A Note on Efficiency vs. Distributional Equity in Legal Rulemaking: Should Distributional Equity Matter Given Optimal Income Taxation?

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By STEVEN SHAVELL*

The question addressed in this paper is whether the choice of legal rules ought to be influenced by consideration of their redistributive effects. The answer to this question would, of course, be simple were it assumed that there was no difficulty in redistributing income, for then any socially undesirable distributional effect following from adoption of a particular rule could be undone by use of an appropriate redistributive tax scheme. Thus it would be best to choose legal rules only on the basis of criteria other than distributional equity, and, therefore, in the model to be studied here, to choose rules only on the basis of "efficiency."[1]

However, there is acknowledged difficulty in redistributing income; and such difficulty will be assumed below to be due solely to the adverse effect of an income tax on the incentive to work. In view of this problem, an otherwise socially optimal distribution of income generally would not be achievable, so that it might be expected that distributional equity as well as efficiency ought to enter into the choice of a legal rule. Suppose, for example, that the social preference is for income equality, but that, because an income-equalizing tax would severely depress work effort and lower the aggregate product to be shared, it would turn out to be best to employ only a mildly redistributive income tax. Consequently, one might suspect that it would be desirable to accomplish some further redistribution by giving an advantage under the law to those with relatively low income.

But this line of thought does not recognize that an attempt at redistribution through the choice over legal rules would involve the same sort of problem as exists under the income tax: If low-income individuals are treated relatively favorably in a legal setting, then there would be created a disincentive to work analogous to that associated with, say, a generous guaranteed minimum income under the tax schedule.

This suggests the result to be shown here, that despite imperfect ability to redistribute income through taxation, everyone would strictly prefer that legal rules be chosen only on the basis of their efficiency. After proving this result, I will comment on its interpretation and on its relationship to results in the literature on optimal income taxation.

I. The Model

Risk-neutral individuals are assumed to expend effort at work and to take care to prevent accident losses.[2] The individuals differ in their ability to earn income from work effort but not in their capacity to reduce accidents by taking care. Specifically, let w = work effort, $f(w)$ = disutility of work effort, a = ability, $p(a)$ = density of the population with ability a, y = income, $m(y)$ = density of the population earning income y, c = care taken to prevent accidents, $g(c)$ = disutility of care, $n(c)$ = density of the popu-

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[1] It will be clear, though, that in an expanded version of the model of this paper, not only efficiency (the promotion of aggregate product or, equivalently, the reduction of aggregate losses plus prevention costs) but also other considerations that are not in strict logic income redistributional (for example, protection of personal rights and liberties) would generally affect the choice of legal rules.

[2] The terms "care" and "accident losses" are used only for concreteness; care could be more generally interpreted as any action having disutility, and accident losses as any outcome with a probability distribution affected by such an action.

lation taking care c, and $l(c;n)$ = expected losses suffered by an individual given c and n.

For simplicity, work effort and income are assumed to be linearly related,

$$(1) \qquad y = aw$$

The government sets a tax based on income; because the government is presumed to be unable to observe directly either ability or work effort, the tax cannot be based on either of those variables. Let $t(y)$ = income tax given y. Since the government is assumed to return in the aggregate all taxes collected, the tax schedule must satisfy[3]

$$(2) \qquad \int t(y)p(a)da = 0$$

where y should be understood to be a function of a. This function and the density m will be determined below.

The care an individual takes is assumed to affect the probability distribution of losses suffered by others through its effect on the density function n, and it may affect as well the distribution of losses suffered by the individual himself. Losses are treated as a subtraction from income and therefore, since individuals are risk neutral, only expected losses l are considered.

A liability rule specifies how much an individual who is involved in an accident pays or receives in damages. Such a rule is allowed to depend on the levels of care of the involved parties, on their incomes, and on the magnitude of harm done. However, there will not be a need to consider liability rules explicitly. All that will matter below is the relationship between an individual's expected damage payments and his level of care, and this is implicitly determined by choice of a liability rule. Let $d(c, y; m, n)$ = expected net damages paid by an individual under a liability rule given c, y, m, and n.[4] (If a liability rule does not depend on income, then expected damages will be denoted by the simpler form $d(c; n)$.) Since under a liability rule, what one individual pays another receives, aggregate net liability payments must be zero,

$$(3) \qquad \int d(c, y; m, n)p(a)da = 0$$

Here, c and y are to be understood as functions of a.

