ELSEVIER

Journal of Public Economics 55 (1994) 19–40

JOURNAL OF PUBLIC ECONOMICS

Pecuniary redistribution through in-kind programs

Stephen Coate[a], Stephen Johnson[b], Richard Zeckhauser[b,*,†]

[a]*Wharton School, University of Pennsylvania, Philadelphia, PA 19104, USA*
[b]*J.F.K. School of Government, Harvard University, 79 J.F. Kennedy Street, Cambridge, MA 02138, USA*

Received November 1992, revised version received April 1993

Abstract

The pecuniary effects of cash and in-kind programs differ. A program that builds housing for the poor, for example, is likely to result in a lower price of existing low-income housing than would an equally costly cash transfer program. Low-income renters in general would benefit; landlords would lose. This paper argues that these pecuniary effects provide a previously unstudied rationale for the use of in-kind programs. Specifically, in a world in which the government has limited ability to target taxation, the pecuniary effects of in-kind programs may be used to transfer rents from one group in society to another. The pros and cons of using in-kind programs in this way are identified and examples from the real world are discussed.

1. Introduction

What is the appropriate role for government in providing specific private goods? This question is central to public finance, if only to explain current

* Corresponding author.

† We thank two anonymous referees, Richard Arnott, Tony Atkinson, David Cutler, Howard Frant, Victor Fuchs, Harold Husock, Nancy Jackson, Thomas Kane, Glenn Loury, Stephen Morris, Joe Newhouse, Jay Patel, Harold Pollack, Dani Rodrik, Tomas Sjostrom, Lawrence Summers, Mark Thompson, Ray Vernon, and participants in seminars at Boston and Harvard Universities, the University of Pennsylvania, and the National Bureau of Economic Research for helpful comments. The Japanese Corporate Associates Program at the Kennedy School and the National Science Foundation provided funding for this research. Zeckhauser is a research associate of the National Bureau of Economic Research.

0047-2727/94/$07.00
SSDI 0047-2727(93)01401-U

practices: the governments of many nations devote considerable resources to secure private goods such as food, housing, health, and education, for their citizens. Existing public finance theory supports this practice only in special circumstances. The first major justification for providing citizens with goods rather than cash is paternalism, reflecting a belief that recipients would make the wrong consumption choices if given cash. The second is target efficiency: goods may attract the intended beneficiaries better than cash. The final justification is that of externalities: the rest of society benefits in some way from the recipients' consumption of the good in question.[1]

An obvious difference between in-kind and cash programs lies in their pecuniary effects. A program that builds housing for the poor, for example, is likely to result in a lower price of existing low-income housing than would an equally costly cash transfer program. This implies benefits for all low-income renters, not just the ones in the new housing. We argue here that these different pecuniary effects can provide a previously unstudied rationale for the use of in-kind programs. Specifically, we show that in a world in which the government has limited ability to tax, the pecuniary effects of in-kind programs may be used to transfer rents from one group in society to another.

To provide a simple but compelling illustration, consider a developing country whose government would like to redistribute from rural farmers to urban dwellers. Suppose, however, that the government does not have the administrative infrastructure to tax the rural population directly. One policy it may implement is to import food from the world market and distribute it, financing the deficit by a tax on urban dwellers. This will expand domestic supply, lower the price of food, and thereby shift rents from farmers to urban dwellers. The government can therefore effect redistribution even though it has no ability to tax the donor group. We refer to this process as *Pecuniary Redistribution through In-Kind Programs* or PRK for short.[2] The key idea is that, by expanding the supply of a good, an in-kind program lowers its price and transfers rents from suppliers to consumers. Naturally, for this policy to be effective, the supply curve must be upward sloping with some suppliers earning rents.

[1] Garfinkel (1973) develops the case in which donor taxpayers have special preferences about the consumption patterns of recipients. Nichols and Zeckhauser (1981), Blackorby and Donaldson (1988) and Besley and Coate (1991) provide various versions of the target efficiency argument. Bruce and Waldman (1991) provide a somewhat different argument for in-kind transfers based on the Samaritan's Dilemma. Thurow (1974) provides a summary of many of the economic arguments for in-kind transfers.

