Optimal Mechanisms for Income Transfer

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The poor receive a sub-optimal amount of material goods through the economic processes of our society. Poor and non-poor alike seek to institute mechanisms that give something to the poor beyond what they get from the natural workings of the "competitive" system. That the non-poor share in this desire indicates that an externality is generated when the economic welfare of the poor is improved.

On a collective basis, the non-poor are willing to pay for the provision of this externality through transfer programs that benefit the poor. In the traditional terminology of externalities, a transfer program leads to an increase in the level of production of a good, in this case the economic welfare of the poor, which generates an externality.

This externality goes to all the non-poor. Thus, taking the non-poor to be the relevant group, this externality functions as a public good.[1] Once it is provided for one non-poor man, it is made available to benefit each non-poor man whether or not he contributed to its provision. Exclusion is not possible. As is usual with public goods, if individuals act in isolation a sub-optimal level of the good will be provided. That is why redistributive schemes of any magnitude are usually carried out by some collective body.[2]

In this paper, I am interested in the transfer program that would be chosen by a representative citizen who took into account that he would have to pay his proportional share of any collective effort. I assume that the citizen acts as a utility maximizer. His utility function is taken as given, so I need not be concerned with the moral or ethical values that underlie its structure. It is not of consequence here, whether the externality that enters his utility function is motivated by guilt, a sense of justice, or the desire to maintain a stable society.[3] What is important is the way a non-poor man benefits from improvements in the material well-being of the poor, the way the externality enters his utility function.

The elusive social welfare function is not dealt with here, nor are any other criteria relating to the welfare of the total society. All relevant welfare judgments are made on an individual basis by the participants in the society. It is probable, as I have suggested, that the providers of the scheme would choose to act collectively.

I conduct the analysis with the aid of a simple two-party model. One party is the

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[1] See James Buchanan for a recent discussion of the strategic elements of interactive situations in which groups provide themselves with public goods.

[2] Private charity cannot be relied upon to lead to a significant level of transfers to the poor unless there are substantial private benefits that return to the individual giver. Some individuals derive great inner satisfaction from giving, but for many others something more is needed. To this end, churches offer salvation to donors, universities name buildings for them, and the United Fund gives them stickers for their windows. The federal government encourages private charity through tax deductions.

[3] One need not be a Marxist to allege that poverty and societal stability do not go hand in hand. "Poverty is the parent of revolution and crime." Aristotle, *Politics*, Book II.

representative poor man. The other is the representative citizen; he is assumed to be non-poor.[4] The structure of the model is given by the assumed form of the representative individuals' utility functions and the permissible forms of income transfer schemes. After establishing this structure, I first examine the efficiency of negative income tax schemes. Then I turn to the major investigation, the problem of deriving the optimal income transfer scheme.

Quite obviously the optimal scheme in any particular circumstance will depend upon the parameters of the model. However, it is evident that certain predominant characteristics of optimal schemes can be discovered. To facilitate exposition, and indeed to make the optimization process computationally feasible, I sometimes find it helpful to employ numerical examples; in each case, the reader should understand that the specific functions and values of the parameters are selected to be illustrative, and that the major characteristics of the results can be generalized.

I. The Formulation of the Problem

The representative citizen asks himself the central question of this paper. *How should assistance programs to the poor be structured so as to maximize the utility function of the representative citizen*? I assume that considerations relating to assistance programs can be examined apart from the other decisions and allocations of the society, that the maximization of a subsidiary utility function relating to this single area will be consistent with the maximization of the representative citizen's comprehensive utility function.

My representative citizen, hereafter called A, has a utility function that includes three variables: The first variable, y, is the poor man's annual income after all transfers have been made. This variable, like all other money magnitudes in this paper, is measured in dollar units.[5] Assume for the present that A does not care about the poor man's expenditure pattern, that the poor man can best determine his own optimal consumption allocations, and that, other things being equal, the pattern that is best for the poor man is best for A. The second variable, h, is the number of hours the poor man works in a year. The third variable, c, is the annual dollar cost of the assistance program per poor man. The number of poor men in the society is known. Indirectly, then, c also gives the total annual cost of the program for the whole society. The total transfer to the poor, or perhaps A's share of it, may enter more directly into A's utility function. Given that these cost magnitudes are linear relations of one another, any one of them may be used as an argument of A's utility function. I use cost per poor man.

