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Abstract

Can the redistribution of property income to the working class be the optimal response of the propertied class to the threat of extralegal appropriation? This paper develops a theoretical model in which, if the competitively determined share of wages in total product is sufficiently small relative to the effectiveness of time allocated to extralegal appropriative activities, then a tax-financed wage subsidy that reduces the net income of the property owners below what would be their competitively determined share could be consistent with maximizing the net income of the propertied class. In this model, the equilibrium share of wages turns out to equal either the competitively determined wage share or a parameter that measures the effectiveness of time allocated to extralegal appropriative activities, whichever is larger. Redistribution of income causes the workers to refrain from extralegal appropriative activities — in effect, it induces them to acquiesce in the existing property ownership — and it increases the net income of both the workers and the property owners.

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The history of the institution of private property is replete with cases in which “progressive” factions within the propertied class have promoted, or at least have acquiesced in, programs for altering the distribution of income in favor of labor at the expense of property.¹ How do we explain the emergence of these progressive factions within the propertied class? Do these progressive factions reflect altruistic concern for the welfare of the working class? Perhaps, but some historians and social scientists have suggested that in supporting programs that redistribute property income to the working class progressive factions within the propertied class actually are advancing the self-interest of the propertied class itself. Specifically, this literature — see, for example, Piven & Cloward (1971), which also contains numerous references to historical research — suggests that redistribution is the optimal response of the propertied class to the threat of extralegal appropriation.

My purpose in this paper is to explore this idea within a positive model of income redistribution. Extralegal appropriation is a generic term for any activity that contravenes the established system of property rights. Specifically, extralegal appropriation includes all forms of theft or extortion. The present model focuses on the threat of extralegal appropriation that, as in the case of Robin Hood’s band, would take from the rich (the property owners) and would give to the poor (the workers). A central objective of the modelling is to determine how the maximum net income of the propertied class depends both on the technology of production and on the technology of extralegal appropriation. In particular, the model asks whether the maximum net income of the propertied class can be less than the competitively determined rental income of property.

This analysis both extends the theory of income distribution and adds to the growing literature on the allocation of resources between productive and appropriative activities.

¹The fact that in many modern democracies the existing policy of income redistribution is a product of a voting system in which labor has the majority of votes does not contradict this observation. Certainly when the propertied class agreed to enfranchise labor, by relaxing historical property qualifications for voting, the propertied class knew that in effect they were acquiescing in increased redistribution of property income.

The present model is related to the general equilibrium model of insurrections analyzed in Grossman (1991) and to the model of land reform analyzed in Grossman (1992). In Grossman (1991) I modelled property income as determined collusively, rather than competitively as in the present paper, and I modelled appropriation as a probabilistic winner take-all contest, rather than as a process that determines the distribution of property income as in the present paper. I also considered a more complex technology of appropriation that explicitly allows for the possibility of allocating resources to the suppression of appropriative activity. In Grossman (1992) I consider redistribution through a reform of property ownership rather than through a tax-financed wage subsidy.

Trygve Haavelmo (1954, pages 91-98) provided a canonical formalization of the general-equilibrium theory of the allocation of resources between productive and appropriative activities. Important recent contributions to this literature include the work of Michelle Garfinkel (1990), Jack Hirshleifer (1991), and Stergios Skaperdas (1992). Like the present paper, these studies analyze the effects of the technologies of production and appropriation on resource allocation and income distribution. But, these studies consider productive and appropriative interactions between a pair of large collective decision makers, each of whom tries to appropriate both its own productive efforts as well as the productive efforts of the other. In contrast, the model of appropriation in the present paper is more specific in that only one class of agents, the workers, attempts to appropriate the income of the other class of agents, the property owners. In addition, in the present paper the competing interests are owners of complementary resources who interact in competitive markets as well as through extralegal appropriative activities.

1. Property Income

Consider a simple economy in which the technology of production involves combining homogeneous labor time with homogeneous units of capital. The property owners, who

each own one unit of the capital, are a distinct group from the workers, who supply the labor time. The property owners hire the workers in a competitive labor market. The objective of the property owners is to maximize their income, which is the rent earned by their capital. Assuming that production from each unit of capital equals h^α , $0 < \alpha < 1$, where h is number of units of labor time employed with each unit of capital, equilibrium in the competitive labor market implies that both the pre-tax share of wages in total product and the elasticity of pre-tax wage income with respect to employment equal α and that the pre-tax share of property income in total output equals $1 - \alpha$.

