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Asset Forfeiture Laws and Criminal Deterrence

by

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Abstract: Asset forfeiture laws allow the seizure of assets used in the commission of a crime. This paper examines the impact of such laws on deterrence by incorporating the possibility of asset forfeiture into the standard economic model of crime. When punishment is by a fine that can be optimally chosen, forfeiture is never optimal because of the deadweight loss it imposes in the capital market. When the fine is limited by the offender's wealth, forfeiture may or may not be desirable. Extensions of the basic model include the optimal use of forfeiture when (i) partial seizure is possible, (ii) punishment is by imprisonment, (iii) the probability of apprehension is endogenous, and (iv) enforcers are rent-seekers.

Key words: Criminal punishment, asset forfeiture, law enforcement
JEL codes: H11, K14, K41

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1. Introduction

Asset forfeiture laws—laws that allow the government to seize assets used in the commission of a crime—represent an established component in the arsenal of law enforcement authorities. Although asset forfeiture was originally derived from admiralty law, where it was one of the few effective ways of controlling smuggling, the strategy has recently been revived for use as a weapon in the war on drugs. Proponents see it as a deterrent of crime because of the risk that it imposes on owners of capital that may be used for criminal purposes, but also as a source of revenue for budget-constrained law enforcement agencies. Critics, in contrast, see it as an invitation for abuse by rent-seeking enforcers, as well as a potentially serious threat to private property. The purpose of this paper is to evaluate asset forfeiture as a law enforcement tool by incorporating it into the standard economic model of crime.

The results of the analysis suggest that forfeiture can be used effectively, in combination with more standard tools (for example, criminal fines or prison), as a deterrent under certain conditions, but the risk of overuse is real. In particular, we show that when punishment is by a fine that can be set optimally, it is never efficient to use forfeiture because of the deadweight loss it imposes in the capital market. Only when the fine is limited, for example by the wealth of the offender, will forfeiture be potentially desirable. Even in that case, however, forfeiture may overdeter offenders from a social point of view. A more refined version of forfeiture that allows partial seizure can overcome this problem, but if the enforcer's objective function includes revenue from the seized assets (as might be true of local enforcers), there remains a significant risk of overuse of the policy.

The paper is organized as follows. Section 2 sets the stage by reviewing the law of forfeiture and the scope of its actual use. Section 3 then develops the basic model and derives the main conclusions. Section 4 pursues extensions, and Section 5 concludes.

2. The Law of Forfeiture

Government seizure of capital assets used in the commission of a crime is rooted in admiralty law. In 1790, for example, the U.S. Congress adopted a forfeiture law to enforce customs duties, which were at the time the principal source of federal tax revenue. The Supreme Court, in recognizing the usefulness of forfeiture in the prevention of piracy and other customs violations, upheld these early laws. Forfeiture was briefly revived during Prohibition to seize vehicles transporting illegal liquor, and again in the 1970s and 80s as tool against organized crime and drug trafficking. Since then, it has been expanded by Congress to cover a myriad of federal offenses, including fraud and other white collar crimes (Mellor, 2011). For example, the passage of the Civil Asset Forfeiture Reform Act of 2000 (CAFRA),[1] and the Patriot Act of 2001,[2] made hundreds of illegal activities subject to forfeiture. State forfeiture laws also have a long history that predates the Constitution. Currently, 47 states authorize the forfeiture of assets used in the commission of a crime.

Property can be seized under both criminal and civil proceedings. Under criminal law, the defendant property owner must have been convicted of a crime before his or her property can be seized, and if the defendant is acquitted, the property must be returned. Under civil forfeiture, in contrast, the government's action is against the property itself rather than the, so no criminal conviction is necessary. By untethering forfeiture from criminal law, with its stiff burden of

[1] Pub. L. No. 106-185 (2000).
[2] Pub. L. No. 107-56 (2001).

proof and procedural hurdles, seizure becomes easier, but so does the concomitant risk of taking property from innocent parties. Owners can always pursue an "innocent owner" defense, but the burden of proof is shifted to the defendant to prove either that he or she had no actual or constructive knowledge that the property in question was being used in an illegal activity, or that, upon learning of the activity, he or she took all reasonable steps to stop it. Often this burden is difficult to meet.

For example, in *United States v. Two Parcels of Property at Castle Street* (1994), the court held that seizure of a multi-family house where the owners' children were engaging in narcotics use was allowed because the parents "failed to undertake every reasonable means of preventing narcotics activities at the residence." [3] This despite the fact that the parents had pressed their children to stop their drug activities, had sent their adult children away, and had reported the illegal activities to the police.

