WEALTH REDISTRIBUTION AND THE SOCIAL COSTS OF CRIME AND LAW ENFORCEMENT

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This paper explores how the distribution of wealth affects the social costs of crime and law enforcement and whether more or less equality, in this regard, is socially desirable. Generally, the optimal distribution of wealth should balance the social costs of enforcing the law upon wealthy individuals and those costs vis-à-vis poor individuals. The paper shows that, in a broad set of circumstances, greater or even perfect equality in the distribution of wealth is socially desirable. This is the case even though, as is assumed, the distribution of the benefits and harms resulting from harmful acts are the same for all individuals, all of whom also have identical and linear utility functions. However, there are certain circumstances under which inequality is socially preferable, circumstances that, all other things equal, are more likely to arise in poorer societies.
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ABSTRACT

This paper explores how the distribution of wealth affects the social costs of crime and law enforcement and whether more or less equality, in this regard, is socially desirable. Generally, the optimal distribution of wealth should balance the social costs of enforcing the law upon wealthy individuals and those costs vis-à-vis poor individuals. The paper shows that, in a broad set of circumstances, greater or even perfect equality in the distribution of wealth is socially desirable. This is the case even though, as is assumed, the distribution of the benefits and harms resulting from harmful acts are the same for all individuals, all of whom also have identical and linear utility functions. However, there are certain circumstances under which inequality is socially preferable, circumstances that, all other things equal, are more likely to arise in poorer societies.

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1. INTRODUCTION

Redistributing wealth from the rich to the poor is an exercise in balancing marginal social costs and benefits. The social benefits derive from the idea that people have decreasing marginal utilities of wealth (poor individuals value the marginal dollar more than do rich individuals) or that the social welfare function exhibits aversion to inequality (individuals in a given society tend to prefer equality). The social costs involved are associated with the administration of the wealth redistribution and the use of distortionary, rather than lump sum, taxes.

This paper argues that redistribution generates additional social benefits or costs of a completely different kind, namely, its impact on the social costs of crime and law enforcement. I show that, in a broad range/set of circumstances, redistribution reduces these costs and, back-of-the-envelope calculations suggest, to a significant extent. This serves as an additional justification for progressive taxation, indicating that the scope of redistribution should be greater than what is usually recommended in the public finance literature.

The kernel of the argument put forth here is grounded in the notion that it is generally cheaper to enforce the law on the rich than on the poor, for two cumulative reasons: first, because monetary sanctions are less costly than enforcement efforts in achieving any particular level of deterrence, and, second, because, for obvious reasons, monetary sanctions cannot exceed offenders' level of wealth. Thus, the greater offenders' level of wealth, more deterrence can be achieved at no additional cost or the same level of deterrence can be maintained at a lower cost through appropriate reduction of the enforcement efforts. A redistribution of wealth from the rich to the poor would increase the possible fine for the latter, thereby reducing the social costs of enforcing the law on them, and reduce it for the former, thereby
increasing the social costs with regard to them. Whether or not redistribution is socially desirable becomes, then, a question of the relative magnitudes of these benefits and costs, a question of the tradeoff between the social costs of enforcing the law on the rich and the social costs vis-à-vis the poor.

As this paper will demonstrate, this tradeoff depends, amongst other things, on how the benefits from the harmful act are distributed (the shape and range of the distribution function, which is assumed to be the same for all individuals), whether the probability of punishment can vary across poor and rich individuals (the technology of law enforcement), and how wealthy the given society is in general. While I show that redistribution of wealth towards greater equality is socially desirable in a wide set of circumstances, there are certain circumstances in which the reverse is true and greater inequality is socially preferable. These latter circumstances, presumably less common, are more likely to arise in poorer societies. Thus, a pattern may emerge in which greater equality generates in richer countries additional social benefits in the form of reduced social costs of crime and law enforcement, while in poorer countries, it is more likely to be associated with additional social costs.¹

As an illustration of the argument that redistribution may reduce the social costs of crime and law enforcement, let us consider the following Example.

**Example 1:** Suppose that rich individuals and poor individuals have monetary resources of $12,000 and $6000, respectively, and can both engage in a certain harmful act from which they obtain benefits that range uniformly from $0 to $2000 and that causes harm of $1500. Further suppose that given the costs of law enforcement, optimal enforcement requires

¹ Or, from another perspective, this paper suggests that all else equal, rich (poor) countries tend to be wealthier the more (or less) equally their wealth is distributed, because the costs of enforcing the law correspondingly decrease.
setting the probability of punishment, which we will assume to be identical for all, at 0.2 and the fine at $7500.

Under these circumstances, poor offenders will pay, if apprehended, their entire wealth ($6000). They face an expected sanction of $1200 ($6000 X 0.2) and therefore are underdeterred, in the sense that some of the poor will commit the harmful act even though the harm exceeds the benefits they obtain (1500>1200). Wealthy offenders, in contrast, if apprehended, will pay less than their entire wealth ($7500); their expected sanction is $1500 ($7500 X 0.2), and accordingly, they are "perfectly" deterred, in the sense that no rich individual who commits (refrains from) the harmful act will derive benefits that are less (greater) than the harm generated. Now, say we redistribute $1000 from the rich to the poor so that, respectively, they have monetary resources of $11,000 and $7000. This will have no impact on the level of deterrence for the rich, because they will still face an expected sanction of $1500 ($7500 X 0.2); it will, however, enhance the deterrence of the poor, as they now will face the higher expected sanction of $1400 ($7000 X 0.2). The latter increase in deterrence will reduce social harm because poor individuals were previously underdeterred, and moreover, this outcome would entail no social costs, because enforcement efforts have not been changed. Thus redistribution increases social welfare. In this simple illustration redistribution was socially desirable because, amongst other things, poor individuals were under-deterred, while rich individuals were perfectly deterred, but, as will be shown in this paper, the point holds under broad circumstances.

Alternatively, social welfare could be increased by a saving in enforcement efforts without affecting deterrence. To understand this, let us redistribute again $1000 from the rich to the poor, increase the fine to $8750, and reduce the probability of punishment to approximately 0.171. These changes would maintain the same levels of deterrence for the poor and rich (the rich would face an expected sanction of $8750\times 0.171 = $1500 and the poor would face $7000\times 0.171 = $1200), but also would reduce enforcement efforts. Thus, social welfare would increase.

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As already mentioned, redistribution is not always socially desirable and there are certain circumstances in which inequality may be preferable. One possible reason (discussed in infra Part 5.C.) is that the benefits from harmful acts for all individuals are sufficiently high relative to wealth. Example 2 illustrates this point:

**Example 2:** Suppose that rich individuals and poor individuals have monetary resources of $12,000 and $6000, respectively, and they can engage in some harmful act from which they will obtain benefits that range from $12,000 to $14,000 and that causes harm of $13,000.

Under these circumstances, there is no point in investing any resources in law enforcement, even if it is very cheap, because all individuals would commit the harmful act regardless (the minimum benefits are equal to or greater than the maximum expected sanction). Redistributing wealth from the rich to the poor is obviously pointless. However, suppose that $1000 were redistributed from the poor to the rich, giving the latter $13,000 while the former remain with $5000. Under this scenario, rich potential offenders could be perfectly deterred by setting the probability of punishment at 1, assuming, for simplicity, that enforcement efforts are virtually costless, and the magnitudes of the fines at $13,000, so that the expected sanction for the rich ($13,000 X 1) is equal to the harm—$13,000. Under the same scheme, poor individuals would be completely undeterred as their expected sanction ($5000X1) would be less than their minimum expected benefit ($12,000). Since, with redistribution, deterrence of the rich is increased from zero to perfect deterrence, while deterrence of the poor remains unchanged, social welfare is enhanced. In this Example, more unequal wealth distribution is socially desirable because, amongst other things, the original distribution of wealth results in no deterrence at all.
However, the point that unequal distribution may be socially beneficial holds more generally and in different circumstances, as discussed in infra Parts 4, 5.C., and 5.D.

The arguments in this paper are not founded on the notion that the poor are more likely to break the law because they derive greater utility from doing so (i.e., the poor have greater needs), or because the opportunity costs of crime are lower for them (i.e., the poor derive less utility from legitimate alternatives), or because they suffer less from imprisonment (i.e., the opportunity costs of time are lower for them), or because the greater the level of inequality, the greater the benefits of criminal behavior and thus the greater the likelihood of its occurrence (i.e., the potential payoff from theft or burglary is higher). Rather, this paper assumes identical distribution of the benefits and harm resulting from a given harmful act across all individuals, rich or poor. These premises are roughly applicable with regard to many types of harmful acts, such as leisure-related offenses (littering the beach, double-parking, and so on) and certain violent crimes. However, the framework and analysis I present in this paper can be extended to more traditional property crimes and can incorporate the observations pointed out above as well.