My representative poor man, hereafter called P, has a utility function that includes only the first two variables: his income and the number of hours he works. The utility functions for A and P are, respectively

$$(1) \quad {}_AU = A(y, h, c) \quad \text{and} \quad {}_PU = P(y, h)$$

Both functions are assumed to have positive partial derivatives with respect to y. The partial of A with respect to c is negative. It is not possible to prespecify the signs of the partials with respect to h for all values of h. Over the relevant range, however, we would expect the partial of P with respect to h to be negative. This means that P will choose to work fewer hours if he loses no income as a result. The partial of A with respect to h will be posi-

[4] In some societies the poor will exercise influence over the structure of assistance programs. In such societies the representative citizen is an amalgam of a poor and a non-poor man.

[5] To avoid the complications that accompany attempts to deal with incommensurate units, units of measurement are frequently omitted in this paper. Thus y here is given the value of 500, not $500.

tive, at least until h takes on a very substantial value. Up through this point, other things being equal, A would like to see a reduction in P's leisure time.[6]

A's preference in this regard might reflect a paternalistic attitude. For P's sake, A might wish to provide him with the motivation, self-esteem, and beneficial experience that come from working at a job. Then again, A's preference may merely indicate his selfish desires. He may believe that additional work for the poor will reduce social unrest.

The major question of this paper, remember, is how should the representative citizen design assistance programs to the poor so as to maximize his own utility function. There is no general answer to this question. However, if we restrict the scope of our inquiry and specify the structure of the interactive situation, we can gain some insights. One possibility would be to treat this as a problem of trade in valued goods. A gives money to P in return for which P agrees to work some specified amount. The amount of the gift plus P's earnings would be the total of P's income. With full cooperation A and P can easily arrive at a Pareto optimal point. However, the type of cooperation needed to reach such an outcome might be impossible to achieve. Indeed, contractual arrangements of this nature might be considered unattractive.

Assistance programs are usually formulated on an impersonal basis. The transferring agent or agency, the representative citizen in this model, first draws up a general assistance program. The individual poor man then responds to the program in the way that is best for him. In terms of the model, A and P are engaged in a nonsimultaneous move, non-zero sum game. In the absence of cooperation, the situation has aspects of interdependence familiar to us from the theory of leadership oligopoly. There one firm, the first mover, markets a quantity assuming that the second firm will maximize its profits with respect to the market situation. This is the type of strategic planning that the representative citizen follows when he draws up the mechanism for income transfer that is best for him.

The model works in the following fashion. *A first sets up an assistance program; P then selects the number of hours he wishes to work in order to maximize his utility function subject to that program; A selects the program that gives him the highest utility payoff when P maximizes with respect to that program.* This formulation will be the basis for the analysis that follows.

II. The Negative Income Tax Plan

Economists have proposed the negative income tax (NIT) as a promising approach to the problem of redistribution. (See Christopher Green, Robert Theobald, James Tobin (1966, 1967), and James Vadakin.) Under the plan a poor man receives a stipend from the government, and this stipend is reduced as his income increases but by less than the full amount of the increase. The reduction in stipend represents a tax by the government on earned income. By contrast, income maintenance plans cut the stipend by one dollar for every dollar of earnings up to the base level. They form the limiting case of the NIT plan with the marginal tax rate equal to 100 percent.

It is unfortunate that these transfer plans have acquired the label negative income tax. They are negative only in the aggregate sense and apply a positive marginal tax rate to earnings. In this paper I follow convention to the extent that I label tax plans that are negative in the aggregate as NIT's. However, as I will

[6] Beyond some point, of course, A would like to see P have more, not less, leisure time. It is with this consideration in mind that we establish such measures as overtime laws and child labor laws.

discuss at length, it is most important to distinguish between plans that have negative marginal tax rates and ones, like those that have been widely discussed, that apply positive marginal tax rates to earnings. Hereafter, in this paper, unless otherwise specified, the term "tax rate" refers to the marginal tax rate on earnings.