State and local officials can expand their powers of seizure by partnering with federal officials under "equitable sharing" arrangements. As long as the activity in question violates federal law and federal seizure is allowed, federal officials can commence seizure, provided that the local authorities have conducted all of the "pre-seizure activities." In these cooperative cases, local authorities retain 80% of the value of forfeited assets under the condition that the funds will be used exclusively for law enforcement expenses. In 2006, one-third of all local police departments in the U.S. received property, assets, or goods from drug asset forfeitures. The risk, of course, is that local authorities will view forfeitures primarily as a revenue source, rather than for their intended use in aiding law enforcement. There is little empirical evidence on this, but one study by the Institute for Justice found that in states with greater innocent owner

[3] 31 F.3d 35 (2nd. Cir., 1994).

protections, law enforcement officials were more likely to use federal forfeiture laws under the above sharing arrangement (Williams et al., 2010).

Given the risk of abuse, it is important to ask whether forfeiture laws offer any benefits in the form of deterrence. Addressing that question is the goal of theoretical analysis in the next section. In developing the model, we will not formally distinguish between civil and criminal forfeiture. Rather, we will simply assume that when a crime is discovered, any capital used in its commission may be subject to seizure. The goal is to characterize the conditions under which forfeiture is socially desirable as a law enforcement tool.

3. The Model

The model to be developed in this section is the standard Becker-Polinsky-Shavell model of rational criminals (Becker, 1968; Polinsky and Shavell, 2000, 2007), extended to allow for the use of a capital asset in the commission of crime, which can then be seized by the enforcer. Suppose there exists a group of potential offenders who expect a monetary gain, g, from committing a crime, where g varies across offenders on the interval $[0,\bar{g}]$, reflecting, for example, different criminal opportunities. Let the distribution and density functions be given by $Z(g)$ and $z(g)$. Offenders also face an expected sanction of ps, where p is the probability of apprehension, and s is the sanction on conviction, which we will initially take to be a fine.

We extend the standard model by supposing that the crime in question requires the use of a capital asset—for example, a car, boat, or warehouse—that the offender must rent from the asset's owner. Let R be the rental price, which we will assume reflects the opportunity cost of the asset to the owner. (In other words, the capital market is assumed to be perfectly competitive.) Thus, as will be detailed below, R will reflect any potential legal consequences that the owner might face (in particular, the risk of forfeiture). We will also assume that the owner of the asset cannot distinguish between legal and illegal users of the asset, precluding segmentation of the market.

Given the above assumptions, the net gain to a potential offender from committing the crime in question is $g–R–ps$. Only those offenders for whom this is positive will commit the crime, so the expected number of offenses is

$$Q_I = N_I \int_{R+ps}^{\bar{g}} z(g)dg = N_I[1 - Z(R + ps)], \quad (1)$$

where N_I is the maximum potential number of offenders.

In addition to criminals, there exist "legal" users of capital. Let b be the gross dollar gain from legal uses, which is distributed across potential users on $[0,\bar{b}]$ with distribution and density functions $F(b)$ and $f(b)$. Legal users of capital will therefore earn a net return of $b–R$, so the number of legal users is

$$Q_L = N_L \int_{R}^{\bar{b}} f(b)db = N_L[1 - F(R)], \quad (2)$$

where N_L is the maximum number of legal users.

For simplicity, we will assume that capital is supplied perfectly elastically at the opportunity cost. We treat the asset in question as homogeneous, and assume that it has a value of V. Thus, in the absence of any risk of loss or depreciation, the rental rate is rV, where r is the market interest rate. It follows that when there is no forfeiture rule

$$R_0 = rV. \quad (3)$$

When there is a forfeiture rule, the government can seize any assets used in the commission of a crime. This will cause the rental rate for the asset to rise in proportion to the expected loss. Although capital owners cannot distinguish criminal from legal users, we assume that they do know the relative numbers of each in the market. Thus, the probability that a particular user intends to use the capital for a criminal activity is

$$\theta = \frac{Q_I}{Q_I + Q_L}, \tag{4}$$

where Q_I and Q_L are defined by (1) and (2).

Now define q to be the probability that the assets are seized conditional on discovery of the underlying crime. Thus, q=0 when there is no forfeiture law and q=1 when there is. The market rental rate now becomes

$$R(q) = rV + pq\theta V = (r+pq\theta)V, \tag{5}$$

where $pq\theta V$ is the risk premium. Note that $R(q)$ and θ are therefore simultaneously determined in equilibrium by (4), (5), (1) and (2).