The paper is motivated in part by the existing literature on crime and law enforcement, which examines extensively the theoretical and empirical relationships between deterrence and income distribution in society. Both theory and empirical evidence suggest a positive correlation between crime and wealth inequality, but the effects are not clear-cut. However, very few works have explored the normative

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3 Compare with Polinsky and Shavell (1984, 1991) and Bar-Niv and Safra (2001), who make a similar assumption.
5 For example, Zhang (1997) found that certain welfare programs have a negative and often significant effect on property crime, but no significant effect on violent crime. Kelly (2000) found that income inequality has no effect on property crime, but has a significant and robust effect on violent crime, while poverty and police activity have a significant effect on property crime, though little impact on violent crime.
question of the social desirability of redistributing wealth from the perspective of crime and law enforcement. These questions, it should be stressed, are different, because social welfare may be greater as a result of redistribution even if the crime rate remains the same or even rises, as demonstrated in this paper.

The literature on crime and law enforcement which explores the normative rather than the positive effects of redistribution includes, amongst others,\(^6\) papers by Benoit and Osborn (1995) and Demougin and Schwager (2001). Both papers however differ significantly from the inquiry undertaken here in several aspects. In particular, both focus on the political mechanism by which wealthy individuals would seek to finance welfare transfers to the poor in order to "purchase" security, whereas this paper adopts the standard of social welfare maximization. In addition, the forces that drive the results in these papers are markedly different from those in the present paper. For example, under the Demougin and Schwager (2001) model, only the poor are potential criminals and the rich are classified as the victims, whereas in Benoit and Osborn (1995), the possibility that innocent people will be punished is included as an important explanatory variable for the results. None of these parameters are present in the model set forth.

This paper builds on the work of Polinsky and Shavell (1984, 1991) and of Garoupa (2001), which explore the optimal probability and severity of punishment when wealth varies across individuals. However, these authors did not consider either the possibility or the social desirability of wealth redistribution in reducing the social costs of crime and law enforcement, which is the focus of this paper.

\(^6\) See also Cassone and Marchese (2006), who expand the work of Demougin & Schwager (2000) to consider risk aversion and continuous labor supply. Also noteworthy is Eaton and White’s (1995) work, which explores the effect on economic efficiency of the distribution of wealth and systems for enforcing property rights.
The paper is organized as follows. Part 2 unfolds the general model, and Part 3 demonstrates that greater or even perfect equality is socially desirable if, amongst other things, the probability of punishment is uniform for all offenders. Part 4 shows that greater equality in wealth distribution is also generally desirable if the probability of punishment can vary across individuals but that there are circumstances in which greater or even perfect inequality is socially preferable. Part 5 refines the basic model presented in Part 2 and examines the robustness of the results. It too points to circumstances in which perfect equality is socially undesirable, even if the probability of punishment is uniform for all individuals. Part 6 concludes and the Appendix contains the formal proofs.

2. THE MODEL

Risk-neutral individuals contemplate whether to commit a harmful act causing harm of $h$. Each individual obtains benefits $b$ which are assumed to be distributed uniformly on the support $[0, \hat{b}]$. Assume that, for some individuals, the benefits exceed the harm, $\hat{b} > h$, implying that some harmful acts are socially desirable. This, however, is not crucial for the results. Following Polinsky and Shavell (1984, 1991), further assume that the benefits and harm resulting from the harmful act are not contingent on the level of wealth of individuals or the distribution of wealth among individuals.

If an individual does commit the harmful act, he will face some probability of being caught and fined. Assume that the fine may depend on offenders' wealth or, alternatively that it is set regardless of wealth, but those offenders who lack the

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7 The model follows and expands on the general model found in Polinsky and Shavell (1984).
8 Part 5 briefly analyzes: (1) non-uniform distribution functions and (2) uniform distribution functions whose support is $[\hat{b}, \hat{b}]$, where $\hat{b} > 0$. These may affect the results.
9 Part 6 points out how the model can be modified to account for other possibilities.
resources to pay the fine in full pay all that they have. The maximum feasible fine \( f \) is, therefore, constrained to the level of wealth of offenders, which, in turn, depends on how all the wealth in society is distributed amongst all individuals. If wealth is distributed equally, the level of wealth and, hence, the maximum feasible fine for each individual will be \( \bar{w} \). However, wealth is generally not distributed equally in most societies. For simplicity, assume that the total population, which is normalized and set at 1, is divided into two equally-sized groups,\(^{10}\) Rich, \( R \), and Poor, \( P \). Poor individuals have a wealth level of \( w_p(\geq 0) \), and rich individuals \( w_r(>0) \), where \( w_p \leq w_r \) and \( w_p + w_r = 2\bar{w} \).

The social planner can affect the distribution of wealth in society by transferring wealth from rich individuals to poor individuals or vice versa. Without loss of generality, it is assumed that the rich individuals are at least as rich as the poor individuals following the redistribution. Together, these imply that the amount of wealth redistributed from the rich to the poor, \( x \), should satisfy \(-w_p \leq x \leq \frac{w_r - w_p}{2} \).\(^{11}\) To abstract from other issues commonly related to redistribution, it is assumed that wealth redistribution is costless, entailing neither administrative costs nor incentive effects beyond those associated with engaging in the harmful act. Coupled with the assumption that all individuals have identical, linear utility functions, this assumption implies that redistribution is relevant if and only if it affects the social costs of crime and law enforcement. It also suggests an alternative interpretation of the model, developed in the Appendix, according to which the social planner sets directly the wealth levels of the poor and rich, \( w_p(\geq 0) \) and \( w_r(>0) \)
subject to \( w_p \leq w_R \) and \( w_p + w_R = 2\bar{w} \). Thus, the notions of greater or less wealth equality and redistribution are treated as equivalent and used interchangeably in this paper.

The enforcement technology is assumed at the outset to be "general" in nature or "non-discriminatory," so that the probability of punishment must be identical for all individuals. This is justified if it is difficult to adjust enforcement efforts in accordance with wealth, for example, if poor and rich individuals offend in the same area and it is hard to identify whether offenders are rich or poor prior to resources being spent on enforcement. The alternative, that enforcement efforts are "specific" in nature or "discriminatory" so that the probability of punishment can vary across individuals, emerges as significant and will be analyzed in Part 4. Assume that the costs of enforcement, which are given by the function \( c(p) \), are not contingent on the distribution of wealth in society, but, rather, are identical for all offenders, and that this cost function exhibits decreasing or constant marginal returns, so that \( c'(p) > 0 \) and \( c''(p) \geq 0 \).

Social welfare or, equivalently, the social costs of crime and law enforcement, amount to the sum of benefits obtained by individuals who commit the harmful act, less the harm done, and less the enforcement costs. To determine social welfare, observe that all individuals, rich or poor, will commit the harmful act if and only if the benefits they derive exceed the expected sanction they face, that is, if \( b > pf_i \), \( i = P, R \). Hence, social welfare before redistribution can be expressed as:

\[
(1) \quad SW = \frac{1}{2} \int_{pfr} (b-h)g(b)db + \frac{1}{2} \int_{pfr} (b-h)g(b)db - c(p)
\]

\[12\] The terms "general enforcement" and "specific enforcement" are borrowed from Shavell (1991).
The usual social problem is to choose the probability and severity of punishment that maximize social welfare. The main purpose of this paper is to consider the conditions under which redistributing wealth increases or reduces social welfare or, more generally, the optimal level of redistribution (i.e., the optimal distribution of wealth).

### 3. GENERAL ENFORCEMENT

Our analysis of the social desirability of redistributing wealth will be conducted in two steps. First, we will depict the optimal law enforcement scheme (the optimal probability and severity of punishment) given some unequal distribution of wealth, and then we will analyze whether social welfare can be augmented by way of wealth redistribution. The optimal distribution of wealth is directly derived in the Appendix.

#### A. The Optimal Enforcement Scheme

The optimal probability and optimal severity of punishment for a certain unequal distribution of wealth are arrived at by solving the constrained maximization problem (1), which is characterized by the following lemma (see Polinsky and Shavell (1984)):

**Lemma 1**: (1) The optimal fine for poor offenders is equal to their entire wealth, \( f_p^* = w_p \). (2) The optimal fine for rich offenders is equal to their entire wealth or is set according to the multiplier principle, whichever is less, \( f_r^* = \min[w_r, \frac{h}{p^*}] \). (3) The optimal probability of punishment gives rise to two scenarios: (a) under-deterrence of poor individuals but perfect deterrence of rich individuals, that is, \( p^* f_p^* < h = p^* f_r^* \), which occurs if \( f_r^* = \frac{h}{p^*} < w_r \), or (b) under-deterrence of both poor and rich individuals, that is, \( p^* f_p^* < p^* f_r^* < h \), which occurs if \( f_r^* = w_r \). (4) Poor individuals
inevitably face a lower expected sanction and, therefore, are less deterred than rich individuals, $p^* f_p^* < p^* f_R^*$.