The advantage of the *NIT* over income maintenance plans is that it retains some of the incentive to work. (See Peter Diamond.) At any income level some amount of marginal earnings will be retained. Figure 1 compares a positive marginal tax rate *NIT* plan with an income maintenance plan with the same base stipend. The recipient's indifference map is superimposed on the figure so it is possible to determine his maximizing response (the number of hours he chooses to work) for each of the two transfer plans.

In Figure 1:

wage rate = slope of OA,
base stipend = OB,
marginal tax rate under *NIT* = slope of OA minus the slope of BD,[7]
cost of the plan = the vertical distance from a relevant point on the two-segment line BDA to line OA.

Notice that northwesterly movements across the figure take the recipient to higher indifference curves.

As illustrated, the recipient would choose not to work under the income maintenance plan. Point B is on a higher indifference curve than any point on CA. With the negative income tax, he will choose point E where the two-segment line BDA reaches the highest indifference curve.

[7] Beyond point D regular tax rates may apply to reduce income after stipend and taxes.

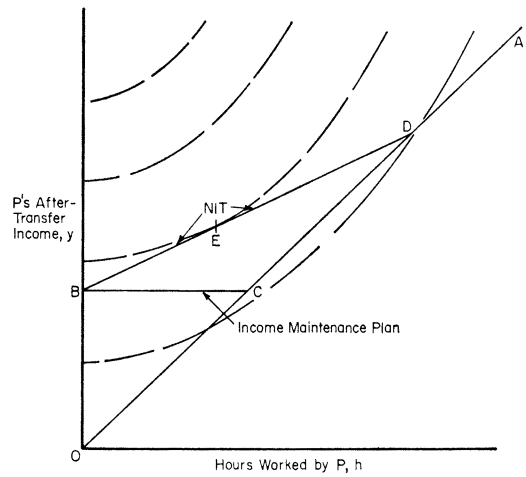

FIGURE 1. A NEGATIVE INCOME TAX PLAN COMPARED WITH AN INCOME MAINTENANCE PLAN

For the poor man, the *NIT* weakly dominates the income maintenance plan. For any amount of work it yields equal or greater income. Which plan is more costly to the government depends upon the amount that is worked under the two plans. The cost is given by the vertical distance from the income-hours point selected by the poor man to the wage-income line, OA. The more effective the *NIT* work incentive, the lower is its relative cost.[8]

[8] The poor man might work more under the income maintenance plan than he would with the *NIT*, even though the partial derivative of his utility function with respect to work is everywhere negative. This will be the case if the best point for the poor man on AC:1) is on a higher indifference curve than point B (the assumed best point on BC) and therefore will be selected with the income maintenance plan; 2) is on a lower indifference curve than the best point on BD and therefore will not be selected with the *NIT*; and 3) lies to the right of the best point on BD and thus represents a greater work effort. Unless leisure is an inferior good, 3) will hold whenever 1) and 2) are satisfied.

The case in which these three conditions are satisfied is quite different from the case in which leisure is an inferior good, so that raising its price (decreasing the marginal tax rate on income) decreases the amount of leisure consumed (increases the work effort). If it were an inferior good, then as the price line pivoted upwards from BC to BD, higher utility levels would be accompanied by greater work effort. That is, the *NIT* would produce a greater work effort than the income main-

An Example with the Negative Income Tax

The possibilities A considers are all negative income tax plans with constant marginal tax rates. A selects the base stipend, s, and the tax rate, t. The transfer plan thus established determines P's after-transfer income, y, as a function of the hours he works, h, and his wage rate, w. This income equals the base stipend, plus P's wage income multiplied by one minus the tax rate. That is,

$$(2) \qquad y = s + hw(1 - t)$$

Given the transfer plan, P picks h, the number of hours he wishes to work, in order to maximize his utility function, $P(y, h)$. In the terminology of oligopoly theory, P reacts to the s and t selected by A.[9] This response by P determines the cost of the plan to A. That cost, c, is the difference between P's after-transfer income and his wage income if he works h hours. In algebraic terms we have

$$(3) \quad c = [s + hw(1 - t)] - hw = s - hwt$$

A manipulates s and t to maximize his utility function, $A(y, h, c)$. Here h is determined, given that P will make his maximizing response, and y and c are defined by (2) and (3) as functions of this maximizing h.