[2] An earlier draft of this paper [Coate et al. (1992)] uses the term 'Robin Hooding rents' to refer to the use of in-kind programs in this way. At referee suggestion the title was changed, first because Robin Hood was not especially concerned with price changes, and second because many of the real-world examples of PRK would have Robin turning in his grave!

PRK creates distortions in the economy. By lowering the price of the publicly provided good, it results in overconsumption relative to the efficient level. Therefore a system of lump-sum taxes and transfers could, if unconstrained, accomplish the same redistribution at lower social cost. In many practical situations, however, governments will not have available any such system of distortion-free taxation. Indeed, in some circumstances (such as the one described above), PRK may be the only way of effecting transfers between the groups in question.

More commonly, the government will have alternative instruments for effecting transfers, but these instruments will themselves create distortions. Such instruments include statutory restrictions on trade (e.g. price controls), as well as distortionary taxes. We find that public provision will always be a useful supplement to price controls. It may also be desirable in the presence of distortionary taxes, if the government cannot directly tax the rents of the target donor group. For example, if the government wishes to transfer rents from foreign producers to domestic consumers but GATT rules or political sensitivities prevent the tax system from discriminating against foreign producers (say through a tariff), public provision of the good in question may be a useful supplement to an excise tax on all producers. Alternatively, if the government can tax labor earnings but cannot observe the income derived from renting out third-floor apartments, then public provision of housing may be part of a second-best efficient system of redistribution.

Although PRK can serve normative purposes, it also has its drawbacks. Expropriating rents in this fashion may have long-run incentive effects, for today's rents flow from yesterday's investment activities. If real estate rents or sales are taxed, buildings may be too few and too small, at least in the long run. So too if building rents are confiscated by the construction of public housing. Moreover, even when PRK is undesirable in some second-best sense, governments may still be tempted to employ it. Since PRK works through changing prices rather than direct taxation, it may largely escape the scrutiny of the budgetary process. This could be an attractive feature to a government agency seeking to make transfers that might not be welcomed by the general public.

The existing literature on cash versus in-kind transfers has largely ignored the implications of their quite different pecuniary effects.[3] One exception is Coate's (1989) paper on famine relief, which analyzes whether an agency concerned with minimizing mortality should give cash to famine victims or

[3] Usher (1977), in his interesting analysis of why commodities are socialized, notes that a socialization program which decreases average consumption of a good (say medical care) 'appropriates' rents from suppliers of the socialized commodity (doctors). Rodgers (1973) argues that farmers interested in raising the price of farm products in the late 1930s played a major role in creating the first Food Stamp Plan.

instead should ship in and distribute food. Coate observes that in some circumstances cash transfers to famine victims may have pecuniary effects that hurt the recipient group. Starving citizens will spend cash on food; the price of food will rise (assuming some supply inelasticity); and part of the cash grant will end up benefiting those who supply food rather than the intended famine victims. Thus in certain circumstances, shipping food into the famine region may be more effective than distributing cash.

The remainder of our paper is organized as follows. Section 2 outlines the framework for our analysis. Section 3 shows how a government may use in-kind programs to transfer rents from a group that it cannot reach with taxes. Section 4 examines the case for PRK when the government has alternative instruments for effecting transfers from the target donor group. Section 5 identifies some of the likely drawbacks with PRK. Section 6 discusses PRK in practice, and section 7 concludes.

2. The model

We consider an economy with two goods and two groups of individuals. Good x serves as the numeraire; good z has price p. The groups are labelled A and B; group i ($i \in \{A, B\}$) has n_i individuals. A member of group A is endowed with an income of y_A units of the numeraire. The per capita income endowment for group B is y_B. Only group B members own good z; each possesses $\bar{z}$ units.

The members of group i have identical utility functions for the two goods, represented as $u_i(x, z)$. The two utility functions are assumed to be smooth, increasing in both arguments and strongly quasi-concave. In addition, for both groups, the two goods are normal and gross substitutes. The demand for z at price p of an individual in group i whose endowment has value w is denoted by $z_i(p, w)$. The associated indirect utility function by $v_i(p, w)$.

The economy can supplement its holdings of good z with new production. Specifically, the economy has a technology that transforms c units of the numeraire into 1 unit of z, where $c > 0$. This technology is not reversible; that is, good z cannot be turned back into units of the numeraire.[4] Producers are assumed to behave competitively, which implies that the price of good z cannot exceed c in equilibrium. It may, however, fall below c if the demand for z from As is less than the (net) supply from Bs.