The explanation of Lemma 1 is roughly as follows. If enforcement efforts were costless and offenders' wealth sufficiently large, the optimal expected sanction would equal harm for both the rich and the poor. This would guarantee that individuals would commit the harmful act if and only if the benefits they derive were to exceed the harm. However, since enforcement efforts are costly while fines are socially costless, the optimal fine for *poor* individuals should amount to their entire wealth; otherwise social welfare could be increased by raising the fine to its maximum level and possibly reducing the probability of punishment without affecting deterrence. This is Becker's argument. A certain degree of under-deterrence with respect to the *poor* is socially optimal, because at the starting point of perfect deterrence—i.e., the expected sanction equals the harm—the net harm imposed by the marginal poor offenders is virtually zero. Therefore, a slight reduction in the probability of punishment saves enforcement costs at no cost. This is Polinsky and Shavell's point. Since the probability of punishment is the same for all offenders, rich individuals cannot optimally face a lower expected sanction than poor individuals do, for otherwise, social welfare could be increased at no cost by increasing the sanction imposed on the rich, which would be feasible. The rich can be optimally under-deterred, but then the fine imposed on them must be equal to their entire wealth. The rich can also be perfectly deterred, but then they should not face a fine that is equal to

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*Lemma (1) can be summarized as $f_p^* = w_p, f_R^* = \min \left[ \frac{h}{p^*_R}, w_R \right], p^* f_p^* < p^* f_R^* \leq h.$*
their entire wealth but rather one that is set according to the multiplier principle, i.e.,
equal to the harm divided by the probability of punishment, so that the expected
sanction will equal the harm. As Polinsky and Shavell emphasize, Becker's argument
for increasing the fine to its maximum and reducing the probability of punishment
appropriately is not valid anymore, because it comes at the expense of increasing
under-deterrence of the poor, since the probability of punishment must be the same
for all. This completes the explanation of Lemma 1.

Having described the optimal enforcement scheme, let us now prove that greater
equality increases social welfare, first for situations in which the poor are under-
deterred and the rich perfectly deterred (Scenario (a)) and then for situations in which
the poor and rich are both under-deterred (Scenario (b)).

B. Poor Individuals Under-Deterred; Rich Individuals Perfectly Deterred

Suppose first that the optimal enforcement scheme is characterized by Scenario (a)
as illustrated in Figure 1.

Figure 1

This implies that the fine imposed on the poor is equal to their total wealth (they
face an expected sanction of \(p^*w_p\)), while the fine imposed on the rich is less than
their entire wealth, i.e., it is set according to the multiplier principle (they face an

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14 The shape of Figure 1 results from the assumption that the benefits from the harmful act are
uniformly distributed.
expected sanction of \( h \) rather than \( p^*w_R \). Therefore, redistributing a sufficiently small amount of wealth \( x \) (satisfying \( 0 < x < w_R - \frac{h}{p^*} \)) from the rich to the poor will not affect the feasibility of the fine imposed on the rich, but it will enable an increase in the fine imposed on the poor by \( x \). If the probability of punishment is unchanged, the expected sanction for the poor will be increased to \( p^*(w_p + x) \), that is, by \( p^*x \), while the expected sanction for the rich will remain at \( h \) (Figure 1). Therefore, redistribution will increase deterrence of the poor without compromising deterrence of the rich. Since, under the original distribution, poor individuals are under-deterred (Lemma 1(3)), social welfare will necessarily increase following redistribution. Example 1 in the Introduction illustrates this situation precisely.

C. Poor and Rich Individuals Under-Deterred

Now suppose that both poor and rich individuals are under-deterred, \( p^*w_p < p^*w_R < h \), as illustrated in Figure 2 (Scenario (b)).

![Figure 2](http://law.bepress.com/taulwps/art100)

This means that the fines imposed on rich and poor individuals are at the maximal level. Here, redistributing wealth from the rich to the poor will come at a cost: deterrence of the rich will necessarily drop. Nevertheless, say we redistribute \( x \) from the rich to the poor, adjust fines accordingly to \( f_R = w_r - x \) and \( f_p = w_p + x \), and keep the probability of punishment at its original level. The third move entails that the
costs of enforcement are unaffected. The second move entails that the expected sanction that poor (rich) offenders face increases (decreases) by exactly $p^* x$ (Figure 2). Thus, poor individuals are deterred more and rich individuals deterred less. Since the benefits from the harmful act are distributed uniformly, an equal change in the expected sanction increases (decreases) the number of offenders by exactly the same amount. This means that there are fewer poor individuals who commit the harmful act but an increase in exactly the same amount of rich individuals committing the act.\textsuperscript{15}

Nevertheless, social welfare is increased, because the net harm generated by the additional rich offenders amounts to less than the savings in net harm that would have been created by the additional deterred poor individuals. The reason for this is that the benefits derived by the additional rich offenders are greater than the benefits forgone by the now-deterred poor offenders. This stems from the fact that rich offenders face a greater optimal expected sanction than do poor individuals (Lemma 1(4)). Thus, net harm is reduced and social welfare is increased.\textsuperscript{16}

To illustrate this result numerically, consider Example 3, a variation on Example 1 from the Introduction that assumes that, because enforcement efforts are higher, both the poor and rich are under-deterred.

\textsuperscript{15} Since the population is normalized to 1, an increase (decrease) of the expected sanction for the poor (rich) by $p^* x$ implies that there are additional $\frac{p^* x}{2b}$ poor individuals who are deterred (rich offenders). This follows from the definition of a uniform distribution function: there is the same number of individuals in any given interval as there are in any other interval of the same length.

\textsuperscript{16} Note that this result does not depend on the assumption that the two groups are equal in size. Assume, for example, that the Rich group is of size $\mu$ and the Poor group of size $1 - \mu$. Now transfer $x$ from the Rich to the Poor, giving the Rich offenders $w_R - x$ and the Poor offenders $w_P + \frac{\mu x}{1 - \mu}$.

Since benefits are distributed uniformly, the reduction in deterrence of the Rich, $\mu p^* x$, is exactly equal to the increase in deterrence of the Poor, $\frac{\mu x}{1 - \mu}$. Thus the argument follows accordingly.
Example 3: Suppose that rich individuals and poor individuals have monetary resources of $12,000 and $6000, respectively, and that they can engage in some harmful act from which they obtain benefits that range uniformly from $0 to $2000 and that causes harm of $1500. Further suppose that, given the costs of law enforcement, optimal enforcement requires setting the probability of punishment at $p^*=0.1$ and the fine at $f=$12,000.

Under these conditions, poor individuals face an expected sanction of $600 ($6000X0.1) and rich individuals a sanction of $1200 ($12,000X0.1), and both are therefore under-deterred. Suppose we redistribute now $1000 from the rich to the poor, so that the latter will have $11,000 and the former $7000. Poor individuals now face an expected sanction of $700 ($7000X0.1) and rich offenders an expected sanction of $1100 ($11,000X0.1). The expected sanctions for the poor (rich) have thereby increased (decreased) by exactly $100. Since the benefits are distributed uniformly, this means that there is exactly the same amount of additional rich offenders as they are fewer poor offenders.\footnote{Again, under the definition of a uniform distribution function, there are as many individuals in any given interval as there are in any other interval of the same length. In the present example, the number of rich individuals who derive benefits that range from $1100 to $1200 is the same as the number of poor individuals who derive benefits that range from $600 to $700. In percentage terms, we are dealing with 2.5% (0.5X100/2000) of the overall population of poor/rich individuals.}

The overall rate of crime — the combined deterrence of poor and rich individuals — has not changed. However, although the same harm of $1500 is imposed per offender from either group, the additional rich offenders derive benefits that range from $1100 to $1200 (or, on average, $1150) per offender; in contrast, the additional deterred poor individuals derive benefits ranging from $600 to $700 (or, on average, $650) per individual. In other words, the additional rich offenders impose, on average, a net harm of $350 ($1500 – $1150) per offender, while the additional deterred poor individuals impose, on average, a net harm of $850 ($1500 – $650) per individual. Thus, redistributing...
$1000 from rich individuals to poor individuals increases social welfare by $500 ($850 – $350) on average per each rich offender who replaces a poor offender, which is socially desirable.\textsuperscript{18}

\textit{D. Summary}

It was shown above that regardless of the optimal enforcement scheme, redistribution (greater equality) increases social welfare. This leads to the following proposition:

\textbf{Proposition 1: If the enforcement technology is general, then perfect equality in the distribution of wealth is socially desirable.}

The explanation of Proposition 1 is twofold (a direct proof can be found in the Appendix): First, redistributing wealth from rich to poor individuals causes the overall rate of crime to drop, as deterrence of the rich is unaffected, whereas deterrence of the poor increases (Scenario (a)). Second, even if the overall rate of crime is unaffected, since the increase in deterrence of the poor is completely offset by the decrease in deterrence of the rich, the shift in the composition of the group of offenders is socially desirable, since marginal poor offenders impose greater net harm than do marginal rich ones.\textsuperscript{19} This is the case not because poor individuals cause greater harm or

\textsuperscript{18} A back–of-the-envelope calculation of the total savings in social costs (reduced net harm) can be made based on the above redistribution. Since the change in the composition of offenders is 2.5\% of the total population (0.5X100/2000=0.025) and the savings per offenders amount to $500, the total savings add up to $12.5 (0.025X500=12.5). Compared with the total net harm associated with crime before the redistribution takes place—$50 (0.5X1400/2000[1500 – 1300] + 0.5X800/2000[1500 – 1600])—this is a reduction of 25\%(!) in net harm (12.5X100/50). Furthermore, if redistribution were complete (i.e., \( x = 3,000 \)), the net harm associated with crime would be reduced to $27.5 (1100/2000[1500 – 1450]), which would be a reduction of 45\% in net harm!