To investigate this interactive situation, we must employ some hypothetical utility functions. The selected functions have the partials specified in the discussion of (1), the expression that gives the general form of the utility functions. Two of P's indifference curves derived from his hypothetical utility function are presented in Figure 2.

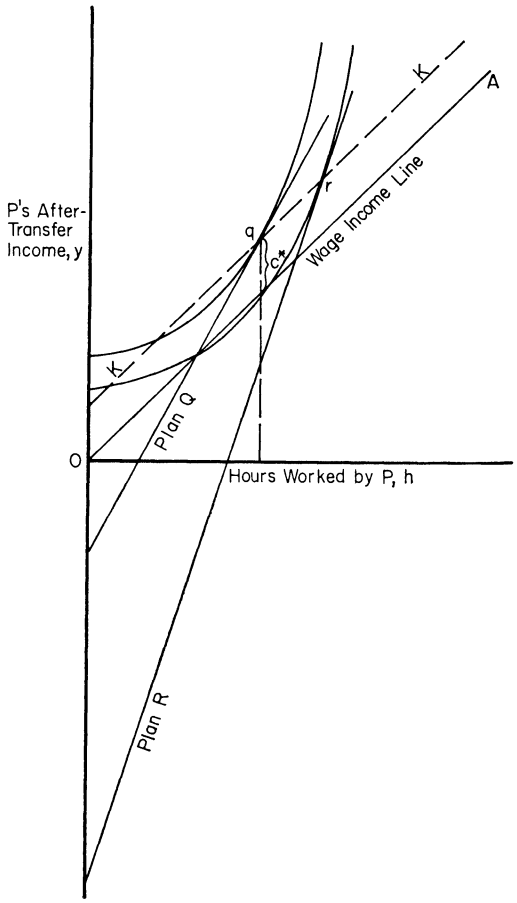

FIGURE 2. TRANSFER PLANS OF EQUAL COST

Each of the possible income transfer plans A could establish can be represented as a straight line across the diagram, which is called a plan line. The base stipend, s, for the plan will give its vertical intercept, the amount P receives if he works not at all. The slope of the plan line indicates the amount of extra income P receives for an additional hour of work. Thus, this slope minus the wage rate gives the marginal tax rate, t, for the plan.

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tenance plan. This contradicts the hypothesized observation.

If the recipient works more under the income maintenance plan than he would under the NIT, it must be because he is functioning on the CD segment of the income maintenance plan. On this segment the price of leisure is greater than it is with the NIT; the inferior good explanation would not be relevant.

[9] P's reaction function has two arguments; it cannot be represented in a two-dimensional diagram. However, every s, t pair determines a unique plan line. As Figure 2 illustrates, P's reaction to a plan line can be shown in a two-dimensional diagram.

Assume that A established the transfer plan represented as plan Q in the figure. P will choose point q, the point along the plan line that offers P the highest utility, the point where it is tangent to one of his indifference curves.

The cost of this plan to A will be the difference between P's after-transfer income and his wage income. It is shown as c^* on the figure. The line KK shows all combinations of after-transfer income and hours worked for P which cost A the amount c^*. Any plan that leads P to make a maximizing response that lies on KK will cost the same amount. Observe that P's maximizing response to plan R is at point r, a point on KK. This means that plan R will cost A the same amount as plan Q.

Characteristics of the Optimal Plan

To determine the characteristics of A's optimal plan, let him first deal with the single family of plans that cost c^*. Given a choice between transfer plans Q and R, A would decide whether he preferred point q or point r. The two points cost the same. Point r yields P a higher after-transfer income; A values P's income positively. Point r also represents a greater work effort for P; A would likely regard this as an asset as well. With two areas of advantage and none of disadvantage, A would choose plan R over plan Q.