To be explicit, each capitalist selects h to maximize

$$(1) \quad r = h^\alpha - Wh,$$

where r is rent per unit of capital and W is the wage per unit of labor time. Given that each capitalist takes W as given, the maximization of r implies that h satisfies

$$(2) \quad h^{1-\alpha} = \frac{\alpha}{W}.$$

Assuming that the total number of units of capital is equal to the total number of families of workers, the clearing condition for the labor market is

$$(3) \quad h = L,$$

where L is the number of units of labor time that the average working family supplies. Taken together, equations (1), (2), and (3) imply that the wage rate satisfies

$$(4) \quad W = \frac{\alpha}{L^{1-\alpha}}$$

and that resulting rent per unit of capital before taxes is given by

$$(5) \quad r = (1 - \alpha)L^\alpha.$$

The state taxes property income at rate t , $t \geq 0$. Thus, rent per unit of capital after taxes is $(1 - t)r$. The state redistributes these taxes on property income to the working

families. In order to maximize the working families' incentive to supply productive labor, this redistribution always takes the form of a wage subsidy.² Because I am concerned with determining conditions under which it is in the interest of the property owners to redistribute income to the workers, the analysis assumes that the tax rate on property income is non-negative and, accordingly, that after-tax property income is either less than or equal to its competitively determined level.³

The property owners also face the threat of extralegal appropriation. Let β , $0 \leq \beta \leq 1$, represent the fraction of their after-tax property income that the property owners lose to extralegal appropriation, and let M denote the net income of the property owners per unit of capital after taxes and losses to extralegal appropriation. On the above assumptions, M is given by⁴

$$(6) \quad M = (1 - \beta)(1 - t)r = (1 - \beta)(1 - t)(1 - \alpha)L^\alpha.$$

2. Productive Labor and Extralegal Appropriation

The families of workers divide their time between supplying labor for production and engaging in extralegal appropriative activities. Each family has one unit of time, of which it allocates ℓ units, $0 \leq \ell \leq 1$, to productive labor and $1 - \ell$ units to extralegal appropriative activities. A family's labor income is $(1 + z)W\ell$, $z \geq 0$, where z is the rate at which the state subsidizes wages.

²In Grossman (1992), I consider a less sophisticated economy in which a tax-financed wage subsidy is infeasible (or prohibitively costly to administer). This complementary model focuses on the redistribution of property ownership, rather than on the redistribution of property income.

³In Grossman (1991), property income is determined collusively and, consequently, can exceed its competitively determined level.

⁴With M reinterpreted as the expected net income of the capitalists, equation (6) also would describe an alternative story, told in Grossman (1991), in which β is the probability that an insurrection is successful and in which, if they are successful, then the insurgents take all of the after-tax property income but, if they are unsuccessful, then they take nothing. In this alternative story the equilibrium income distribution would be stochastic. Accordingly, the rest of the analysis would be unchanged only if, as in Grossman (1991), the objective of all agents was to maximize expected income.

As in Grossman (1991, 1992), extralegal appropriations are divided among the worker families proportionately to the time allocated by each family to appropriative activities. Accordingly, a family's income from appropriative activities is $\beta(1-t)r\frac{1-\ell}{1-L}$, where $1-L$, $0 \leq 1-L \leq 1$, is the number of units of time that the average family allocates to appropriative activities.⁵

Each family takes $(1+z)W$ and $\beta(1-t)r/(1-L)$ as given and chooses ℓ to maximize its income, denoted by e . On the above assumptions, e is given by

$$(7) \quad e = (1+z)W\ell + \beta(1-t)r\frac{1-\ell}{1-L}.$$

Given equation (7), the Kuhn-Tucker conditions for family choices imply that the allocation of time by each and every working family satisfies

$$(8) \quad \ell = \begin{cases} 0 & \text{for } (1+z)W < \beta(1-t)r/(1-L) \\ [0, 1] & \text{for } (1+z)W = \beta(1-t)r/(1-L) \\ 1 & \text{for } (1+z)W > \beta(1-t)r/(1-L). \end{cases}$$

Equation (8) indicates, among other things, that a family would devote all of its time to one activity — either productive labor or extralegal appropriation — only if the return to that activity is not smaller than the return to the other activity.