3.1.Optimal Enforcement without Forfeiture

As a benchmark, we first consider optimal enforcement without forfeiture, or when q=0. In that case, the legal capital market is not affected by the illegal use of capital (i.e., $R(q)=R(0)\equiv R_0$). For simplicity, we will treat the probability of discovery, p, as fixed for most of the analysis.[4] Thus, the fine is chosen to maximize the following social welfare function

$$W_0 = N_L \int_{R_0}^{\bar{b}} (b - R_0) f(b)db + N_I \int_{R_0+ps}^{\bar{g}} (g - R_0 - h) z(g)dg - c, \tag{6}$$

where c is the (fixed) cost of enforcement. (Welfare in the legal market, the first term, is included here only to facilitate comparison with the case of forfeiture below.) Note that, as is conventional, the offenders' gains are counted in the social welfare for the illegal market (the second term on the right-hand side), along with social costs per crime, denoted h. If h is sufficiently large, complete deterrence would be the first-best solution, though this will not

[4] See Section 4.3, which extends the model to allow an optimal choice of p.

generally be possible due to limitations on the feasible fine, s. Note finally that the expected fine revenue is not counted directly in (6) because it is a transfer payment.

In the case where s is not constrained, the resulting first order condition for the optimal fine is[5]

$$-N_I(ps-h)z(\cdot)p = 0,$$

which implies that $ps=h$, or

$$s^* = h/p. \tag{7}$$

This is the standard expression for an optimal fine given imperfect enforcement (Polinsky and Shavell, 2007, p. 413). However, to the extent that s^* exceeds the wealth of offenders, there will be underdeterrence. This will tend to be true, for example, if p is small and/or h is large. In that case, the fine should be set at its maximal level, $\bar{s}$, in which case $p\bar{s}-h<0$.

3.2. *Forfeiture Law*

Now consider the case where owners of capital used in the commission of a crime will have the asset seized in the event that the crime is discovered; that is, $q=1$.[6] Although this does not affect the offender directly, the policy may enhance deterrence indirectly by causing the cost of capital to rise according to (5). Specifically, $R(1)\equiv R_1>R_0$. Unlike the raising of the fine, however, this action is not costless (even though it is a transfer) because it will distort the demand by legal users of capital, given that capital owners cannot distinguish between legal and illegal users (and hence cannot charge them different prices). (We assume, however, that there is no direct cost of raising q from zero to one—i.e., the act of seizure, like the raising of a fine, is costless.)

Welfare under a forfeiture law is given by

[5] We assume here (and where necessary below) that the second-order condition is satisfied.

[6] It is conceivable that the crime could be discovered, and the asset forfeited, even if the offender is not caught. We do not consider that case here.

$$W_1 = N_L \int_{R_1}^{\bar{b}} (b - R_1) f(b) db + N_I \int_{R_1+ps}^{\bar{g}} (g - R_1 - h) z(g) dg + N_I \int_{R_1+ps}^{\bar{g}} pVz(g) dg - c, \qquad (8)$$

where the last integral term is the expected value of the seized capital. Note that this term has to be included in the welfare expression to offset the cost borne by the capital users through the R_1 terms. Because the market for capital is competitive, however, capital owners break even in expected terms, and so their profit does not need to be explicitly included in (8).

Assuming that p is the same with and without forfeiture, we can form the difference between (8) and (6) to get

$$W_1 - W_0 = -N_L \int_{R_0}^{R_1} (b - R_0) f(b) db - N_L \int_{R_1}^{\bar{b}} (R_1 - R_0) f(b) db - \int_{R_0+ps}^{R_1+ps} (g - R_0 - h) z(g) dg$$

$$-N_I \int_{R_1+ps}^{\bar{g}} (R_1 - R_0) z(g) dg + N_I \int_{R_1+ps}^{\bar{g}} pVz(g) dg. \qquad (9)$$

Now substitute $R_1–R_0=p\theta V>0$ into the second and fourth terms and observe that the resulting terms cancel with the fifth term by (1), (2), and (4). This reflects the fact that the value of the forfeited capital is just a transfer from capital users to the government through the increased cost of capital. (As noted, the assumption of a perfectly elastic supply of capital ensures that capital owners are not harmed by forfeiture since the full cost is passed on to users.) This leaves

$$W_1 - W_0 = -N_L \int_{R_0}^{R_1} (b - R_0) f(b) db - N_I \int_{R_0+ps}^{R_1+ps} (g - R_0 - h) z(g) dg, \qquad (10)$$

as the net effect of forfeiture on welfare.