What properties accompany this preference? The base stipend for plan R is significantly more negative than the one for plan Q. The marginal tax rates for both plans are negative. This is illustrated by the fact that the slopes of the plan lines, given by $(1-t)w$, exceed the slope of the wage income line. But the marginal tax rate for the preferred plan, plan R, is substantially more negative.

Surely Q would not be A's optimal plan in this cost family. He could establish plans that would lead P to make responses that lay much farther out along KK. The respective plan lines would be tangent to P's indifference curves running through the relevant points on KK. In general, we would expect the slopes of the intersecting indifference curves to become steeper the farther out we move on KK.[10] This means the tangent plan lines will have steeper slopes (more negative marginal tax rates) and more negative vertical intercepts (more negative base stipends).

Following this argument to its logical extreme, we would expect A's optimal plan in this cost family to have s and t equal to minus infinity. Before these parameters reached the infinity level, however, P would be working so hard that A would value negatively any additional hours worked. The likely result is that A's optimal plan will have s and t take on substantially, but not ridiculously, negative values.[11]

This within-family optimality property will hold no matter what numerical value is assigned to c^*. This implies that the optimum optimorum plan will also have a substantially negative s and t. Otherwise,

[10] A movement out along KK gives P more of one valued variable (after-transfer income) and less of another (leisure). We would expect the marginal rate of substitution of the first for the second, as indicated by the slope of P's indifference curve through the relevant point on KK, to be increasing. Even short-run exceptions to this expectation can be ruled out, if 1) P's indifference curves are strictly convex, if 2) leisure is not an inferior good for P, and if 3) all other goods taken together (what is in effect P's after-transfer income) are not inferior for him. Conditions 2) and 3) insure, respectively, that upward and rightward movements across P's indifference map will never lead to indifference curves of decreasing steepness. The three conditions together insure that northeasterly movements will lead to curves of increasing steepness.

[11] In a more extensive version of this paper, I solved A's optimization problem explicitly for the utility functions given in equation (4) below. P's reaction function turns out to be $h=1500-s/2w(1-t)$; he will work less as s or t increases. Given that A's utility function values increases in h positively, for all values of h, we get the extra result that A's optimal transfer plan has s and t equal to minus infinity.

there would be a plan within its own cost family to which it would be inferior.

To find his global optimal plan, A must systematically vary the value of c^*, each time finding the optimal plan within the relevant cost family. He then makes a comparison among these plans to find the one that yields him the highest utility. This will be his optimum optimorum plan.

The fact that A's optimal plan has a negative marginal tax rate should not be surprising.[12] We would come to that conclusion by extending the argument relating to the advantages of *NIT* plans over income maintenance plans. A negative t encourages P to earn more on his own. His resulting higher income offers a greater externality to A; A's bonus-granting procedure is similar to the one used by foundations that give matching grants to support universities and at the same time to increase incentives for alumni contributions.

Results with the Optimal Plan— Parallels with Other Strategic Situations

To determine the optimal assistance program to the poor, I utilized the framework of a two-move, non-zero sum game. In this case, A selected a plan that, when it takes account of P's maximizing responses, leads to the best outcome for A. In this context, I showed that a negative income tax plan with fractional marginal tax rates will have an advantage over its limiting form, the income maintenance plan, a plan with a 100 percent marginal tax rate. Plans with negative marginal tax rates were found to be even more attractive from A's standpoint.

Unfortunately, the plan that is optimal for A in my game-theoretic formulation is in no way optimal for P and A together; it is not a Pareto optimum. The representative citizen and the representative poor man can each take actions that convey positive externalities to the other; they are in a situation of reciprocal externalities. The citizen can increase the transfer he gives to the poor man. The poor man can work longer hours and earn more income, thus indirectly increasing the utility of the citizen. But P acts as a self-interested maximizer and A is only interested in those aspects of P's well-being that enter directly into his own utility function. What results, of course, is an outcome inferior to a cooperative solution.