The final element in the structure of the model is the determination of β , the fraction of after-tax property income extralegally appropriated. A natural assumption is that, for $\beta < 1$, β is an increasing function of $1-L$, the number of units to time that the average family allocates to appropriative activities. A simple formalization of this assumption is

$$(9) \quad \beta = \begin{cases} \frac{\theta}{1-\theta}(1-L) & \text{for } 1-L \leq \frac{1-\theta}{\theta} \\ 1 & \text{for } 1-L > \frac{1-\theta}{\theta} \end{cases}$$

⁵At this level of abstraction, we can think of extralegal appropriation as being either an individual activity or a team activity. Also, as in Grossman (1991, 1992), this model assumes that the only cost of time allocated to extralegal appropriative activities is the foregone income from productive activities.

where $0 \leq \theta < 1$. In equation (9), the parameter θ reflects the technology for extralegal appropriation and it measures the effectiveness of time allocated to extralegal appropriative activities. Specifically, as long as β is less than unity, the larger is θ the larger is both the average and the marginal effect of $1 - L$ on β .⁶

To determine the average family's allocation of time between production and appropriation, substitute equation (9) into equation (8) and aggregate to obtain

$$(10) \quad L = \begin{cases} 0 & \text{for } (1+z)W < \frac{\theta}{1-\theta}(1-t)r \\ [0, 1] & \text{for } (1+z)W = \frac{\theta}{1-\theta}(1-t)r \\ 1 & \text{for } (1+z)W > \frac{\theta}{1-\theta}(1-t)r \end{cases}$$

Given that the wage rate and the rental rate are determined by equations (4) and (5), equation (10) implies

$$(11) \quad L = \min\left(\frac{1+z}{1-t} \frac{\alpha}{1-\alpha} \frac{1-\theta}{\theta}, 1\right).$$

For $L < 1$, the value of L given by equation (11) equates the wage rate, which equals the marginal product of productive labor, to the marginal return to appropriative activity, which is proportionate to the rental rate on capital.

3. The State

The state is the agent of the propertied class and its objective is to maximize M , the net income of the property owners, as given by equation (6). The state's policy instruments are t , the rate at which it taxes property income, and z , the rate at which it subsidizes wages. The constraints on this maximization are the technology of extralegal

⁶A more general specification of this technology — see, for example, Grossman (1991) — would allow for a nonlinear relation between β and time allocated to extralegal appropriative activities and also for expenditures by the state for the suppression of extralegal appropriative activities.

appropriation, given by equation (9), the average family's criterion for allocation of time, given by equation (11), and the state's budget constraint, given by $zWL = tr$.⁷ With the wage rate and the rental rate determined by equations (4) and (5), the state's budget constraint reduces to

$$(12) \quad t = \frac{\alpha}{1 - \alpha} z.$$

The constraints on the maximization of M imply the following tradeoff: On the one hand, the choice of a larger wage subsidy, z , requires a higher tax rate, t , on property income. On the other hand, a larger z induces a larger allocation of time to productive labor and a smaller allocation of time to extralegal appropriative activities and, hence, both more rent per unit of capital and a smaller fraction of property income lost to extralegal appropriations.

Substituting equation (12) into equation (11), we obtain $L < 1$ for $z < \bar{z}$ and $L = 1$ for $z \geq \bar{z}$, where

$$(13) \quad \bar{z} = \max \left(0, \frac{\theta}{\alpha} - 1 \right).$$

In this formulation, \bar{z} is the minimum value of z that would induce $L = 1$. If $\alpha \geq \theta$, then \bar{z} equals zero. In other words, if in competitive equilibrium the share of wages in total product would be at least equal to θ , then extralegal appropriative activities are not an attractive use of time and the state does not have to subsidize wages in order to induce worker families to allocate all of their time to productive labor. In this case, competitively determined shares of property income and wages in total product support an equilibrium with no taxes on property income, no wage subsidies, and no extralegal appropriation.

⁷The essential property of this budget constraint is that any wage subsidy must be paid for out of property income. The same constraint would apply even if the property owners increased wages voluntarily rather than being taxed to finance wage subsidies. In any event, tax financing is presumably necessary to get around the free-rider problem that would make a voluntary scheme infeasible. This budget constraint abstracts from the costs of administering a tax-financed wage subsidy. If these costs were substantial, then attention would turn to alternative forms of redistribution, as in Grossman (1992).

Alternatively, if $\alpha < \theta$, then \bar{z} is positive. In this case, a positive wage subsidy would be necessary to induce worker families to allocate all of their time to productive labor.