[Figure 1 here]

Note that the first term is negative, reflecting the deadweight loss in welfare in the legal capital market as a result of the price increase. This loss is shown by the triangle labeled A in Figure 1. The second term reflects the deterrent effect of forfeiture in the illegal market. Note that if the fine were not constrained so that the enforcer could set $s^*=h/p$ as prescribed by (7), this term would be unambiguously negative, reflecting the welfare loss in the market for illegal capital use.[7] Thus, if the fine could be set at the optimal level, a forfeiture law would never be desirable in terms of deterrence because the fine alone would achieve the optimal number of criminal transactions. Adding forfeiture would only impose a welfare loss in the capital market. We can thus state:

Proposition 1: When the criminal fine for offenders is unconstrained so that $s^*=h/p$, a forfeiture law is never socially desirable. It follows that $s<h/p$ is a necessary (but not sufficient) condition for a forfeiture law to be socially desirable.

Given this result, we now suppose that the maximal fine, $\bar{s}$, is less than s^*, implying that $\bar{s}<h/p$.[8] With $s=\bar{s}$, the second term in (10) is now ambiguous in sign; at the lower bound, the term in parentheses equals $p\bar{s}-h<0$, while at the upper bound, this term is $p\bar{s}+p\theta V-h$, which may be positive or negative. The offsetting effects reflect the underdeterrence of the criminal fine in the absence of forfeiture on one hand, and the possible overdeterrence of the fine combined with forfeiture on the other.

Suppose first that $p\bar{s}+p\theta V-h>0$, meaning that the combination of the maximal fine and forfeiture overdeters offenders. In that case, the second term in (10) may be positive or negative; it is positive if the loss from overdeterrence under forfeiture is less than the loss from underdeterrence under the fine alone. In other words, there is a net deterrence *gain* from the forfeiture law. This gain, however, must then be weighed against the loss in the legal capital market (the first term in (10)) to determine if the forfeiture law is desirable. If, on the other hand, the second term in (10) is negative, then there is a net deterrence *loss* from forfeiture, in

[7] Specifically, the lower bound of the integral would be R_0+h while the upper bound would be R_1+h, where $R_1>R_0$. Thus, the integral term itself would be positive, making the overall term negative.

[8] In the case where p is chosen optimally, it will always be true that $s=\bar{s}$ (i.e., the fine should be maximal) and p will be chosen such that $p\bar{s}<h$ at the optimum (Polinsky and Shavell, 2000, p. 53). That is, there is some underdeterrence.

which case forfeiture would never be optimal. These two cases are shown in Figure 2. The line labeled $rV+h$ represents the social cost of capital in illegal use; the line above it, labeled $rV+p\theta V+p\bar{s}$, represents the actual cost under forfeiture; and the line below it, labeled $rV+p\bar{s}$, represents the actual cost without forfeiture. The area represented by triangle B is the loss from underdeterrence, and the area of triangle C represents the loss from overdeterrence. Thus, area B minus area C is the net gain (loss) from forfeiture. If this difference is negative, forfeiture is never optimal, but if it is positive and larger than area A in Figure 1, forfeiture produces a net social gain.

[Figure 2 here]

Now suppose that $p\bar{s} + p\theta V - h < 0$, meaning that the maximal fine combined with forfeiture underdeters offenders. In this case, the second term in (10) is unambiguously positive because forfeiture enhances deterrence without overdeterring. Once again, however, this gain must be weighed against the loss in the legal capital market to determine the desirability of a forfeiture law. This case is shown in Figure 3,where the trapezoid labeled D is the net deterrence gain (i.e., the reduction in the welfare loss) from forfeiture.

[Figure 3 here]

Proposition 2: Assume that $\bar{s} < h/p$ so that the maximal fine underdeters. Then a forfeiture law may or may not be socially desirable.

3.3.Conditions Favoring the use of Forfeiture

Given the above conclusions, it is worth considering the circumstances under which forfeiture is more likely to be desirable in practice, given the assumption that $\bar{s}<h/p$. Note first that as h rises, all else equal, the extent of underdeterrence from the fine alone rises. Thus, it becomes more likely that a forfeiture law is socially desirable. In terms of the graphs, an

increase in h increases the magnitude of area B and decreases the magnitude of area C in Figure 2. Thus, it becomes more likely that the difference between areas B and C is positive. Further, an increase in h eventually causes a transition from the situation in Figure 2 to that in Figure 3 where there is only a gain (area D), which is itself increasing in h. For large enough h, this gain will outweigh the deadweight loss in Figure 1 (which is obviously unaffected by h).