Situations of reciprocal externalities have received much study in the economics literature. Most frequently the point of departure is the outcome with simultaneous independent adjustment. In this context, Otto Davis and Andrew Whinston discuss two firms each of which conveys production externalities to the other, and James Buchanan and Gordon Tullock consider a community whose members can immunize themselves and thus convey an externality to each other by decreasing the likelihood of exposure to a disease. The simultaneous-independent-adjustment outcome, with each party maximizing in his own self-interest, will be inefficient. The equilibrium has the abstract characteristics of the inefficient, but jointly-dominated, outcome of the well-known prisoners' dilemma. (See R. Duncan Luce and Howard Raiffa, pp. 95–102, and Buchanan.)

In the dynamic aspect of their strategic interaction, Stackelberg's model of leadership duopoly (see William Fellner, pp. 98–119) and A. L. Bowley's model of bilateral monopoly closely resemble the model presented here. There are two key parallels among the three models: One player moves first in each of them. He is the first pick his quantity in the duopoly model. He is the seller who starts by setting the price in the bilateral monopoly model. He is the representative citizen

[12] Jonathan Kesselman also discussed the attractiveness of a negative marginal tax rate for income transfer plans.

who establishes the assistance plan in the income transfer model. Second, the first mover is assumed to know the reaction function of the player who moves second. In moving first he acts strategically and maximizes against the known reaction. The outcome that is achieved in each of these models is dominated by a cooperative solution. Cooperation in these three models would require that their first mover respectively market a smaller quantity, set a lower price, and establish a more generous transfer plan. The second mover would agree not to maximize in a self-interested way against the choice of the first mover. He would market a smaller quantity in the duopoly model, buy a greater quantity in the bilateral monopoly model, and work longer hours in the income transfer model, than he would if he solely considered his own welfare.

III. A Pareto Optimal Transfer Plan

Fortunately, if Pareto optimality is our goal, our analysis has not led us far astray. Plans with substantially negative marginal tax rates can lead to Pareto optima even though P responds as a self-interested maximizer. Except in very perverse cases, plans with positive marginal tax rates will not result in outcomes that are even close to the Pareto frontier.

To see this most clearly, consider hypothetical utility functions for A and for P. They are[13]

$$(4) \quad {}_AU = A(y, h, c) = y^{4/10}h^{1/10}(3000-c)^{5/10},$$

and

$${}_PU = P(y, h) = y^{1/2}(3000-h)^{1/2}$$

[13] The parameter assigned the value 3,000 in the utility function for A can be increased (decreased) to make cost a less (more) important consideration for A. This particular utility function for P has a unitary elasticity of substitution. Changing the marginal tax rate will affect hours worked only if there is a non-zero stipend. For positive stipends, lowering the marginal tax rate (an effective wage increase) will increase hours worked and conversely.

To simplify further discussion, I assume that the wage rate, w, is equal to 1.

Figure 3 presents an indifference curve for P and one for A. These curves are derived from the utility functions specified above. From (3), given w, c is uniquely determined once y and h are known. This enables us to represent an indifference curve for A's three-argument utility function in a two-dimensional figure.

If A establishes plan X, P will search along its plan line to find his point of maximum utility. P's maximizing response will be at point x, where the plan line is tangent to his indifference curve.[14] Point x has another important property. It is a point where one of A's indifference curves is tangent to that of P. This means that it is a Pareto optimal point. Thus, plan X leads P to make a response at a Pareto optimal point. It is a Pareto optimal plan.

Plan X has a negative base stipend, $s = -\$5119.37$, which is indicated by the negative intercept of its plan line with the vertical axis. Its negative marginal tax rate, $t = -2.605$, is shown by the fact that the slope of the plan line is greater than the wage rate (in this case 1).

