameters, the probability and magnitude of fines are complements rather than substitutes.

Summing-up, when courts dislike punishment, we might observe a reduction of severity (due to court preferences) and probability of punishment (due to technology costs) at the same time.
Consider now the following the extension of the model. Suppose that only a fraction β of courts is not willing to enforce a fine higher that F'. In other words, if the optimal fine is more than F', a fraction β of courts will prefer acquittal rather than conviction.

For a moment, let us consider the case where enforcement is costless. By construction, we know that the expected sanction equals harm. Therefore, the government has to pick one of the following two solutions:

(a) Solution A: the fine equals F' and the probability is simply h/F'.

[7] Mathematically, under Proposition 2, notice that the marginal cost $x'(p)$ is divided by $g(pf)f$.

(b) Solution B: the fine equals *F,* the average fine is *(1-β)F* due to the remaining *β* courts setting a zero fine and the probability is *h/(1-β)F*.

Proposition 3

When enforcement is costless,

(1) The government is indifferent between solution A and solution B.

(2) The optimal probability of detection is lower under solution Aiff *β> 1- F'/F*.

(3) There is full deterrence.

Proof of Proposition 3

Since enforcement is costless and both solutions guarantee that expected sanction equals harm, they are equivalent. The difference between the probabilities of detection is determined by *F'* and *(1-β)F*.

If the fraction of courts disliking punishment is high, *F'* is greater than *(1-β)F*and therefore the probability is lower under solution A. The converse takes place if the fraction of courts disliking punishment is low. QED

We can offer an immediate interpretation of the main insight. Suppose, initially, a lot of courts dislike punishment (that is, β is close to one). Then solution A is more appropriate, with a less severe sanction given by *F'* (lower than F) and a lower probability given by *h/F'*. As time goes by, let us imagine that the government packs courts with judges who like punishment or suppose announcing tougher law enforcement induces a self-selection pattern by which people who like punishment are more willing to become judges (that is, β gets closer to zero). At some point, the threshold *1- F'/F* is crossed. Now solution B is more appropriate. A maximal sanction should be imposed (even though a small fraction β will deviate and acquit offenders). The probability is given by *h/(1-β)F*.

Another way of looking at our suggested interpretation is to say that as more and more courts dislike punishment, sanctions go down and probability goes up, initially as function of β and later is simply given by *h/F'*.

Once enforcement is costly, the results are more cumbersome since optimal probabilities should take into account enforcement costs. However, we can develop the basic intuition. For a moment, let us assume that full deterrence is still optimal. The government should favor solution A when the probability is lower, namely, when *F'* is greater than *(1-β)F*. The government should favor solution B otherwise.

As probabilities need to be adjusted for incomplete deterrence as shown by Proposition 2, following Garoupa (2001), the optimal policy is necessarily more nuanced. In fact, let us define the pair <*p',p"*> as the following implicit probabilities:

$$F'(h-p'F')\,g(p'F') = x'(p') \qquad (1)$$

$$(1-\beta)F\,(h-p''(1-\beta)F)\,g(p''(1-\beta)F) = x'(p'') \qquad (2)$$

We can write that *p'* is above *p"* when the left-hand-side of (1) is higher than the left-hand-side of (2). The left-hand sides measure the marginal gain from enhancing the probability of punishment given a specific marginal cost measure by *x'(p)*. In fact, by equalizing both left-hand sides of (1) and (2), we derive an implicit threshold for β taking into account that enforcement is costly.

Let us illustrate the specific trade-off with a simple linear example. The enforcement cost function is given by x(p)=xp and assume the type are described by a uniform distribution with support [0,1], with h<1 so that some acts are socially beneficial. From (1) and (2), we derive the following results:

$$p' = h/F' - x/F'^2$$

$$p'' = h/(1-\beta)F - x/(1-\beta)^2F^2$$

The fundamental exercise is easy to understand. When the sanction is *(1-β)F,* rather than*F',* should we expect the probability to go up or down? The answer depends on two distinct effects. The first

piece, as we have seen before in Proposition 3, is how *(1-β)F* relates to *F'*. The second concern is the substitutability of severity and probability of punishment following Garoupa (2001).

III. APPLICATIONS

There are important applications of the simple model developed in this article. First, reform of criminal law cannot ignore the willingness of courts to impose tougher sanctions. Under our analysis, severe sanctions could induce more acquittals thus undermining reforms that enhance law enforcement. Second, the results suggest a significant concern about the political economy of criminal sanctions. A prevalence of liberal judges opposing severe punishment coupled with a government favoring tougher law enforcement might force a reduction in probability and severity of punishment at the same time. Third, judicial preferences can undermine sentencing guidelines and other mandatory sentencing policies in ways that are detrimental for criminal deterrence.

Another area of application of these results is regulation. A divergence between regulators and courts concerning appropriate sanctions might diminish not only effective regulatory penalties but also the incentives for regulatory enforcement. When regulators are more demanding than courts we might end up with lower sanctions and lower probabilities if there is significant under-deterrence. In fact, our analysis suggests that the experience of regulatory decisions being reversed by courts frequently as we have observed in a few jurisdictions cannot be addressed or solved by escalating sanctions.

IV. CONCLUSION

In this essay, we have observed that when courts dislike punishment, sanctions naturally go down. We have also argued that the trade-off between probability and severity of punishment may not be consistent with optimal law enforcement when there is substantial under-deterrence. When sanctions are sufficiently large, we approach complete deterrence (the negative externality is fully internalized). By decreasing the fine, we must increase the probability achieving the same

deterrence level but with more significant enforcement costs. However, when sanctions are low, we have substantial under-deterrence. By reducing fines, we should also decrease the probability making further losses in deterrence.