A second situation favoring a forfeiture law is when p, the probability of actually apprehending the offender is low. In this case, the threat of a criminal fine is not an effective deterrent, so forfeiture can be used to augment deterrence by indirectly penalizing the offender through the cost of capital. In particular, a lower p makes it more likely that the situation in Figure 3 obtains, where the fine plus forfeiture underdeters. The same logic applies to the case where $\bar{s}$, the maximal fine, is low (due, for example, to wealth constraints on the part of offenders) because, once again, the threat of a criminal fine is an ineffective deterrent. In neither of these cases, however, is forfeiture a perfect substitute for criminal fines because of the concomitant welfare loss in the market for legal users of capital.

We summarize the above effects in

Proposition 3: Given $\bar{s} < h/p$, a forfeiture law becomes more desirable, all else equal, as (i) h rises, (ii) p falls, and (iii) $\bar{s}$ falls.

4. Extensions

4.1. Optimal Forfeiture

The analysis to this point has shown that a forfeiture law may or may not be socially desirable. An important drawback of forfeiture as described so far is that it is all or nothing—either it is always or never used—making it an overly blunt instrument. One way that it could be more finely tuned would be to allow enforcers to choose a value of q between zero and one. This option is desirable if, when q=1, the expression in (10) is negative (i.e., forfeiture overdeters).

Setting q<1 could be interpreted in one of two ways: either the policy is only sometimes used, or it is always used but only a fraction of the value of the illegally used capital is seized. For concreteness, we will adopt the latter interpretation (which would also seem be the fairer of the two approaches in an "equal protection" sense). In deriving the optimal forfeiture policy, we will maintain the constraint that $q\leq 1$, or that forfeiture is limited to the value of the asset being used illegally. We will also continue to treat p and s as fixed and assume that $h>ps$, since, as we have seen, this is a necessary condition for forfeiture to be desirable.

To proceed, rewrite (10), the net gain from forfeiture, as a general function of q by replacing R_1 with $R(q)$ from (5):

$$\Delta(q) \equiv W(q) - W_0 = -N_L \int_{R_0}^{R(q)} (b - R_0) f(b) db - N_I \int_{R_0+ps}^{R(q)+ps} (g - R_0 - h) z(g) dg, \quad (11)$$

where the first term on the right-hand side is the welfare loss in the legal capital market, and the second term is the net gain (loss) in the illegal market.[9] Now take the derivative of this expression with respect to q and, assuming an interior solution (i.e., $0<q^*<1$), set it equal to zero. After substituting $R(q)-R_0=pq\theta V$ and noting that $\partial R(q)/\partial q = p\theta V$, we obtain[10]

$$(h - ps) N_I z(\cdot) = pq\theta V (N_L f(\cdot) + N_I g(\cdot)). \quad (12)$$

The left-hand side is the marginal deterrence benefit of an increase in the probability of forfeiture, which is positive given $h>ps$, reflecting underdeterrence by the fine alone. The right-hand side is the marginal cost of greater forfeiture in the form of larger deadweight losses in both

[9] See Atkinson and Stiglitz (1980, pp. 367-368), who analogously examine the determination of the optimal distortionary tax.

[10] In taking this derivative, we are assuming that θ, the fraction of illegal capital users in the market, remains constant as q varies. This will be true if the elasticities of demand for legal and illegal users are the same in the neighborhood of the optimal q. We will maintain this assumption hereafter.

the legal and illegal capital markets. Since the right-hand side is positive, there will be some residual underdeterrence at the optimum.[11]

The preceding policy, though superior to all-or-nothing forfeiture in theory, would present some practical difficulties. Clearly, the optimal forfeiture probability, q^*, would be case-specific in the same way that the optimal prison term, when paired with a fine, would be. But since deterrence under forfeiture is created indirectly through the capital market, and price discrimination is not possible, individualization of this sort cannot occur. (Although seizures rates could vary by case, all offenders would see the same premium at the time they rent the capital.) Thus, q^* would have to be based on the average underdeterrence of offenders under a fine-only policy, as reflected by the left-hand side of (12). Still, the outcome would be more finely tuned than an all-or-nothing approach.

4.2. Punishment is Prison

In this section we briefly examine the case where punishment is prison instead of a fine. (We continue to assume here that p is fixed.) Thus, the only difference from the above model is that the criminal sanction is costly to impose. The variable s will now be interpreted as the dollar cost to the offender of prison, which we assume is linearly increasing in the length of the prison term (i.e., the unit cost of prison to the offender is $1). Also, let βs be the corresponding social cost (in addition to the cost to the offender) of imprisonment.