\textsuperscript{19} This shows that the normative question concerning the social desirability of wealth inequality is different from the positive question concerning the effects of the distribution of wealth on deterrence.
because rich individuals derive greater benefits from the harmful act — by assumption harm and benefits are the same across offenders regardless of wealth — rather, because marginal rich offenders derive greater benefits than do marginal poor offenders, as the expected sanction the former face is higher. This explanation hints at the factors that may impact the validity of Proposition 1, for example, how the benefits from the harmful act are distributed. These factors will be discussed in Part 5, where the model is refined.

4. SPECIFIC ENFORCEMENT

The previous Part showed that redistribution is socially desirable if, amongst other things, the enforcement technology is general. This Part examines how this outcome changes when enforcement efforts are specific, in the sense that the probability of punishment can vary between rich individuals and poor individuals. This is justified, for example, if the poor and rich live and commit offenses in different areas or if offenders can be identified as poor or rich prior to the decision how much to invest in enforcement efforts, they can be identified before enforcement efforts are made—for example, tax auditors can audit rich individuals more frequently than poor ones. Now, the social planner has another tool at its disposal for maximizing social welfare: the enforcement efforts vis-à-vis the poor can be fine-tuned separately from the measures taken against the rich. This turns out to be critical for the social desirability of wealth redistribution.

A. The Optimal Enforcement Scheme

Let us begin again by depicting the optimal enforcement scheme given a certain wealth inequality. To simplify things, the enforcement costs are assumed to be
proportional to the probability of punishment, but this is not qualitatively crucial.

Social welfare (1) is adjusted to account for the nature of the enforcement technology and can be formulated as follows:

\[
SW = \frac{1}{2} \int_{p_{r/f}}^{b} bg(b)db - h(1 - G(p_{r/f})) - \frac{1}{2} c(p_{r}) + \frac{1}{2} \int_{p_{r/f}} b(b)db - h(1 - G(p_{r/f})) - \frac{1}{2} c(p_{r}).
\]

Since the probability and severity of punishment can vary across individuals, the optimal enforcement schemes for the poor and rich are determined independently. These schemes are represented by the following Lemma 2 (see Polinsky and Shavell (1984), Garoupa (2001)):

**Lemma 2:** (1) The optimal fine for poor and rich individuals is the maximal fine, \( f_i^* = w_i \). (2) The optimal probability of punishment for each gives rise to under-deterrence, \( p^*(w_i)w_i < h \). (3) The optimal expected sanction for the rich is greater than the optimal expected sanction for the poor, \( p^*(w_f)w_f < p^*(w_r)w_r \).

**Proof:** See Garoupa (2001).

The explanation of Lemma 2 is straightforward. Since fines are socially costless whereas enforcement efforts are socially costly, *fines should be set at their maximum level*. Otherwise, social welfare could be increased by raising fines to their maximum level and reducing the probability of enforcement with no impact on deterrence. This is Becker's argument. *Some degree of under-deterrence is socially optimal*, because under first best deterrence—i.e., the expected sanction equals the harm—the net harm

\[20\] The notation terms \( p_i \) and \( p(w_i) \) will be used interchangeably.
imposed by the marginal offenders stands at virtually zero. Therefore, reducing the probability of punishment slightly saves enforcement costs at virtually no cost. This is Polinsky and Shavell's point. The reason why the expected sanction is greater for the rich than for the poor is as follows: As wealth increases, the same optimal level of deterrence can be achieved by increasing the fine and reducing the probability of punishment, so that the optimal expected sanction remains constant. However, as the fine increases the deterrent effect of enforcement efforts are higher. Therefore, since optimality is characterized by some degree of under-deterrence, it is not optimal to reduce the probability of punishment all the way down. Rather, it is desirable to achieve greater deterrence. Accordingly, as wealth increases, the optimal expected sanction increases, indicating that the expected sanction for the rich is greater than the expected sanction for the poor. This is Garoupa's point.

As the above explanation makes clear, it is cheaper to enforce the law against the rich than against the poor. This means that redistributing wealth from rich individuals to poor individuals reduces the social costs of crime and law enforcement associated with the poor but, at the same time, increases the social costs of crime and law enforcement associated with the rich. Whether redistribution is socially desirable depends, then, on the relative magnitudes of these costs, i.e., on the tradeoff between the social costs entailed with the poor and those entailed with the rich. Since the two groups are distinguished only in terms of their wealth, this tradeoff can be partly determined by inquiring into the properties of the value function of the social problem at hand, to which we now turn.

21 To illustrate, if the optimal fine is $1000 then any 1% increase in the probability of punishment has an impact on the level of deterrence of $10 (1000X1%). However, if the optimal fine is $2000, then any 1% increase in the probability of punishment generates an impact of $20 (2000X1%) on the level of deterrence.

22 A more direct approach shows that the tradeoff depends on the "shadow prices" of wealth for the rich and poor. This is the approach taken in Part 4. D.
B. The Value Function

The value function, \( V(w, p(w)) = \max_p \int b\cdot p\cdot g\cdot (b - h)\cdot db - c(p) \), renders the maximum social welfare attainable under our model as a function of the wealth of a group of identical individuals. It is obtained by solving the maximization problem time and again for different levels of wealth of a group of identical individuals. Since the optimal fine is the entire wealth of offenders, regardless of their level of wealth, the value function can be determined solely with respect to the probability of punishment. The value function increases with wealth, because it is cheaper to enforce the law upon richer individuals. Using the envelope theorem, this can be understood by observing that

\[
\frac{dV(w, p(w))}{dw} = \frac{\partial V(w, p(w))}{\partial w} = p^*(h - p^*w)g(p^*w) > 0.
\]

In determining the tradeoff between the social costs of crime and law enforcement associated with the rich and those associated with the poor, one critical question is whether the value function increases with wealth at increasing or decreasing rates. Namely, does increasing the wealth of individuals by, say, $1000 increase social welfare by more or by less than the decrease in social welfare resulting from an equivalent reduction of $1000 in the wealth of individuals? Graphically, the shape of the value function is of great importance, in particular either its concavity or convexity. If, for example, the value function were concave (convex) throughout its support, then greater or, indeed, perfect equality (inequality) in the distribution of wealth would be socially desirable. The reason for this is that redistributing wealth from rich (poor) individuals to poor (rich) individuals would always increase the social welfare associated with the poor (rich) by more than the decrease in social welfare associated with the rich (poor). If, however, the value function is partly
convex and partly concave—as is, indeed, the case—another important matter must be determined: the positions of the poor and rich, given their wealth levels, on the function. For example, if both the poor and rich are positioned on the concave (convex) interval of the value function, then greater equality (inequality) will be socially desirable.

The shape of the value function is determined by the sign of its second derivative with respect to wealth,

\[
\text{sign}\left[\frac{d^2V(w, p(w))}{dw^2}\right] = \text{sign}\left[(h - 2p*w)^2 - (p*w)^2\right],
\]

and is illustrated in Figure 3.

**Figure 3**

As evident from the figure, the value function can be partitioned into two intervals: one where it is convex (the unbroken line) and one where it is concave (the broken line). As can be easily verified from equation 4, the inflection point occurs exactly at

\[
w = \frac{h}{3p^*(w)} \quad \text{or, equivalently, at } h = 3p^*(w)w.
\]

The partition of the value function is based on the magnitude of offenders' wealth, \(w\), relative to the optimal multiplier \(p^*(w)\).
principle, $\frac{h}{p^*(w)}$ or, equivalently, on the magnitude of the harm, $h$, relative to the optimal expected sanction, $p^*(w)w$.

