

REDISTRIBUTION AND MARGINAL PRODUCTIVITY REWARD

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ABSTRACT

A fundamental ethical question is how a redistributive system should reward individual effort. Marginal productivity reward has been justified either as a way of ensuring efficiency or as a way of respecting people's self-ownership. Both these arguments have their limitations. We show that marginal productivity reward is implied by one intuitively appealing requirement on the reward structure, which we name non-negative reward. This result can be interpreted in one of two ways. It can be seen as a new justification of marginal productivity reward that avoids the limitations of the traditional arguments. Alternatively, it can be seen as a result showing that any redistributive system that makes transfers conditional on effort, sometimes will make the reward individuals get for their additional effort completely conditional on others effort. Finally, we also show that no genuine redistributive system satisfies both non-negative reward and the liberal requirement of no forced labour.

Equity

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1. INTRODUCTION

A fundamental ethical question is how a redistributive system should reward individual effort. One prominent answer to this question is that people should be rewarded with their marginal productivity. This answer has traditionally been given two types of justifications. First, marginal productivity reward has been justified by efficiency considerations. Economic theory shows that deviations from marginal productivity reward create distortions that may cause Pareto-inefficiency. Second, it has been justified by equity considerations. According to some theories of distributive justice, in particular libertarianism (Nozick, 1974), marginal productivity reward is the only way of respecting people's self-ownership (see also Kolm, 2001).

Both these arguments have their limitations. The efficiency argument only provides a justification for marginal productivity reward in situations where there are incentive problems. For example, in situations where the Hicksian supply of effort is inelastic, there is no efficiency reason for rewarding effort with its marginal product. The equity argument is problematic because it relies on some very controversial normative assumptions. Only people accepting the basic idea of full self-ownership and the view that full self-ownership implies marginal productivity reward would be convinced by the libertarian equity argument. This position, however, is rejected both by utilitarians (for example, Mirrlees, 1971; Harsanyi, 1987; Broome, 1991) and liberal egalitarians (for example, Rawls, 1971; Fleurbaey, 1995; Moulin & Roemer, 1989).

In this paper we present a result that may be seen as an alternative justification for marginal productivity reward that avoids the limitations of the traditional arguments. The result applies even in the absence of incentive considerations and it relies on a much less controversial normative assumption than the self-ownership argument. We show that marginal productivity reward follows from a very appealing requirement, namely that people never should have a reduction in their post-tax income when they increase their effort. We name this the *non-negative reward requirement*. To illustrate, consider two situations a and b , where you work harder or longer hours in b than in a and thus have a higher total pre-tax income in b than in a . The requirement then states that your post-tax income in b should not be lower than your post-tax income in a .

Alternatively, the result can be seen as showing that an unavoidable consequence of any redistributive system that makes transfers to an individual conditional on his effort is that sometimes the reward individuals get for their additional effort will be completely conditional on *others* effort. This may be an obvious feature of a redistributive system in an economy where

there are interdependencies in the production technology, but the result establishes that this is the case also when there are *no* interdependencies in the production technology.

Another very appealing requirement on a redistributive system is that it should not force anyone to work, which we name *no forced labour*. Our second result, however, shows that this requirement is incompatible with non-negative reward in any genuine redistributive system.

We present the formal framework in Section 2. In Section 3, we establish the propositions. Section 4 provides some discussion of how to interpret the results.

2. FORMAL FRAMEWORK

Consider a society with a population $N = \{1, \dots, n\}$, $n \geq 2$, where person i 's effort is e_i and $e = (e_1, \dots, e_n)$ is the effort distribution in a particular situation e . Let Ω be the set of all effort distributions. We assume that all individuals can choose between all effort levels $e_i \in [e^{\min}, e^{\max}] \subseteq \mathbb{R}_+$, where \mathbb{R}_+ is the set of real non-negative numbers. The pre-tax income for each individual i , $f_i : [e^{\min}, e^{\max}] \rightarrow \mathbb{R}_+$ is continuous and strictly increasing in effort, where $f_i(e^{\min}) = 0$, $\forall i \in N$. Note that we do not assume any interdependencies in the production technology and, moreover, we do not make any assumptions about how the choice of effort is affected by the redistributive system. Hence, each person's pre-tax income is independent of other people's effort and we cover cases both with and without incentive problems.