In the absence of forfeiture, the social welfare function in this case (the analog to (6)) is

$$W_0^p = N_L \int_{R_0}^{\bar{b}} (b - R_0) f(b) db + N_I \int_{R_0+ps}^{\bar{g}} (g - R_0 - p(1+\beta)s - h) z(g) dg - c, \quad (13)$$

[11] In this sense, the optimal use of forfeiture in combination with fines is like the optimal use of prison, which would also only be used if fines alone underdeter (Polinsky and Shavell, 2000, 2007).

Note that this differs from (6) only by the inclusion of the cost of imprisonment (to the offender and society) in the second integral term. Now suppose a forfeiture law is added to the threat of prison. The resulting welfare function, written as a function of q, is

$$W^p(q) = N_I \int_{R(q)}^{\bar{b}} \big(b - R(q)\big) f(b)db + N_I \int_{R(q)+ps}^{\bar{b}} (g - R(q) - p(1+\beta)s - h) z(g)dg$$

$$+N_I \int_{R(q)+ps}^{\bar{b}} pVz(g)dg - c. \qquad (14)$$

As above, we first derive the optimal prison term, which involves maximizing (14) with respect to s. The resulting the first-order condition is

$$(h + p\beta s)z(\cdot) = [1 - Z(\cdot)](1 + \beta). \qquad (15)$$

This represents the standard condition for the optimal prison term when the probability of apprehension is fixed.[12] The left-hand side is the marginal benefit of an additional unit of s in terms of its deterrent effect (i.e., the savings in harm plus social punishment costs), while the right-hand side is the marginal cost of raising s, consisting of the extra cost of punishing those individuals who are actually apprehended.

To derive the optimal forfeiture rate, we proceed as above and form the difference between (15) and (13). After cancelling terms using (1), (2), and (4) we obtain the analogous expression to (11):

$$\Delta^p(q) \equiv W^p(q) - W_0 = -N_L \int_{R_0}^{R(q)} (b - R_0) f(b)db$$

$$-N_I \int_{R_0+ps}^{R(q)+ps} (g - R_0 - p(1+\beta)s - h) z(g)dg, \qquad (16)$$

where the two terms have the same interpretation. Differentiating this expression with respect to q and setting the result equal to zero yields the first-order condition

$$(h + p\beta s)z(\cdot) = pq\theta V(N_L f(\cdot) + N_I z(\cdot))/N_I. \qquad (17)$$

[12] See Polinsky and Shavell (2007). They also show that when p is endogenous, the optimal prison term, like the optimal fine, would be maximal.

The left-hand side (which is identical to the corresponding term in (14)) is the marginal benefit of greater deterrence, while the right-hand side is the marginal cost in the form of the distortionary effects of forfeiture (as in (12)). Together, (14) and (17) determine the optimal combination of *s* and *q*. Generally, both will be positive (i.e., it will be optimal to use both the threat of imprisonment and forfeiture) because both are costly penalties. At the optimum, they should be adjusted until the marginal costs (the right-hand sides of (14) and (17)) are equal.

4.3.Endogenous Probability of Apprehension

We briefly note here the implications of allowing the enforcer to choose the probability of apprehension, *p*, along with the forfeiture rate. We focus on the case of a fine coupled with forfeiture, which gives the enforcer three choice variables: *p*, *s*, and *q*. As usual, the optimal fine, if unconstrained, should be maximal because it is costless to raise. The question, then, is whether the forfeiture rate should also be maximal. The situation is similar to the combined use of prison and fines when *p* is endogenous; in that case, Polinsky and Shavell (2000, p. 55) show that the optimal prison term is not generally maximal. Thus, a similar conclusion applies here with respect to the forfeiture rate; that is, $0<q^*<1$.

To understand the intuition for this result, suppose initially that $q<1$, and then raise *q* and lower *p* so as to hold $R(q)$ constant. While this lowers enforcement costs and holds the deadweight loss from forfeiture constant, it reduces deterrence because the expected fine, $p\bar{s}$, falls. Thus, there is a necessary trade-off between deterrence and the social cost of raising *q*. At the optimum, these factors must just balance, which will generally yield an interior solution for *q*.

4.4. The Costs of Forfeiture

As noted above, one objection critics have raised about forfeiture laws concerns their possible abuse by enforcers, especially those at the local level, who might see the tool as a convenient source of revenue. Garoupa and Klerman (2002), for example, study the case of a rent-seeking enforcer whose goal, in part, is to maximize the revenue from criminal fines. They show that such a government will often set the expected fine above the harm from crime.