The explanation for the shape of the value function (its convex and concave intervals) is roughly as follows. If harm is large relative to the optimal expected sanction that prevails for a given level of wealth, then the social gains from increased deterrence are enormous. As wealth increases, these social gains can be achieved not only by maintaining the probability of punishment, but actually by increasing it even further. As a result, at low levels of wealth, social welfare increases rapidly. However, as wealth climbs, the optimal expected sanction becomes sufficiently large relative to the harm (although it never equals the harm, because some degree of under-deterrence is always optimal), and the social gain from increasing deterrence is relatively small. At sufficiently moderate levels of wealth, social welfare increases mainly due to the savings in enforcement efforts, and it therefore increases only gradually.

The shape of the value function clarifies that the social desirability of redistributing wealth depends on the positions of the poor and the rich along the function curve. This is a matter of the relative magnitude of wealth and the optimal multiplier principle or equivalently, of the relative magnitude of the harm and the optimal expected sanctions associated with the poor and rich respectively. This leads to the following results.  

**C. The Results**

The first result stands in sharp contrast to the social desirability of perfect equality (Proposition (1)).

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23 To minimize repetition, the following results are stated in terms of the relation between harm and the optimal expected sanctions. However, they could be stated and understood in terms of the relation between wealth and the optimal multiplier principle.
Proposition 2 (1): If the enforcement technology is specific, then perfect equality in the distribution of wealth is not socially desirable if the harm is sufficiently large relative to the optimal expected sanction associated with perfect equality, i.e., if $h > 3p^*(\bar{w})\bar{w}$.

The proof for this Proposition is straightforward. If $h > 3p^*(\bar{w})\bar{w}$, then the value function is convex at $\bar{w}$. Therefore, redistributing wealth from those designated poor to those designated rich will increase the social welfare associated with the rich by more than the decrease in the social welfare associated with the poor. The combined social welfare will increase, indicating that perfect equality is not optimal. The following numerical example illustrates this.

Example 4: Suppose that all individuals, rich and poor, have $900 in monetary resources and can engage in some harmful act from which they obtain benefits that are distributed uniformly, ranging from $0 to $2000, and that causes social harm of $1500. Suppose also that optimal law enforcement requires setting the probability of punishment at 0.4 and the fine at $900. Thus all individuals face an expected sanction of $360 ($900X0.4), which is less than a third of the harm ($360X3<1500$).

Consider now redistributing $100 from those designated poor to those designated rich, so that rich individuals and poor individuals have monetary resources of $1000 and $800 respectively. Say we adjust the fines accordingly as well as the probability of punishment so that for rich individuals $p_R = 0.45$ and for poor individuals $p_p = 0.35$. Since enforcement efforts are assumed to be proportionate to

\[24\] Indeed, individuals are substantially under-deterred: the crime rate is 82% (100X1.640/2000).
the probability of punishment, the increased costs of enforcement associated with the rich are entirely offset by the decrease in the enforcement costs associated with the poor. The expected sanction for the rich increases to $450 ($1000X0.45), or by $90 ($450 – $360), and, for the poor, decreases to $280 ($800X0.35), or by $80 ($280 – $360). Since the benefits from the harmful act are distributed uniformly from $0 to $2000, the increase in deterrence of the rich indicates that there is an additional 2.25% (50X90/2000) of the population that is deterred. The decrease in deterrence of the poor suggests that there is an additional 2% (50X80/2000) of the population that commits the harmful act. In total, deterrence has therefore increased by 0.25%. The additional rich individuals who are deterred have derived benefits that range from $360 to $450, or, on average, $405 per offender, and have imposed harm of $1500. Therefore, the net harm imposed by these individuals is $1095 ($1500 – $405) per offender and $2463.75 ($1095X2.25) in total. The additional poor offenders derive benefits that range from $280 to $360, or, on average, $320 per offender, and likewise impose a harm of $1500. Therefore, the net harm imposed by these offenders is $1180 ($1500 – $320) per offender and $2360 ($1,180X2) in total. By redistributing $100 from poor individuals to rich individuals, the social costs of crime and law enforcement associated with the rich has decreased by $2463.75, which is greater than the $2360 increase in the social costs of crime and law enforcement associated with the poor. Social welfare has thus increased by $103.75, which contradicts the presumed optimality of equal distribution of wealth.

Observe that the net harm associated with the harmful act when wealth is distributed equally is $262.4 (($1180 – $1500)$1640/$2000). Therefore, increased inequality will reduce net harm by almost 40% (103.75X100/262.4).
While Proposition 2(1) suggests that *some* inequality in the distribution of wealth may be socially desirable, the shape of the value function leads to an even stronger and more intriguing result.

**Proposition 2 (2):** *If the enforcement technology is specific, greater inequality in the distribution of wealth is socially desirable if the harm is sufficiently large relative to the optimal expected sanction associated with the rich, that is, if* $h > 3p^*(w_R)w_R$.

*Perfect inequality is socially desirable if this condition holds for* $w_R = 2\bar{w}$.

The proof for Proposition 2 (2) is also straightforward. It rests on the observation that the optimal expected sanction for the rich is greater than for the poor, that is, $p^*(w_p)w_p < p^*(w_R)w_R$ (Lemma 2(3)). If the optimal expected sanction for the rich is sufficiently small relative to the harm, then, both the rich and poor are positioned on the convex interval of the value function (see Figure 3). Therefore, increasing inequality reduces the social costs of crime and law enforcement associated with the rich by more than the increase in those costs associated with the poor. The second part of the Proposition implies that this process will continue to hold if, for any possible unequal distribution of wealth, both the poor and the rich are positioned on the convex interval of the value function. Therefore, perfect inequality is socially desirable.

We demonstrated that some or even perfect inequality in wealth distribution may be socially desirable if the enforcement technology is specific in nature. The conditions

$27$ Stated mathematically, if $h > 3p^*(2\bar{w})2\bar{w}$, then for any $i$, $h > 3p^*(w_i)w_i$, which indicates that the value function is convex at the interval $[0,2\bar{w}]$. 

http://law.bepress.com/tauwps/art100
presented, however, were quite extreme in that the optimal expected sanctions relative
to harm are very small and, accordingly, under-deterrence is very substantial. These
conditions *ceteris paribus* are more likely to occur in poorer countries, which suggest
that redistribution is more likely to impose additional costs in those countries. We will
now seek to show that under ordinary conditions, conditions that, *ceteris paribus*, are
more likely to arise in richer countries, greater equality of wealth distribution is
socially desirable.

**Proposition 2 (3):** *If the enforcement technology is specific, greater equality in the
distribution of wealth is socially desirable if the harm from the harmful act is
sufficiently moderate relative to the optimal expected sanction associated with the
poor, that is, if $h < 3p^*(w_p)w_p$.  

The proof for this Proposition is essentially the mirror-image of the proof for
Proposition 2 (2), using the observation that $p^*(w_p)w_p < p^*(w_r)w_r$. If the optimal
expected sanction associated with the poor is sufficiently moderate relative to the
harm, then both the poor and the rich, given their wealth levels, are positioned on the
concave interval of the value function (see Figure 3). Therefore, redistributing wealth
from the rich to the poor will increase the social welfare associated with the poor by
more than it decreases the social welfare associated with the rich, after the appropriate
adjustments to the respective enforcement schemes have been made. Thus, greater
equality increases social welfare and is, accordingly, socially desirable.
Thus far, we have analyzed the social desirability of redistributing wealth on the basis of the shape of the value function. However, this line of inquiry is not helpful if the poor are positioned on the convex interval of the value function and the rich on its concave interval. This scenario is possible if the harm from the harmful act is sufficiently great relative to the optimal expected sanction associated with the poor and sufficiently moderate relative to the optimal expected sanction associated with the rich, that is, if \( 3p^*(w_p)w_p < h < 3p^*(w_R)w_R \).\(^{28}\) In such a case, a direct analysis of the tradeoff between the social costs of crime and law enforcement associated with the poor and the same social costs associated with the rich is required and leads to the following simple yet compelling result.

**Proposition 2 (4):** If the enforcement technology is specific, greater equality in the distribution of wealth is socially desirable if the optimal probability of punishment associated with the rich is less than that associated with the poor, i.e., if \( p^*_R < p^*_P \).

Proposition 2 (4) can be proved easily by using equation (3),\(^{29}\) but for uniformity, we will use a similar method to that used in Part 3. The optimal enforcement scheme, given that rich individuals receive \( w_R \) and poor individuals \( w_p \), is set forth in Lemma (2). Suppose we redistribute \( x \) from the rich to the poor and alter their respective fines accordingly, to \( f_p = w_p + x \) and \( f_R = w_R - x \). We will hold the respective fines accordingly.

---

\(^{28}\) The opposite, however, is impossible because the value function is first convex and then concave.