The expected position of an individual of ability a may now be written, given his work effort and level of care,

$$(4) \qquad y - t(y) - l(c; n) - d(c, y; m, n) - f(w) - g(c)$$

where $y = aw$. The first four terms comprise expected income. And, as will be explained subsequently, the assumption of the separable form of the last two terms, the disutilities of work effort and of care, is necessary to the result to be proved.

It is assumed that an individual chooses (the unique) levels of work effort and of care that maximize expected utility (4), while taking the tax schedule, the liability rule (and thus d), and the population distributions (m, n) as fixed. This defines w, c and y as functions of a; and from the functions c and y, induced population distributions of care and of income can be derived.[5] It should be observed from (4) that given m and n, an individual's choice of c is completely determined by his choice of y. Thus c may be written as $c(y; m, n)$ and (4) may be rewritten as

$$(5) \qquad y - t(y) - l(c(y; m, n); n) - d(c(y; m, n), y; m, n) - f(w) - g(c(y; m, n))$$

where $y = aw$.

[3]Note from (2) that some individuals will generally pay a negative tax, i.e., receive payments.

[4]A negative value of d corresponds to expected receipt of damages.

[5]For example, given care as a function of ability (and knowing the density p of ability), we can determine the density of care.

It is also assumed that an equilibrium exists for any tax schedule and liability rule: Given a t and a d, there exist m and n such that if these are taken as fixed, the induced distribution of income is in fact m, and that of care is in fact n.

Consider now the problem of minimizing expected accident losses plus the cost of care,

$$\int [l(c;n)+g(c)]p(a)da \tag{6}$$

It can be shown under general conditions that this problem is solved by having all individuals exercise a level of care c^*, to be called the efficient level of care.[6] And it can then be shown that there exist liability rules depending at most on harm done and levels of care (and thus not on income) which induce parties to take the efficient level of care. Such liability rules will be called efficient.[7] Let n^* denote the distribution of care levels under an efficient liability rule, i.e., n^* denotes the degenerate distribution under which all individuals take care c^*.

II. Proof of the result

The result to be established is as follows: *Suppose that under a liability rule some* (a positive fraction) *or all individuals are led to exercise an inefficient level of care* (perhaps because the rule is to some extent based on income). *Then by adoption instead of an efficient liability rule and by appropriate modification of the income tax schedule, everyone can be made strictly better off.*

To prove the result, let us use a hat to denote variables and functions in the situation under the inefficient liability rule and an asterisk to denote variables and functions in a new situation—to be constructed—under an efficient liability rule. (Since in the new situation the liability rule is efficient, there is no conflict with the previous definitions of c^* and n^*.) Define the new tax schedule by

$$\begin{aligned} t^*(y)=\hat{t}(y)&-[l(c^*;n^*)-l(\hat{c}(y;\hat{m},\hat{n});\hat{n})]\\ &-[d(c^*;n^*)-d(\hat{c}(y;\hat{m},\hat{n}),y;\hat{m},\hat{n})]\\ &-[g(c^*)-g(\hat{c}(y;\hat{m},\hat{n}))]-s^* \end{aligned} \tag{7}$$

where

$$\begin{aligned} s^*=&\int [l(\hat{c};\hat{n})+g(\hat{c})]p(a)da\\ &-[l(c^*,n^*)+g(c^*)] \end{aligned} \tag{8}$$

(Note here that $\hat{c}$ is the function $\hat{c}(a)$ relating care to ability obtaining in the original situation.) Thus s^* is the expected savings in accident losses plus prevention costs to be had by use of an efficient liability rule. This savings is positive by assumption.

An individual's expected utility as a function of w and c under the efficient liability rule and the new tax is (see (4))

$$\begin{aligned} y-t^*(y)&-l(c;n^*)-d(c;n^*)-f(w)\\ -g(c)&=y-\hat{t}(y)-l(\hat{c}(y;\hat{m},\hat{n});\hat{n})\\ &-d(\hat{c}(y;\hat{m},\hat{n}),y;\hat{m},\hat{n})-f(w)\\ &-g(\hat{c}(y;\hat{m},\hat{n}))\\ &-[l(c;n^*)+d(c;n^*)+g(c)\\ &-l(c^*;n^*)-d(c^*;n^*)-g(c^*)]+s^* \end{aligned} \tag{9}$$

where $y=aw$. However, since all individuals will choose c^*, the term in brackets equals zero. Consequently, (9) reduces to

$$\begin{aligned} &[y-\hat{t}(y)-l(\hat{c}(y;\hat{m},\hat{n});\hat{n})\\ &-d(\hat{c}(y;\hat{m},\hat{n}),y;\hat{m},\hat{n})-\\ &f(w)-g(\hat{c}(y;\hat{m},\hat{n}))]+s^* \end{aligned} \tag{10}$$

And since the term in brackets is the ex-

[6]Moreover, it should be noted that minimization of (6) is a necessary condition for achieving a (first best) Pareto optimum.