Each Pareto optimal point, each of the points that lies along the contract curve, can be achieved if the linear plan is established tangent to the two indifference curves at their point of tangency. The linear transfer plans that lead to Pareto optimal points, what we might call the Pareto plans, perform a function similar

[14] P's reaction function is easily derived. He maximizes ${}_PU$. For positive ${}_PU$, he can equally well maximize $({}_PU)^2$.

$$(a\text{-}1) \quad ({}_PU)^2 = 3000s - sh + 3000hw(1-t) - h^2w(1-t)$$

Setting the derivative with respect to h equal to zero, we find

$$(a\text{-}2) \quad -s + 3000w(1-t) - 2hw(1-t) = 0$$

Thus,

$$(a\text{-}3) \quad h = 1500 - \frac{s}{2w(1-t)}$$

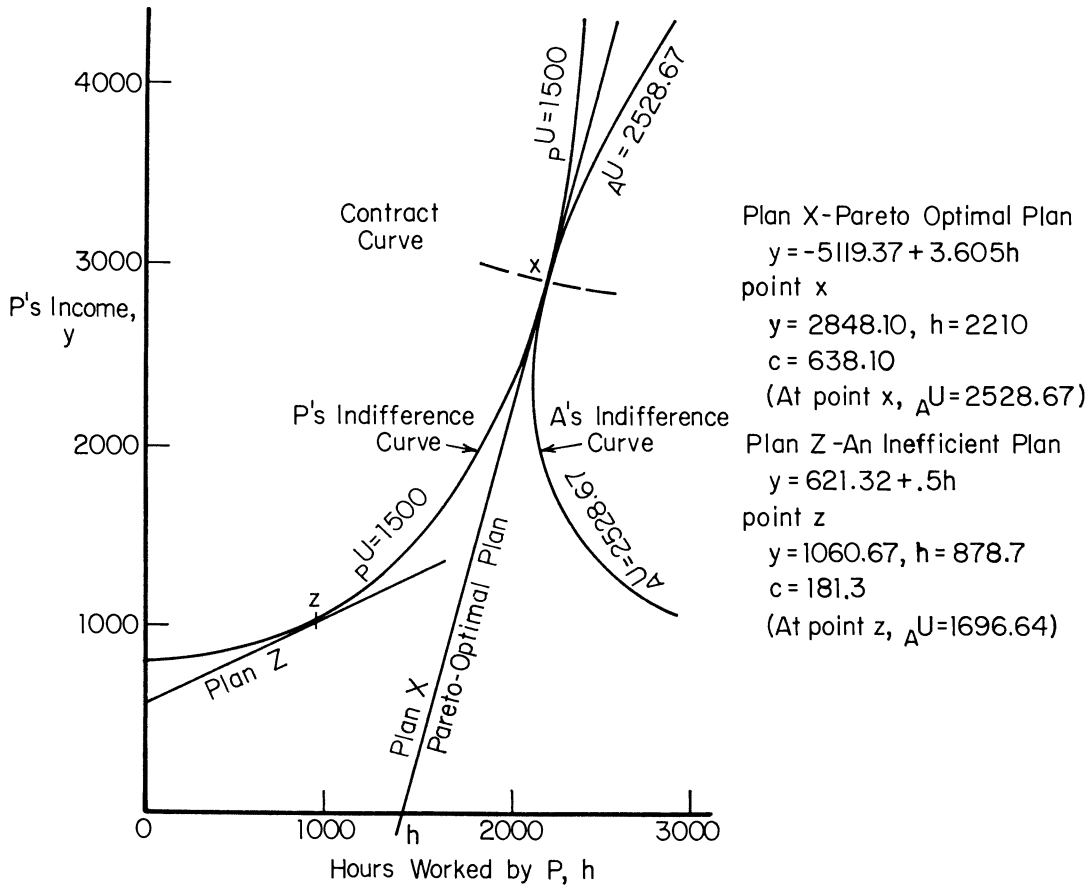

FIGURE 3. ONE PARETO OPTIMAL PLAN

to that of equilibrium price lines in competitive markets. In the case of transfer plans, however, there is no meaningful equivalent to the point of initial endowments.

Of course it would be possible to determine the Pareto optimal points directly, using conventional Lagrangean techniques. Each Pareto optimal point maximizes the sum $P(y, h)+\lambda A(y, h, c)$ for some positive value of λ. Here c is given as function of h and y. For each particular value of λ we can employ conventional maximization techniques to find the y and h that maximize the weighted sum of utilities. By varying the value of λ, we can trace out the locus of efficient trade points, the contract curve.