From equations (6), (9), (11), and (12), we calculate

$$(14) \quad \frac{dM}{dz} = (1 - \alpha)L^\alpha \left\{ \frac{\theta}{1 - \theta} \left(1 - \frac{\alpha}{1 - \alpha}z\right) \frac{dL}{dz} - \frac{\alpha}{1 - \alpha} \left[1 - \frac{\theta}{1 - \theta}(1 - L)\right] \right. \\ \left. + \left(1 - \frac{\alpha}{1 - \alpha}z\right) \left[1 - \frac{\theta}{1 - \theta}(1 - L)\right] \frac{\alpha}{L} \frac{dL}{dz} \right\},$$

where

$$(15) \quad \frac{dL}{dz} = \begin{cases} \frac{\frac{\alpha}{1-\alpha} \frac{1-\theta}{\alpha}}{(1-\alpha)(1-\frac{\alpha}{1-\alpha}z)^2} > 0 & \text{for } z < \bar{z} \\ 0 & \text{for } z > \bar{z}. \end{cases}$$

Substituting from equation (15) into equation (14) we obtain

$$(16) \quad \frac{dM}{dz} \begin{cases} > 0 \\ < 0 \end{cases} \text{ as } z \begin{cases} < \\ > \end{cases} \bar{z}.$$

Condition (16) implies that the objective of maximizing the net income of the propertied class requires

$$(17) \quad z = \bar{z}.$$

Equation (17) says that to maximize the net income of the propertied class the state sets z at the lowest level consistent with $L = 1$ and, hence, with $\beta = 0$. In other words, maximization of the net income of the propertied class requires that the state tax property income and subsidize wages just sufficiently to induce worker families to allocate all of their time to productive labor. If $\alpha \geq \theta$, then this optimal subsidy is zero. But, if $\alpha < \theta$, then the optimal subsidy equals $\frac{\theta}{\alpha} - 1$. This optimal subsidy raises the share of wages inclusive of the wage subsidy in total product to θ and reduces the share of profits net of taxes in total product to $1 - \theta$. In sum, the objective of maximizing the net income of the propertied class implies that in equilibrium the income of the average

worker family is $\max(\alpha, \theta)$ and the net income of property owners per unit of capital is $\min(1 - \alpha, 1 - \theta)$.

Admittedly, the result that there is no extralegal appropriation in equilibrium is model specific. For example, the models developed in Grossman (1991, 1992) suggest that, either with a more general technology of extralegal appropriation or with a sufficient cost of administering a tax-financed wage subsidy, the optimal income redistribution need not be not large enough to deter extralegal appropriative activity completely. Nevertheless, the important general result is that, if the competitively determined share of wages in total product would be sufficiently small relative to the effectiveness of time allocated to extralegal appropriative activities that extralegal appropriative activities would be an attractive alternative to productive labor, then a tax-financed wage subsidy that reduces the net income of the property owners below what would be their competitively determined share of total product would be consistent with maximizing the net income of the propertied class. Specifically, the parameter θ , which represents the technology of extralegal appropriation, is a floor under the equilibrium income share of the workers, and $1 - \theta$ is a ceiling on the equilibrium after-tax income of the property owners.

4. Summary

This paper has considered a simple production economy in which property owners and workers are distinct groups and in which the property owners hire the workers in a competitive labor market. I supposed that, as an alternative to supplying productive labor, the workers could engage in extralegal appropriative activities. Within this framework, the analysis showed that, if the competitively determined share of wages in total product were sufficiently small relative to the effectiveness of time allocated to extralegal appropriative activities, then the workers could find extralegal appropriation attractive. In this case, the property owners, in order to maximize their own net income, would want to tax

themselves in order to pay wage subsidies, reducing after-tax property income below the competitively determined share, in order to make productive labor more attractive and to reduce the workers' incentive to engage in extralegal appropriative activities. The analysis also showed how the equilibrium division of total product between the workers and the property owners depends on both the technology of production and the technology of extralegal appropriation. Specifically, the equilibrium share of wages inclusive of any wage subsidy is equal either to the competitively determined wage share or to a parameter that measures the effectiveness of time allocated to extralegal appropriative activities, whichever is larger, even if in equilibrium the workers allocate no time to extralegal appropriative activities.

Most importantly, this paper has developed a formal model in which the self-interest of the propertied class could cause it voluntarily to redistribute income to the workers. This redistribution causes the workers to refrain from extralegal appropriative activities — in effect, it induces them to acquiesce in the existing property ownership — and it increases the net income of both the workers and the property owners. This theory rationalizes the fact that throughout the history of the institution of private property progressive factions within the propertied class have supported programs for the redistribution of income in favor of labor at the expense of property.

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