\(^{29}\) The proof is as follows: A small redistribution decreases the social costs associated with the poor by \( p^*_P(h - p^*_Pw_p)g(p^*_Pw_p) \) and increases those costs associated with the rich by \( p^*_R(h - p^*_Rw_R)g(p^*_Rw_R) \). Since \( p^*_Rw_R < p^*_Pw_p \) (Lemma 2 (3)) and \( g(p^*_Pw_p) = g(p^*_Rw_R) \), total social welfare increases if \( p^*_P > p^*_R \).
probabilities of punishment at their original levels, so that the costs of enforcement remain unaffected. Assume that $x$ is a sufficiently small amount, so that

$$p_p^*(w_p + x) < p_R^*(w_R - x),$$

i.e.,

$$0 < x < \frac{p_R^*w_R - p_p^*w_p}{p_R + p_p^*},$$

as illustrated in Figure 4.

Figure 4

![Figure 4 Diagram](image)

The expected sanction that rich individuals face, $p_R^*(w_R - x)$, is decreased by $p_p^*x$, while the expected sanction that poor individuals face, $p_p^*(w_p + x)$, is increased by $p_p^*x$. Since $p_p^*$ is assumed to be greater than $p_R^*$, the expected sanction for the poor increased by more than the parallel decrease in the expected sanction for the rich, that is, $p_p^*x > p_R^*x$. This implies that the deterrence of the poor increased by more than the deterrence of the rich decreased (since the benefits from the harmful act are distributed uniformly). Thus, the overall rate of crime necessarily falls. In addition, since poor individuals face a lower expected sanction than that faced by rich individuals, the marginal poor individuals who are now deterred have created greater net harm than generated by the marginal rich individuals who now commit the harmful act. Social welfare is therefore clearly increased, which contradicts the presumed optimality of the original unequal distribution of wealth. The following example illustrates this numerically.

**Example 5:** Suppose that rich and poor individuals have monetary resources of $12,000 and $6000 respectively and they can engage in some harmful act from which they obtain benefits that range uniformly from $0 to $2000 and

...
that causes a harm of $1500. Suppose that, given the costs of law enforcement, optimal enforcement requires setting the probability and severity of punishment at 0.1 and $12,000 for the rich and at 0.15 and $6000 for the poor.

Thus, poor individuals face an expected sanction of $900 ($6000X0.15) and rich individuals face $1200 ($12,000X0.1); both are under-deterred. Let us now redistribute $1000 from the rich to the poor, so that the former have $11,000 and the latter $7000, and adjust the fines accordingly. Poor individuals now face an expected sanction of $1050 ($7000X0.15), that is, an increase of $150 ($1050 – $900), and rich offenders face an expected sanction of $1100 ($11,000X0.1), a decrease of $100 ($1200 – $1100). Since benefits are distributed uniformly, the increase in deterrence of the poor reduces the crime rate by 3.75% (0.5X150/2000) and the decrease in deterrence of the rich raises it by 2.5% (0.5X100/2000). In total, the crime rate drops by 1.25% (3.75% – 2.5%). Note that the additional rich offenders derive benefits ranging from $1100 to $1200, or an average of $1150 per offender, and impose a harm of $1500 per offender. Thus, the additional rich offenders impose a net harm of $350 ($1500 – $1150) per offender and $875 (350X2.5) in total. In contrast, the additional deterred poor individuals derive benefits ranging from $900 to $1050, or an average of $975 per offender. They, too, impose a harm of $1500 per offender. Thus, the additional deterred poor individuals impose a net harm of $525 ($1500 – $975) per offender and $1968.75 (525X3.75) in total. Consequently, social welfare increases by $1093.75 ($1968.75 – $875). This contradicts the presumed optimality.
of the original unequal distribution of wealth and shows that greater equality is socially desirable.

Proposition 2 (4) holds as long as \( p_R^* < p_F^* \). However, since perfect equality is not always socially desirable, as proved by Proposition 2 (1), it follows that the optimal enforcement scheme can be also characterized by \( p_F^* < p_R^* \).\(^{31}\) In the present model, the optimal probability of punishment as a function of wealth increases as long as \( h > 2p^*(w)w \) and decreases when \( h < 2p^*(w)w \).\(^{32}\) This implies that the reverse of Proposition 2 (4) is not true: greater equality may be socially desirable even if \( p_F^* < p_R^* \).

5. REFINING THE MODEL

The previous Parts analyzed the social desirability of redistributing wealth under the alternative assumptions of general enforcement efforts and specific enforcement technology. This Part relaxes certain other assumptions underlying the model. For the purpose of simplicity, the analysis relates only to general enforcement efforts (Part 3). This however is not crucial for the analysis to hold.

A. Socially Non-Desirable Crimes

The model thus far has assumed the harmful act to be socially desirable for some potential offenders in the sense that the benefits they derive are greater than the harm. This accords with many regulatory offenses such as speeding, double-parking,

\(^{31}\) Garoupa (2001) proved this possibility.

\(^{32}\) By the implicit function theorem: \( \text{sign}\left(\frac{dp^*(w)}{dw}\right) = \text{sign}[h - 2p^*(w)w] \).
polluting, and sometimes even theft.\textsuperscript{33} However, many other harmful acts, which likely constitute the core of the criminal law, such as violent crimes, are presumably never socially desirable, i.e., the harm always exceeds the benefits. Nevertheless, the social desirability of redistributing wealth is not contingent on this question.

If the harmful act is never socially desirable, then complete deterrence is what we would strive for but for the costs of enforcement. This implies that, ideally, the expected sanction should be equal to the maximum benefits that can be derived from the harmful act rather than the harm created. The optimal enforcement scheme, given some unequal distribution of wealth, is set forth in the following lemma.

**Lemma 3:** (1) The optimal fine is equal to the entire wealth of offenders, $f_i^* = w_i$. (2) The optimal probability of punishment gives rise to three possibilities: (a) complete deterrence of poor and rich individuals, $p^*w_p = \hat{b} < p^*w_r$; (b) complete deterrence of rich individuals but under-deterrence of poor ones, $p^*w_p < \hat{b} < p^*w_r$; or (c) under-deterrence of poor and rich individuals, $p^*w_p < p^*w_r < \hat{b}$. (3) Poor individuals are (weakly) less deterred than rich individuals.

**Proof:** Omitted.

If the harmful act is never socially desirable, then the fines for both the poor and the rich will amount to their entire wealth, which is obvious. Note that scenarios (b) and (c) in Lemma 3 are analogous to those discussed in Part 3. Therefore, the arguments applied there can be applied here to show that greater equality increases social welfare. In particular, under scenario (b) (poor individuals are under-deterred but the rich are completely deterred), greater equality increases social welfare, because

\textsuperscript{33} The well-known example is that of a man who loses his way in the woods and, as an alternative to starving, enters an unoccupied cabin and steals a negligible amount of food.
greater deterrence of the poor can be achieved without affecting the deterrence of the rich. Similarly, under scenario (c) (both poor and rich individuals are under-deterred), greater equality increases social welfare, because the additional rich offenders impose less net harm than do the additional deterred poor individuals.

Scenario (a), in which both poor and rich individuals are completely deterred, arises when the enforcement efforts are sufficiently cheap. Nevertheless, to save on enforcement efforts, the expected sanction for the poor should amount to only the maximum benefits. Greater equality still increases social welfare, because by increasing the wealth of the poor, complete deterrence can be achieved at lower enforcement costs. Thus, perfect equality is socially desirable even if the harmful act is always socially undesirable.

B. Benefits from the Harmful Act Have No Social Value

We have assumed that the benefits from the harmful act are taken into account in the social welfare calculus. While this is valid for minor offenses such as speeding, double-parking, and even theft, some argue that the illicit benefits offenders derive from major offenses should be given little if any weight in the social calculus. If this is the case, the harmful act is obviously never socially desirable (i.e., the harm always exceed the social benefits). Indeed, the harmful act imposes the same net harm, regardless of who commits it. This should affect the results, since the argument for redistribution was based on the observation that the marginal rich offenders impose less net harm than the marginal poor offenders impose. Nevertheless, perfect equality

\[ p^r(w_r + x) = h < p^r(w_r - x) \]

This move, which is always feasible, indicates that complete deterrence can be achieved with less enforcement efforts.

To illustrate this formally, let us redistribute \( x \) from rich to poor individuals, adjust fines accordingly, and lower the probability of punishment so that
is at least as good as any unequal distribution of wealth and therefore (weakly) superior.

Although the benefits derived from the harmful major offenses are given no social weight, they still determine who commits the harmful act. Therefore the optimal expected sanction should ideally be equal to the maximum benefits. The optimal enforcement scheme in these circumstances is also depicted by Lemma 3.

Under scenario (a) (both poor and rich individuals are completely deterred), greater equality remains socially desirable, because, as argued above, complete deterrence can be achieved at lower enforcement costs. Under scenario (b) (the poor are under deterred but the rich are perfectly deterred), greater equality is also socially desirable, because greater deterrence of the poor can be achieved without compromising deterrence of the rich. However, under scenario (c) (both the poor and the rich are under-deterred), greater equality does not increase social welfare, because the gain in deterrence of the poor is completely offset by the loss in deterrence of the rich. Since the benefits are not included in the social calculus, the change in the composition of offenders is of no consequence. This suggests that greater equality neither increases nor reduces social welfare in this scenario. Since greater equality sometimes increases social welfare, but never reduces it, it is weakly superior to any unequal distribution of wealth.