The laissez-faire equilibrium in this economy is simple to characterize. At price p, As will demand $n_A z_A(p, y_A)$ units of good z, as depicted in Fig. 1. Supply of z comes from two sources, Bs and new production. At price p, Bs'

[4] This assumption can be weakened somewhat. All we really require is that there exists some asymmetry such that 1 unit of z produces strictly less than c units of the numeraire.

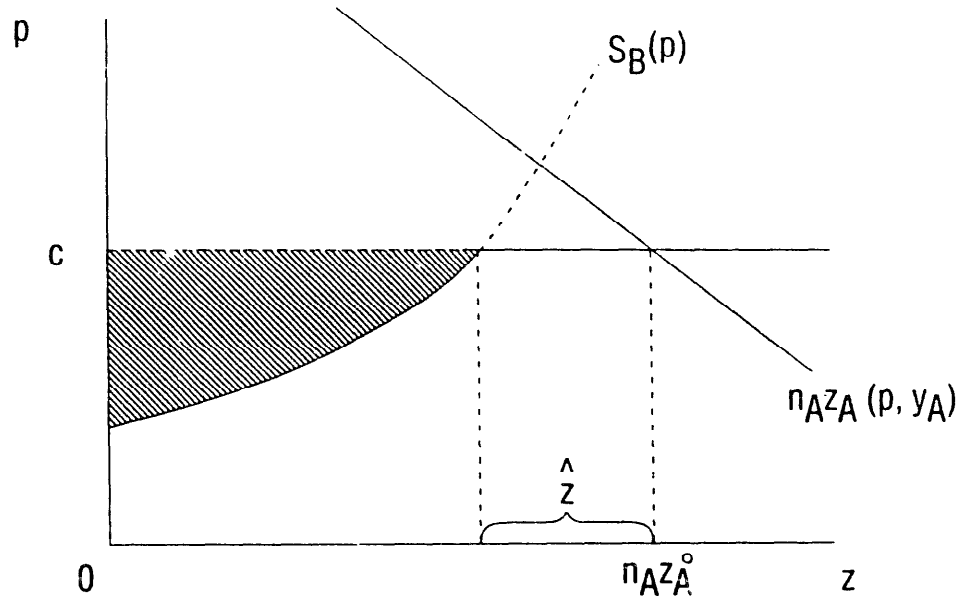

Fig. 1.

supply $S_B(p) \equiv n_B[\bar{z} - z_B(p, y_B + p\bar{z})]$ units.[5] The supply curve of new production is horizontal at price c, as shown in Fig. 1. Thus the aggregate supply curve turns flat as new production is drawn into the market.

If group A's demand exceeds group B's supply at price c, the equilibrium price of z will be c. Group A individuals will consume $z_A^0 \equiv z_A(c, y_A)$ units of z and obtain a utility level $v_A(c, y_A)$, while Bs will consume $z_B(c, y_B + c\bar{z})$ $(= \bar{z} - S_B(c)/n_B)$ units of z and enjoy a utility level $v_B(c, y_B + c\bar{z})$. New production will account for $\hat{z}$ units of the total consumption of z and Bs will earn rents from their holdings of good z, shown as the shaded area in Fig. 1.[6]

The reader may find it helpful to consider two examples that fit quite nicely into this framework. In the first, good z is taken to be housing. The Bs are landlords who own the existing stock of housing. The As have no housing and thus must rent it on the market. New housing may be built at a breakeven annual rental cost of c. In the second example, good z represents food. The Bs are rural farmers who have stocks of food that they have

[5] We will assume that group B individuals' holdings of good z are sufficiently large so that they are net suppliers over the relevant range of prices. The gross substitutes assumption implies that this supply is increasing in p.

[6] If their $\bar{z}$ units are the fruits of a past investment project, the rents received by group B individuals are more properly interpreted as quasi-rents.

grown. The As are urban dwellers endowed only with income. Food can be imported from abroad at price c; thus 1 unit of food can be obtained from c units of the numeraire. Farmers face significant transactions costs in exporting food and hence (at least for prices not substantially below c) will sell their food on the domestic market.[7]

With a few changes in labeling, the model captures situations in which foreign (or out of state) producers are earning rents from their ability to produce more efficiently than domestic producers. In this interpretation, group A can be thought of as 'domestic' consumers and $S_B(p)$ represents the supply curve of foreign producers. Domestic producers have a technology that allows them to transform c units of the numeraire into 1 unit of z. Since $S_B(p)$ is positive for prices below c, foreign producers have a more efficient technology over some ranges of output; the source of their rents.