Our object of study is a redistributive system $F : \Omega \rightarrow \mathbb{R}^n$, where $F_i(e)$ is the post-tax income of person i in situation e . F satisfies the balanced budget constraint $\sum_{i=1}^n F_i(e) = \sum_{i=1}^n f_i(e)$, $\forall e \in \Omega$. Moreover, for F to be considered a genuine redistributive system, we assume that at least for some $e \in \Omega$ and $j \in N$, $F_j(e) \neq f_j(e)$.

3. REWARDING EFFORT

Most people support some degree of redistribution, but typically also agree that a person should be rewarded for an increase in effort. We argue that an appealing feature of any redistributive system would be that it satisfies a minimal reward condition saying that a person who increases his effort, and thus increases his pre-tax income, should not experience a decrease in post-tax income. In other words, if your effort is higher in one situation than

another, then your post-tax income should at least not be lower in the situation where you exercise more effort. Formally, we can write this requirement as follows:

Non-Negative Reward (NNR): For any $e, \tilde{e} \in \Omega$ and $j \in N$, where $\tilde{e}_j > e_j \rightarrow F_j(\tilde{e}) \geq F_j(e)$.

One way of rewarding effort that satisfies NNR is marginal productivity reward.

Marginal Productivity Reward (MPR): For any $e, \tilde{e} \in \Omega$ and $j \in N$, where $\tilde{e}_j \neq e_j \rightarrow F_j(\tilde{e}) - F_j(e) = f_j(\tilde{e}_j) - f_j(e_j)$.

It turns out that the non-negative reward requirement implies that effort is rewarded with marginal productivity, that is, it is incompatible with anything else than lump-sum redistribution.

Proposition 1. A redistributive system F satisfies NNR if and only if it satisfies MPR.

Proof. The if part is straightforward. Hence, we will only prove the only-if part.

- (i) Suppose there exist $e, \tilde{e} \in \Omega$ and $k \in N$ such that $\tilde{e}_k = e_k$ and $F_k(\tilde{e}) > F_k(e)$.
- (ii) Consider a new situation $\hat{e} \in \Omega$, where for some $\varepsilon > 0$, $\hat{e}_i = e_i + \varepsilon, \forall i$.
- (iii) By the continuity of f_i , for a sufficiently small ε , $\sum_i [f_i(\hat{e}_i) - f_i(e_i)] < [F_k(\tilde{e}) - F_k(e)]$.
- (iv) By the balanced budget constraint, $\sum_i [F_i(\hat{e}) - F_i(e)] = \sum_i [f_i(\hat{e}_i) - f_i(e_i)]$. By (iii), this implies that $\sum_i [F_i(\hat{e}) - F_i(e)] < [F_k(\tilde{e}) - F_k(e)]$. By NNR, $F_i(\hat{e}) \geq F_i(e), \forall i$. Hence, it follows that $[F_k(\hat{e}) - F_k(e)] < [F_k(\tilde{e}) - F_k(e)]$.
- (v) By (iv), $F_k(\hat{e}) < F_k(\tilde{e})$. However, since $\hat{e}_k > \tilde{e}_k$, this violates NNR. Thus the supposition in (i) is not possible.
- (vi) Consider any $e, \tilde{e} \in \Omega$ and $k \in N$ such that $\tilde{e}_k > e_k$. We will now show that $F_k(\tilde{e}) - F_k(e) = f_k(\tilde{e}_k) - f_k(e_k)$. Consider $\hat{e} \in \Omega$, where $\hat{e}_i = e_i, \forall i \neq k$ and $\hat{e}_k = \tilde{e}_k$. By (v), $F_i(\hat{e}) = F_i(e), \forall i \neq k$. Hence, by the balanced budget constraint, $F_k(\hat{e}) - F_k(e) = f_k(\hat{e}_k) - f_k(e_k)$. By (iv), $F_k(\hat{e}) = F_k(\tilde{e})$. Moreover, $f_k(\hat{e}_k) = f_k(\tilde{e}_k)$, and the result follows. ■