To examine this possibility in the current context, we first need to specify the objective of a rent-seeking enforcer. We suppose, first, that the enforcement authority ignores the impact of seizure on the legal capital market, and second, that it does not care about the gains to offenders. We will suppose, however, that it internalizes the harm caused by offenders since those costs are borne within his jurisdiction. And, of course, it cares about the amount of both the fine and forfeiture revenue. (We consider only punishment by fines in this section.) The resulting objective function of the enforcer is given by

$$\Pi = N_I \int_{R(q)+ps}^{\bar{g}} (ps + pqV - h) z(g) dg. \tag{18}$$

(We suppress the fixed cost of apprehension.) In this case, we can prove

Proposition 4: When the enforcer is a rent seeker who chooses both the fine and the forfeiture rate to maximize (18), the optimal forfeiture rate is maximal; that is, q*=1.

Proof: First consider the optimal fine. Differentiating (18) with respect to *s* and setting the result equal to zero (assuming an interior solution) yields

$$[1 - Z(\cdot)] = (ps + pqV - h) z(\cdot). \tag{19}$$

The left-hand side is the marginal benefit of raising *s*, consisting of an additional dollar in fine revenue collected from all offenders, while the right-hand side is the marginal cost, consisting of the foregone revenue (net of harm) for each additional crime that is deterred.[13] Note that (19)

[13] Thus, the optimal fine is not maximal here.

implies that at the optimum, $ps+pqV-h>0$. Now, assuming that $s=s^*$, differentiate (18) with respect to q to get

$$\frac{\partial \Pi}{\partial q} = N_I[1 - Z(\cdot)]pV - N_I(ps^* + pqV - h)z(\cdot)\left(\frac{\partial R(q)}{\partial q}\right)$$

$$= N_I pV\{[1 - Z(\cdot)] - (ps^* + pqV - h)z(\cdot)\theta\}. \tag{20}$$

Substituting from (19) and noting that $\theta<1$, we obtain

$$\frac{\partial \Pi}{\partial q} = N_I pV(ps^* + pqV - h)z(\cdot)(1 - \theta) > 0, \tag{21}$$

which implies that $q^*=1$. Thus, the enforcer will confiscate all property used in the commission of a crime. ■

To understand the intuition for this result, consider an initial combination of s and q where $q<1$. Now raise q and lower s so as to hold $R(q)+ps$ fixed, thus leaving the number of crimes unchanged. However, because q is weighted by $\theta<1$in $R(q)$, the amount of fine and forfeiture revenue collected per crime, $ps+pqV$, will rise, thus causing overall profits in (18) to rise. It follows that $q<1$ could not have been optimal; that is, $q^*=1$. This result confirms the concern of critics that a rent-seeking enforcer will have an incentive to overuse forfeiture relative to the social optimum.

Another possible cost of forfeiture, noted above, is the risk of seizure of assets from "innocent" owners. Note, however, that in the current model, no suspects are wrongly accused,[14] so only capital that is actually used in the commission of a crime is seized. In this sense, no victims of seizure are innocent. Further, all capital owners know, at the time they enter into a transaction, that there is a chance their capital will be used illegally, thereby subjecting them to a future risk of forfeiture. However, the capital market compensates them in expected terms for that risk through the rental rate. Thus, complaints of wrongful punishment by victims of seizure

[14] For models where wrongful convictions are possible, see Harris (1970), Png (1986), and Miceli (1990).

are like an insurance company bemoaning the cost of having to pay a claim. Note finally that it does not matter for present purposes whether the enforcer is a welfare maximizer or rent-seeker; in either case, the market will adjust to "compensate" capital owners for the risk of loss.

5. Conclusion

Government seizure of capital assets used in the commission of an illegal act has a long history in Anglo-American law, but it has received renewed attention due to its revived use in the war on drugs. This paper has examined the impact of asset seizure on deterrence by incorporating it into the standard economic model of crime. In the model, certain crimes require criminals to use a capital asset as an input, which they rent from (unsuspecting) capital owners. If and when the crime is detected, the asset may be seized from the owner as part of the overall enforcement policy. The question is whether this threat, even though directed at an "innocent" party to the crime, can enhance deterrence of potential offenders.