3. Pecuniary redistribution through in-kind programs

Suppose the government wishes to redistribute from group B to group A. The purpose could be conventional redistribution, if say As were the poor and Bs the rich, but this is only one possibility. Group B might be the politically disadvantaged, such as the rural farmers in our food example who may well be poorer than the As. Alternatively, in the foreign trade context, group A could be domestic citizens, with group B being foreigners. Or, the Bs could be bad guys, say criminal elements making profits from black marketing.[8]

To tax the members of group B would be simplest, but administrative or political constraints preclude such taxation. Despite these constraints, the government can still effect redistribution with public provision. We demonstrate here that the government can redistribute from Bs to As by taxing the As and using the revenues to provide good z. We also show that PRK is equivalent in its impact to a 'discriminating' subsidy.

[7] If c is the world price of food plus the costs of transporting food in (i.e. $c = p_W + \tau$) then, assuming symmetric transport costs, farmers would not be induced to export until domestic price fell below $p_W - \tau = c - 2\tau$.

[8] Sometimes rents go to individuals who are willing to or have the capabilities to engage in illegal activities. Running the activity on a restricted basis under government supervision transfers rents from the illegal operators to consumers. Often the denial of rents to such parties is thought to be a benefit in itself. One argument in favor of government provision of heroin to identified addicts or of state lotteries is that they have the potential to create beneficial rent transfers.

3.1. The simple analytics of PRK

Consider a public provision program of the following form: first, the government produces g units of good z at cost cg.[9] Thus, in the food example, it imports g units of food and, in the housing example, it builds g units of public housing. Then, this government production is granted equally to the As at no charge. Thus each A receives g/n_A units of z from the government. Finally, a head tax of cg/n_A is levied on each A to finance the cost of the program. The Bs are only affected by this policy through the operation of the market.

The effect of this policy is shown in Fig. 2. Assuming that government rations are tradeable, each A's wealth will equal $y_A + (p-c)g/n_A$ at price p (i.e. income plus the value of the ration less taxes). The new (net) demand curve for z is therefore $n_A z_A(p, y_A + (p-c)g/n_A) - g$. This demand curve equals $n_A z_A^0 - g$ at price $p = c$. Because of the effect of p on wealth, it has a steeper slope than the original curve.[10] The new equilibrium price of z is $p(g)$, which is less than c. This price satisfies the market-clearing condition that group A's (net) demand equal group B's supply, that is

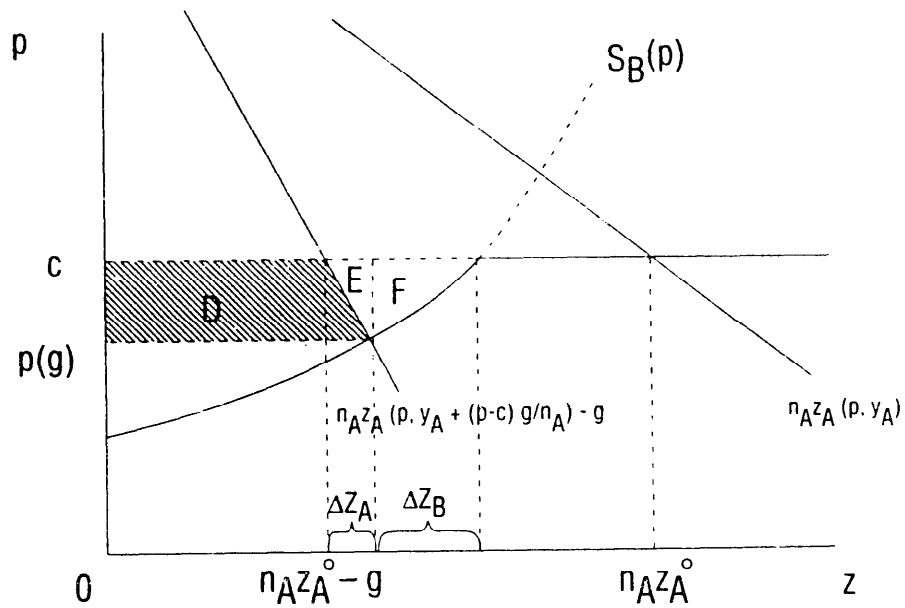

Fig. 2.