It is reassuring to observe that simple transfer plans can achieve the same desirable outcomes that could be negotiated directly between A and P. In our society at least, even though the outcomes with the two schemes were the same, it would seem far preferable to establish impersonal pricing schemes that enable individuals to choose how many hours they wish to work, rather than having negotiated outcomes that specify in advance the number of hours to be worked.

Pareto optimal plans have some interesting properties we should note. It is impor-

tant to understand why there is no need to worry with such plans about the externality that P's work decision conveys to A. The function of such plans is to externalize (what James Buchanan and William Stubblebine have labeled) Pareto-relevant externalities. The externalization procedure insures that at the equilibrium point P and A will have the same trade off rate between the two valued variables, y and h. This equality in rates guarantees that the equilibrium will be efficient.[15]

The conjunction of three facts implies that linear Pareto optimal plans will have negative marginal tax rates whenever A's and P's utility functions have partials with the signs specified above (whenever their indifference curves have the assumed conventional shape). First, P's indifference curves have positive slope. Therefore, with regard to Pareto optimality considerations, that is with regard to possible points of tangency, we need only consider those portions of A's curves that have positive slope as well. Second, A's indifference curves can never have a section with positive slope that does not exceed the wage rate. Otherwise, northeasterly movements along that section of the curve would indicate more hours worked, more income to P, at less cost to A (at the same cost if the slope just equals the wage rate). This would represent an improvement for A on all three valued variables. It would not be a curve of indifference; A would not be indifferent between the old point and the "improved" point. Third, a line that is tangent to an indifference curve of A and an indifference curve of P at their point of tangency will have the same slope that the indifference curves have at that point. The geometric implication of these three facts is that linear Pareto optimal plans will be represented by lines with positive slopes in excess of the wage rate. With such a plan P will be able to work an additional hour and receive extra income in excess of his hourly wage. The marginal tax rate on his earnings will be negative.

Plans with positive marginal tax rates are not only not optimal, they are substantially inferior to the Pareto optimal plans, all of which have negative marginal tax rates. Plan Z in Figure 3 is the plan with a marginal tax rate of .5 that gets P to the same indifference curve he would reach with plan X, a Pareto optimal plan.[16] The base stipend of plan Z is \$621.32. Under plan Z, P will choose to work the number of hours and receive the income indicated by point z. The geometry makes it evident that for A, point z is far inferior to point x.[17]

Earlier we found that the best plan for the representative citizen will have a negative marginal tax rate. We can conclude from this section that this result still holds if the recipient's welfare, as well as that of the representative citizen, is considered.

IV. The Model in Application

My formulation has overlooked the significant fact that the same employment opportunities are not available to all people. A severely handicapped individual, a member of the hard core unemployed, or a person who receives a very meager wage in accord with his marginal product will derive little benefit from an assistance

[15] For example, we might encounter an externality-based inefficiency if my neighbor and I disagreed on the desirability of his spending \$1,000 annually to keep his house freshly painted. The efficient arrangement would be for me to compensate him at the margin so that his after-compensation trade off rate was the same as mine.

[16] There is no plan with a .5 marginal tax rate which leads to a point on the indifference curve of A which runs through point x.

[17] A simple calculation reveals the magnitude of the inferiority. If we hold y, h, and c to their values at z, it would take a lump sum payment of \$3,672 (which A could apply against cost) to get A to his indifference curve which runs through point x. That is, $A(1060.67, 878.7, 3000-(181.3-3672))=2528.67$, the value of ${}_AU$ at point x.

plan that channels all of its positive transfer through a substantial bonus on wage income.

In a more extensive version of this paper, I have shown when the opportunities for poor men differ, the optimal income transfer program will offer more than one transfer plan. For those with little or no opportunity to earn, a plan with a sizable positive stipend will be used to provide assistance. Those who could find productive work will receive assistance under a bonus incentive plan of the type described in this paper.

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