C. Minimum Benefits from the Harmful Act Are Substantial

The assumption that the benefits from the harmful act are distributed uniformly on the support \([0, \hat{b}]\) may be crucial for the results of this paper. Suppose, instead, that the benefits are still distributed uniformly but on the support \([\hat{b}, \hat{b}]\), so that the harmful act confers a positive benefit \(\hat{b}\) on all offenders. This seemingly technical
change might mean that perfect equality is no longer socially desirable or, worse, that perfect inequality is preferable.

To illustrate this, suppose that, with perfect equality, the wealth of individuals is less than the minimum benefits they derive from the given harmful act, \( \overline{w} < \overline{b} \), which is, of course, impossible if \( \overline{b} = 0 \). In this case, there is no point in investing any resources in enforcement, even if very cheap, since all individuals will in any event commit the harmful act. The optimal enforcement scheme thus results in no deterrence at all. However, if some resources \( x \) were redistributed from those designated poor to those designated rich, the wealth of the latter might then exceed the minimum benefits, \( \overline{w} + x > \overline{b} \) (this requires that \( 2\overline{w} > \overline{b} \)). It might therefore be socially desirable to expend resources on enforcement, so that the expected sanction for the rich exceeds the minimum benefits, \( p^*(\overline{w} + x) > \overline{b} \). This would create some deterrence for the rich, without affecting the deterrence of the poor, which is already non-existent. Social welfare would increase, implying that inequality in wealth distribution is socially desirable. Example 2 in the Introduction illustrated precisely this possibility.

Note that if some redistribution from poor to rich individuals increases social welfare, then more redistribution will accomplish the same. The reason is that deterrence of the poor is not impacted, whereas deterrence of the rich is either increased at no additional cost or the same level of deterrence is achieved but at lower enforcement cost.

\[\text{--- Footnote ---}\]

No deterrence, i.e., \( p^* = 0 \), can result under the basic model, as a corner solution, if, at that point, \[\frac{w_R}{2b}(h - p^*w_R) + \frac{w_R}{2b}(h - p^*w_R) < \hat{e}(p^*).\] But this condition holds for any choice of \( w_R \) and \( w_R \), so our results are not actually affected.
Wealth inequality may be socially desirable even if perfect equality results in positive but relatively little deterrence. The explanation is as follows (see Figure 5 below): Since \( p^* \bar{w} > \bar{b} \), it is true that redistributing \( x \) from those designated poor to those designated rich (and keeping \( p^* \) constant) unequivocally reduces social welfare, as long as \( p^*(\bar{w} - x) \geq \bar{b} \), for the same reason explained in Part 3.C.: the additional poor offenders impose greater net harm than do the additional deterred rich individuals.\(^{36}\) However, at \( p^*(\bar{w} - x) = \bar{b} \), further redistribution of wealth from the poor to the rich increases social welfare (creates social gains), because it saves the social costs of enforcing the law upon the rich, at no social cost to the poor who are already completely undeterred. Therefore, wealth inequality is socially desirable if these social gains are greater than the social loss.\(^{37}\)

\[ \text{Figure 5} \]

\[ p^*(\bar{w} - x) \quad p^*(\bar{w} + x) \]

\[ 0 \quad \bar{b} \quad \bar{p} \quad \bar{w} \quad h \quad \bar{b} \]

\(^{36}\) Indeed, the social loss equals \( \frac{p^* x}{2\bar{b}} - p^* x \).

\(^{37}\) The following example illustrates this numerically. Suppose that \( \bar{w} = $9000 \) and the benefits from the harmful act are distributed uniformly ranging from $1500 to $3500, with the social harm from the act at $3000. Suppose also that optimal law enforcement requires setting \( p^* = 0.2 \) and \( f = 9000 \) for an expected sanction of $1800 ($9000X0.2). Deterrence is positive but low ($1800 > $1500). The crime rate is 85% (100X1700/2000). Say we redistribute $3000 from those designated poor to those designated rich, so that the rich have $12,000 and the poor have $6000; we adjust the fines accordingly and hold \( p^* \) at its original level. The expected sanction of the poor will decrease to $1200 ($6000X0.2). Since the minimum benefit from committing the harmful act is $1500, all poor individuals commit the harmful act. Therefore, the decrease in the deterrence of the poor accounts for 7.5% of the total population (50X300/2000). The net harm associated with those additional poor offenders is on average $1350 per offender ($3000 - $1650) or, in total, $101.25 ($1350X7.5%). The expected sanction of the rich has increased to $2400 ($12,000X0.2). This amounts to an additional 15% (50X600/2000) of the population who are now deterred. These additional rich non-offenders impose a net harm of $900 per offender ($3000 - $2100) or a total of $135 ($900X15%). Social welfare is increased by $33.75 ($135 - $101.25).
Note that the likelihood of perfect equality being socially desirable is contingent on, amongst other things, how rich the given society is as a whole. The reason for this is that, all things equal, optimal expected sanctions increase as (total) wealth increases (see Lemma 1 (4)). As is clear from the previous discussion, the social losses and social gains associated with wealth inequality are contingent on the magnitude of the optimal expected sanction relative to the minimum benefits deriving from the harmful act. If, for example, the optimal expected sanction is sufficiently large relative to the minimum benefits, \( p^* w > b \), then there is a greater likelihood that perfect equality is the socially desirable option, since the social losses are relatively large and are likely to outweigh the potential social gains. In contrast, if the optimal expected sanction is not sufficiently large relative to the minimum benefits, then there is a greater likelihood of the social desirability of greater inequality, for the opposite reason. This roughly suggests that, all else equal, in poorer countries, redistribution might entail additional costs in that it increases the social costs of crime and law enforcement, whereas in relatively richer countries, redistribution entails additional benefits, because it reduces the social costs of enforcing the law.

D. Non-Uniform Distribution of Benefits from the Harmful Act

The assumption that the benefits from the harmful act are distributed uniformly across all individuals may also be crucial for our results. To see this, recall the argument in favor of redistribution when both the poor and the rich are under-deterred (Part 3.C.). There, it was explained that redistributing wealth from rich to poor individuals (and keeping the enforcement efforts constant) would result in an increased expected sanction for the poor but a lower expected sanction for the rich

\[ \text{As in Part 4, this condition can be restated in terms of wealth relative to the (modified) optimal multiplier.} \]
reduced by the exact same amount. Since the benefits from the harmful act were assumed to be uniformly distributed, the corresponding changes in the expected sanctions would mean that the overall rate of crime would be unaffected. There would be fewer poor individuals committing the harmful act, but the same amount of additional rich offenders. Redistribution was nevertheless shown to be socially desirable, because the additional deterred poor individuals would impose greater net harm (derive less benefit) than would the additional rich offenders.

If the benefits from the harmful act are distributed non-uniformly, then an equal change in the respective expected sanctions of the poor and the rich could affect deterrence of the former to a greater or lesser extent than it affects deterrence of the latter. If, for example, there are more additional deterred poor individuals than additional rich offenders, then the social desirability of redistributing wealth gains additional force, since the overall rate of crime actually falls. However, if the reverse is true and there are more additional rich offenders than additional poor non-offenders, then redistributing wealth from the rich to the poor is not necessarily socially desirable, because the overall rate of crime actually rises. The additional deterred poor individuals will have imposed greater net harm (derived less benefit) than the additional rich offenders per offender, but the former are fewer in number.

Unfortunately, how the benefits from harmful acts are distributed in reality is unknown. However, two general observations can be made. First, several common density functions decrease throughout their support. This roughly implies that there are many individuals who obtain few benefits and a relatively small number of individuals who obtain great benefits. If the benefits from the harmful act were characterized by these density functions, then the marginal rich offenders, who always

39 These distribution functions include, for example, exponential distribution, log-normal distribution (for some parameters of $\sigma$), and the F distribution.
face higher expected sanctions than their poor counterparts and therefore derive greater benefit, would always be less affected than the marginal poor offenders from an corresponding change in the expected sanction. Therefore, greater equality would be socially desirable. Second, even those density functions that do not monotonically decrease, such as the density function of the normal distribution, which has the usual bell shape, tend to first increase and then decrease. This suggests, again, that if a given society has a relatively large total wealth, it is more likely that the marginal offenders will be positioned on the decreasing interval of the density function (because their expected sanction and, therefore, their benefits are greater). In contrast, if a given society’s overall wealth is relatively small, it is more likely that the marginal offenders will be positioned at the increasing interval of the density function.\(^{40}\) This also roughly indicates that greater equality tends to be socially desirable in richer countries, whereas some inequality may be socially preferable in poorer countries.