[9] One can equivalently think of the government ordering g units from new producers. All that is important is that the government does not purchase z from the Bs. This would simply reduce the market supply of the Bs and have no effect on price.

[10] The gross substitutes assumption implies the new demand curve is downward sloping.

$$n_A z_A(p(g), y_A + (p(g) - c)g/n_A) - g = S_B(p(g)) . \quad (1)$$

Provided that g exceeds $\hat{z}$, all new private production is crowded out by the policy. In response to the lower price of z, the As consume an additional Δz_A units of z. The Bs also consume more z, as the lower price leads them to supply less of their holdings to the market. The increase in their consumption is Δz_B.

Our interest lies in understanding the welfare effects of this policy. Figure 2 permits a simple analysis in terms of changes in consumer surplus.[11] Group B's rents are reduced by the area $D + E + F$. Some of these rents (shaded area D) are transferred to the As. The remainder (area $E + F$) are lost to the economy as a result of the distortion created by the policy. By reducing the price of z below its true social opportunity cost, public provision results in overconsumption of good z. Area E is the deadweight loss resulting from As consuming units of z which they value less than c. Area F is the deadweight loss resulting from excessive consumption of z by the Bs.

Intuition explains why this policy must benefit the As. In the laissez-faire equilibrium each A consumes z_A^0 units of z at price c. The public provision program essentially buys each A g/n_A units of z at price c, and allows them to purchase additional units at a price ($p(g)$) which is less than c. Provided that g is less than $n_A z_A^0$, this expands the As' opportunities. They could continue consuming z_A^0 units of z and increase their consumption of x. This would obviously make them better off. In fact, as shown in Fig. 2, they will choose to take advantage of the lower price and increase their consumption of z.[12]

PRK does not require the government to *give* its production to the As. The government could equally well *sell* its production in the market, financing any deficit by a head tax on the As. Under this policy, an A would have wealth $y_A - (c - p)g/n_A$ at price p. The term $(c - p)g/n_A$ is his share of the government deficit that results from selling the g units at price p. It follows that the demand for z would be $n_A z_A(p, y_A - (c - p)g/n_A)$. The supply of z at price p would be $S_B(p) + g$. From (1) it is clear that the same price and allocation would result.

The redistributive power of the policy stems from government production.

[11] A parallel analysis based on the more reliable equivalent variation measure of welfare change is developed in the appendix.

[12] If the laissez-faire equilibrium involved no new production and a price below c, public provision would not necessarily improve the welfare of the As. This is because the As would have to pay a higher price for the g units provided by the government. This extra cost would have to be offset against the benefits of the lower price for the additional units. A sufficient condition for a small amount of public provision to improve the welfare of the As is that $p^0/(c - p^0) > \epsilon_S(p^0)$, where p^0 is the initial price and $\epsilon_S(p)$ is the elasticity of the B's supply at price p.

By expanding the supply of the good, this forces down the market price of z. Rents are shifted from owners (or old producers) of z to consumers, but only at the cost of creating inefficiency in the economy. If total consumption of good z exceeds the economy's endowment (i.e. $n_A z_A + n_B z_B > n_B \bar{z}$), then efficiency is lost if consumers do not face the true social cost of z, namely c. By forcing the price of z below its true opportunity cost, PRK results in overconsumption of good z relative to the efficient level. Nonetheless, redistribution is effected without explicit taxation of the donor group.

3.2. *Pecuniary redistribution through discriminating subsidies*

Additional insight into the effects of public provision may be obtained by considering its relationship to a discriminating subsidy. The government with an interest in pecuniary redistribution need not provide the good itself. By subsidizing private supply, it can expand production of z, thereby reducing its price. If such subsidies went to all suppliers, including the Bs who already own good z, As would clearly be worse off. However, if subsidies were discriminating in the sense of going only to new producers, rents would be transferred from Bs.