[7]For example, in models of accidents like those in Peter Diamond and my earlier article, strict liability with a defense of contributory negligence or the negligence rule would be efficient.

pected utility function in the original situation (see (5)), and since $s^*>0$, all individuals are strictly better off.

It remains to show that the government breaks even under the new tax schedule, i.e., (2) is satisfied by t^*. Now because (10) differs from the term in brackets by a constant, it follows that individuals choose the same levels of work effort as they did under $\hat{t}$. Accordingly, gross income is the same function of a, i.e., $y^*(a)=y(a)$, and we have (using also (7), (2), (8), and (3)),

$$(11)\quad \int t^*(y^*)p(a)da=\int t^*(\hat{y})p(a)da$$

$$=\int \hat{t}(\hat{y})p(a)da+\left[\int [l(\hat{c};\hat{n})\right.$$

$$\left.+g(\hat{c})]\,p(a)da-l(c^*,n^*)-g(c^*)-s^*\right]$$

$$-d(c^*;n^*)+\int d(\hat{c}(\hat{y};\hat{m},\hat{n}),\hat{y};$$

$$\hat{m},\hat{n})p(a)da=0+0-0+0=0$$

III. Comments

(a) A familiar point of qualification about results such as the one proved here probably bears repeating, namely that if the income tax would not be altered on adoption of new liability rules, then in strict logic the argument given for use of efficient rules does not apply. Now, of course, no one would really expect the income tax structure to be adjusted in response to each and every change in legal rules (much less to individual changes in other domains), for this would be impractical. Therefore, one's attitude toward the result under discussion will depend on his expectation that the income tax would be (or could be) altered in response to changes in legal rules whenever these changes resulted in a "sufficiently important" shift in the distribution of income.

A second point of qualification concerns the possibility that income might be correlated with certain unobservable individual characteristics which ought to lead to favorable legal treatment. If so, income might be employed as a proxy for these characteristics and thereby justifiably influence legal outcomes. For example, suppose that poor individuals' decisions in the marketplace are not as well informed as those of individuals with moderate or high incomes. Then, to the extent that lack of consumer knowledge should influence legal outcomes but cannot be observed by the courts, income could be used as an indicator of lack of knowledge and thus could affect legal outcomes in a desirable way.

A similar point concerns the role of the payment of money damages as social insurance against loss caused by others. To the extent that this role of legal rules is important and that the poor have a greater need for insurance (because of decreasing absolute risk aversion), they might receive favorable legal treatment.

(b) The result shown here is closely related to two results in the literature on income taxation and its adverse effect on the incentive to work. The first result, in James Mirrlees, concerns the use of linear commodity taxation (a fixed tax per unit of the commodity purchased) given simultaneous use of optimal income taxation. Mirrlees shows (among other things) that if the demand for a commodity is independent of income, then it should not be taxed. In other words, there is no scope for beneficial redistribution through linear commodity taxation given optimal income taxation. This is clearly similar to what was proved here, for the motive to take care was independent of income.[8] The second result, in A. Hylland and Richard Zeckhauser, has to do with the choice among government projects, again given simultaneous use of optimal income taxation. Hylland and Zeckhauser consider a model in which there is one produced good; and a government project is

[8] Mirrlees also shows that if demand for a commodity is affected by income, then it may be desirable to impose a tax; when, for example, demand increases with income, a positive linear commodity tax would be used. By analogy, it would be expected that a similar result would hold in regard to legal rules (if the cost of taking care or if the type of accident differed in a systematic way with income).

identified with a function specifying the net amount (positive or negative) of the good to be enjoyed given income. They show that the project that ought to be adopted is the one with highest aggregate net benefits. This is similar to the result of this paper, for the choice of a legal rule may be likened to the choice of a project.[9]

[9]The principal difference between the problem analyzed here and that analyzed by Hylland and Zeckhauser (and by Mirrlees) is the externality associated with individuals' choice of care.

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