7. CONCLUSION

This paper has explored how the distribution of wealth affects the social costs of crime and law enforcement. The key insight of the analysis is that the social desirability of wealth redistribution is contingent on a tradeoff between the social costs of enforcing the law upon the poor and those costs vis-à-vis the rich. This tradeoff is not trivial. It depends, among other things, on how benefits from harmful acts are distributed (the shape and range of the distribution function), on the enforcement technology (whether it is general or specific), and on society’s total wealth.

\(^{40}\) Of course, poor and rich offenders may be positioned at different parts of the density function.
Two general conclusions emerge from the analysis: (1) Redistribution under a broad set circumstances reduces the social costs of crime and law enforcement and, in this respect, is socially desirable. (2) All things equal, there is a greater likelihood that greater equality will be socially desirable in richer countries, while inequality is more likely to be socially desirable in poorer countries. Put differently, in richer countries, greater equality is more likely to confer additional benefits in the form of reduced social costs of crime and law enforcement, whereas in poorer countries, it is more likely to entail additional costs.\textsuperscript{41}

The analysis intentionally omitted the well-known and extremely important social benefits and costs associated with wealth redistribution. First, it was assumed that redistribution is of no welfare consequence in and of itself. In reality, of course, redistribution confers social benefits because individuals have decreasing marginal utility of wealth (the poor values the marginal dollar by more than the rich), or because individuals might have a preference in favor of equality (the social welfare function may exhibit aversion to inequality). Second, redistribution was assumed to be costless. In reality, again, redistribution certainly bears social costs; it involves administrative costs and imposes deadweight loss (distorts behavior) due to the use of distortionary rather than lump sum taxes. These social benefits and costs, however, should not affect the qualitative results of this paper, i.e., the direction of redistribution, with ramifications only for their magnitude.

The framework and analysis in this paper can be extended in several directions, two of which are particularly noteworthy. First, it was assumed that the benefits from the harmful act are independent of the wealth of offenders or distribution of wealth in society. However, the benefits derived from different types of offenses can differ for

\textsuperscript{41} Viewed from a different perspective, this paper raises the possibility that societies with more equal distributions of wealth tend to be wealthier than societies with less equal distribution, if, from the outset, all these societies are sufficiently wealthy, and vice versa if all are sufficiently poor.
the poor and the rich or can depend on the level of wealth inequality. For example, property crimes might confer more benefits to the poor than to the rich and might be more beneficial to potential offenders the greater the wealth inequality. In contrast, offenses that save in time resources, such as speeding, might be of greater benefit to the rich than to the poor, because time may be more valuable to the former. These possibilities can be easily incorporated into the model, and they might either reinforce or weaken the results.

Second, the analysis assumed monetary sanctions to be the sole form of punishment. However, many types of offenses are punished by way of imprisonment, and the principal economic justification for this is the limited wealth of poor offenders. This suggests that deterrence of the poor can be achieved by supplementing fines with imprisonment. Generally speaking, the availability of imprisonment should not affect the fundamental results of this paper, because imprisonment bears lower social costs than fines. Therefore, it should be generally desirable to redistribute resources from the rich to the poor in order to save on a socially costlier instrument. However, further inquiry would be required to establish this formally.

Appendix

Here a formal and direct proof of Proposition 1 is provided for the case in which the fraction of rich (poor) individuals in the population is \( \mu (1 - \mu) \).

The social problem is to choose \( p, f_r, f_p, w_r, w_p \) to maximize:

\[
(1B) \quad SW = (1 - \mu) \int_{b_r}^b (b - h) g(b) db + \mu \int_{b_p}^b (b - h) g(b) db - c(p)
\]

Subject to \( f_r \leq w_r \), \( i = P, R \).
Define the Lagrangian function as:

\[(2B) \quad L = SW + \lambda_1 (w_p - f_p) + \lambda_2 (w_R - f_R) + \lambda_3 (\bar{w} - (1 - \mu)w_p - \mu w_R) + \lambda_4 (w_R - w_p) + \lambda_5 w_p\]

The optimal solution to the problem \(p^*, f_p^*, f_R^*, w_p^*, w_R^*\) should satisfy the Kuhn-Tucker conditions (second order conditions are assumed to be satisfied):

\[\begin{align*}
(3B) \quad &L_{f_p} = (1 - \mu)p(h - pf_p)g(pf_p) - \lambda_1 = 0 \\
(4B) \quad &L_{f_R} = \mu pf_p(h - pf_p)g(pf_p) - \lambda_2 = 0 \\
(5B) \quad &L_p = (1 - \mu)f_p(h - pf_p)g(pf_p) + \mu f_R(h - pf_R)g(pf_R) - c'(p) = 0 \\
(6B) \quad &L_{w_p} = \lambda_3 - \lambda_4 (1 - \mu) - \lambda_3 + \lambda_5 = 0 \\
(7B) \quad &L_{w_R} = \lambda_2 - \lambda_3 \mu + \lambda_4 = 0 \\
(8B) \quad &L_{\lambda_1} = (w_p - f_p) \geq 0, \quad \lambda_1 \geq 0 \quad \text{and} \quad \lambda_3 (w_p - f_p) = 0 \\
(9B) \quad &L_{\lambda_2} = (w_R - f_R) \geq 0, \quad \lambda_2 \geq 0 \quad \text{and} \quad \lambda_2 (w_R - f_R) = 0 \\
(10B) \quad &L_{\lambda_3} = \bar{w} - (1 - \mu)w_p - \mu w_R = 0 \\
(11B) \quad &L_{\lambda_4} = w_R - w_p \geq 0, \quad \lambda_4 \geq 0 \quad \text{and} \quad \lambda_4 (w_R - w_p) = 0 \\
(12B) \quad &L_{\lambda_5} = w_p \geq 0, \quad \lambda_5 \geq 0 \quad \text{and} \quad \lambda_5 w_p = 0
\]

Suppose that \(w_p^* = 0\). Then, from (10B), \(w_R^* = \frac{\bar{w}}{\mu} > 0\), and from (11B), \(\lambda_4 = 0\). From (8B), we have \(f_p^* = 0\), and from (3B) \(\lambda_1 = (1 - \mu) phg(0) > 0\). Suppose \(\lambda_2 = 0\). Then, from (4B) \(p^* f_R^* = h\). But then \(L_p = -c'(p) < 0\), which contradicts (5B). Therefore \(\lambda_2 > 0\), which implies that \(f_R^* = w_R^*\). From (7B), we have \(\lambda_2 = \mu \lambda_5\). Substituting this
into (4B), we get that: \( \lambda_4 = p^*(h - p^* f^*_p)g(p^* f^*_R) \). Similarly, from (6B), it follows that \( \lambda_i = (1 - \mu)\lambda_3 - \lambda_5 \). Substituting this into (3B), we get that: \( \lambda_5 = p^* hg(0) + \frac{\lambda_5}{1 - \mu} \)

But since \( p^*(h - p^* f^*_R)g(p^* f^*_R) < p^* hg(0) + \frac{\lambda_5}{1 - \mu} \), we get a contradiction.

Therefore, \( w^*_p > 0 \) (and \( \lambda_5 = 0 \)).

Suppose that \( w^*_m > w^*_r \). Then from (11B) \( \lambda_3 = 0 \). From (7B) we get: \( \lambda_2 = \mu\lambda_3 \), and from (6B) \( \lambda_1 = (1 - \mu)\lambda_3 \) (recalling that \( \lambda_5 = 0 \)). Suppose now that \( \lambda_3 = 0 \), which implies that \( \lambda_1 = \lambda_2 = 0 \) as well. From (3B) and (4B) we get that \( h = p^* f^*_p = p^* f^*_R \), but this leads to \( L_p < 0 \), which contradicts (5B). Thus, \( \lambda_p, \lambda_R, \lambda > 0 \), which implies (from (8B) and (9B)) that the wealth constraints are binding: \( f^*_p = w_p \) and \( f^*_R = w_R \).

Substituting \( \lambda_1 = (1 - \mu)\lambda_3 \) and \( \lambda_2 = \mu\lambda_3 \) to (3B) and (4B) respectively and rearranging, we get: \( (h - pw_p) = (h - pw_R) \), which is impossible if \( w^*_m > w^*_r \).

Therefore, \( \lambda_4 > 0 \), which implies that \( w^*_p = w^*_p = \bar{w} \) (the last equality follows from (10B)).

This completes the proof of Proposition 1.

Given that \( w^*_p = w^*_p = \bar{w} \), straightforward reasoning leads also to \( f^*_p = f^*_R = \bar{w} \), and \( p^* \) satisfying: \( \bar{w}(h - p^* \bar{w})g(p^* \bar{w}) = c'(p) \), such that \( p^* \bar{w} < h \).

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