The answer turns out to depend on the efficacy of other enforcement tools. In particular, if fines can be used optimally (i.e., without limit), then forfeiture would never be desirable because it imposes a distortion in the capital market. The logic is the same as that which underlies the well-known result that prison should never be used unless fines alone would underdeter offenders because of limits on their ability to pay. Even when fines are limited, however, forfeiture may not be optimal because it may result in overdeterrence. A more refined forfeiture policy would allow partial seizure, but even then it would not be possible to individualize punishment in an optimal way. A more important drawback of the policy according to critics is the incentive of rent-seeking enforcers to overuse the policy as a way to raise revenue.

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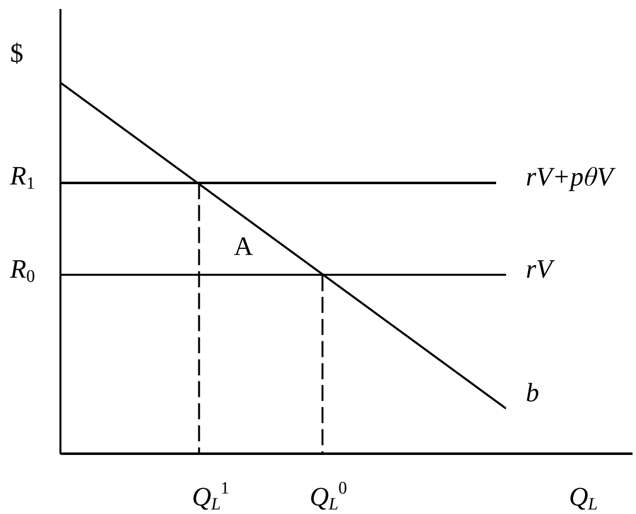

Figure 1. Welfare loss from forfeiture law in the market for legal capital use.

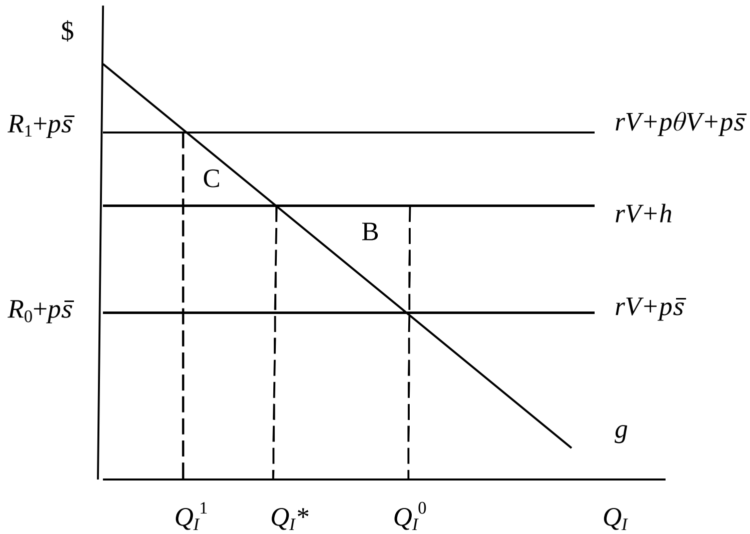

Figure 2. Market for illegal capital use for the case where $p\theta V+p\bar{s}>h>p\bar{s}$.

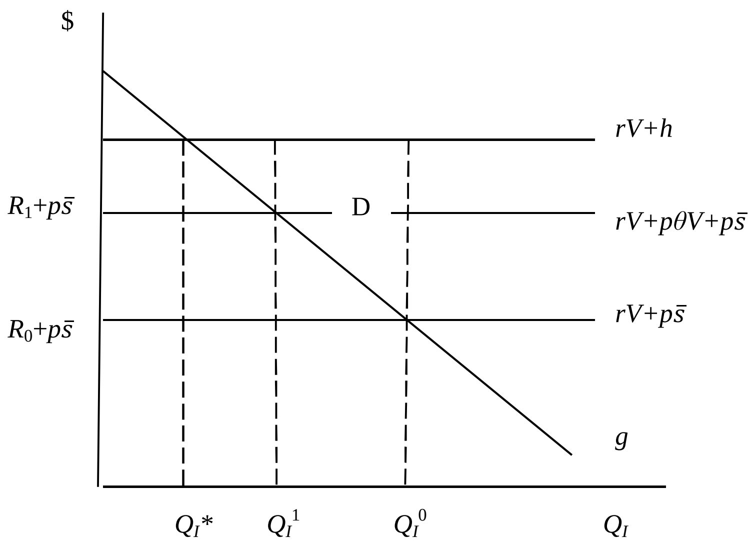

Figure 3. Market for illegal capital use for the case where $p\theta V+p\bar{s}<h$.