Note that in order to establish Proposition 1, we have not required that the post-tax income of all individuals should be positive in all situations. If some people have negative post-tax income, however, then this may be seen

as equivalent to forcing them to work. Therefore, if we want to ensure all individuals the right to choose not to work, then the redistributive system should satisfy the following condition:

No-Forced Labour (NFL): For any $e \in \Omega$ and $j \in N$, $F_j(e) \geq 0$.

NFL should be an appealing condition in a liberal society. However, it turns out to be impossible to combine this condition with the non-negative reward condition.

Proposition 2. There does not exist any redistributive system F satisfying NNR and NFL.

Proof. Proposition 1 shows that only lump-sum taxation satisfies NNR. However, any positive lump-sum tax violates NFL, and the result follows. ■

Alternatively, Proposition 2 may be seen as a characterisation of libertarianism, if libertarianism is interpreted as requiring that each person's post-tax income always should be equal to this person's pre-tax income. Libertarianism implies that there should be no redistribution of income in society, and thus satisfies both NNR and NFL.

4. DISCUSSION

The underlying intuition of Proposition 1 is that any non-lump-sum redistribution, that is, any system of redistribution where transfers are conditional on effort creates interdependencies among the individuals in the economy, even if there are no interdependencies in the production technology. The existence of such fiscal interdependencies makes it impossible to satisfy the non-negative reward requirement.

To illustrate, suppose that individual i has the pre-tax income function $f(w_i, L_i) = w_i L_i$, where w_i is person i 's marginal productivity and L_i is person i 's labour effort. Consider a very simple economy with only two individuals, person 1 and person 2, where they differ in marginal productivity, i.e., $w_1 \neq w_2$ (even though the proof does not rely on this assumption). Moreover, assume that the government redistributive policy is limited to a linear income tax scheme, where the tax revenues are shared equally between the two individuals in society. The post-tax incomes are then given by $F_1 = w_1 L_1 (1 - t) + t((w_1 L_1 + w_2 L_2)/2)$ and $F_2 = w_2 L_2 (1 - t) + t((w_1 L_1 + w_2 L_2)/2)$. In this case, for any positive t , person 1 may receive a lower post-tax income when increasing his effort, if at the same time person 2 decreases his effort.

In other words, the linear income tax scheme creates a fiscal interdependency between the two individuals that makes it impossible to satisfy the non-negative reward requirement.

Proposition 1 shows that this is not only a feature of a linear tax scheme with uniform transfers, but applies to *any* redistributive system that does not rely on lump-sum redistribution. Lump-sum redistribution, however, violates the liberal requirement of no forced labour, and thus any genuine redistributive system faces a fundamental conflict, as reported in Proposition 2. Either sometimes it has to give some people less post-tax income when they have increased their effort or sometimes it has to force people to work.

Finally, let us note that there is a much weaker interpretation of the idea of non-negative reward, namely that a *unilateral* increase in effort by some person never should cause a decrease in his post-tax income. This very weak requirement does not imply marginal productivity reward and it is consistent with any reasonable redistribution system. We doubt, however, that it captures all of our moral intuitions on how to reward effort. We find the idea that an increase in effort should imply no decrease in post-tax income, *independent* of what others do, very attractive, and thus we do believe that it is of importance to observe that lump-sum redistribution is the only redistributive policy that has this feature.

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