Such discriminating subsidies are commonplace in the public arena. We frequently subsidize the population of new Ph.Ds, new housing and new investment, but not the existing stock. To operate a discriminating subsidy in the food example, the government would subsidize only the import of food. Group B individuals, domestic producers who hold the existing stock, would receive no subsidy. In the foreign trade interpretation, the government would subsidize domestic production of the good in question. Indeed, such production subsidies are discussed in the trade literature [see Bhagwati and Srinivasan (1983)].

We compare direct government provision with a discriminating subsidy, assuming that in both cases government expenditure is financed by a tax on As. The key finding is that, under our assumptions, the two policies are equivalent. Thus for any given public provision policy there exists a discriminating subsidy policy which achieves the same allocation and vice versa. A discriminating subsidy policy with subsidy $c - p(g)$ achieves precisely the same allocation as a public provision policy that provides an amount g $(>\hat{z})$. Under the discriminating subsidy policy, the equilibrium price of z must be $p(g)$ as under public provision. Moreover, the total production of good z must equal g, which means that As will have a tax bill of $g(c - p(g))/n_A$ as under public provision (assuming the good is sold, rather than given away).

To see the converse, consider a subsidy policy under which the government offers a subsidy $s > 0$ to new producers of good z. Let z_s denote production under this policy. Note that z_s will be positive and hence the

price of z will be $c - s$. Now consider a public provision policy under which the government provides z_S units of good z. It is straightforward to verify that $p(z_S) = c - s$, which means that each A will have a tax bill of sz_S. Since this is the same as under the subsidy policy, the same allocation will result.

It may be argued that since the government can always achieve the rent transfer by using a discriminating subsidy, public provision is redundant. Notice, however, that the informational requirements for operating a discriminating subsidy are much greater. In particular, it must be possible to distinguish new producers from group B members. This may be difficult in practice. In the food case, for example, the government would have to be sure that the food brought in by importers was really from abroad rather than simply purchased from the rural farmers. By importing the food itself, the government avoids this problem.

4. PRK versus alternative instruments

The previous section showed how the government could shift rents from one group in society to another by using public provision or government subsidized private production, with all costs financed by a head tax on the recipient group. The pecuniary effects of public provision are thus harnessed to achieve redistributional goals in environments where the government has limited abilities to tax the donor group. This finding has widespread applicability in the context of developing countries, where governments typically have extremely limited administrative infrastructures. Frequently, however, governments are likely to have other instruments available for effecting transfers from the target donor group. The question then becomes whether the existence of these instruments make public provision redundant as a tool for redistribution. This section addresses this issue.

4.1. PRK versus price controls

The first alternative instruments we consider are price controls. These are widely used by governments, particularly in the markets to which our model applies. Food price controls are popular in developing countries, and rent controls are common even in developed economies like the United States. Like public provision, price controls have the merit that they may be implemented without a sophisticated system of tax collection. In contrast to public provision, however, the government must be able to monitor transactions in the market closely to ensure that controls are adhered to. This requirement severely hampers the effectiveness of price controls in practice. Moreover, price controls create rent-seeking behavior which may dissipate the gains to beneficiaries of the lower prices.

In what follows we ignore the issues of enforcement and rent-seeking. Our focus will be to demonstrate that public provision will be a useful supplement to even an idealized price control. It will then follow that public provision has a role to play in more realistic circumstances. Suppose then the government imposes a ceiling, $\bar{p} < c$, on the price of z. The resulting supply of good z from Bs is $S_B(\bar{p})$. Assuming that this supply is divided equally among those who demand it, each A will consume $S_B(\bar{p})/n_A$ units of good z and $y_A - \bar{p}S_B(\bar{p})/n_A$ units of x. Such a policy could make the As better off than in the status quo, if the benefits of the lower price of z outweigh its reduced availability.

A standard supply and demand analysis of this policy, as in Fig. 3, identifies area D as the rent transfer from Bs to As and area $E + F$ as the deadweight loss. Area E is the deadweight loss resulting from Bs consuming units of z they value less than the social opportunity cost c. Shaded area F is the deadweight loss resulting from the As not consuming units of z even though their willingness to pay exceeds c.

Now suppose that, in addition to imposing the price control, the government produces g units of good z, divides them equally among the As and finances the resulting deficit by a head tax on As. It should be clear from Fig. 3 that such a policy can improve the welfare of the As. Effectively, the government is buying good z for the As at price c. For small amounts of g (say, less than $n_A z_A^0 - S_B(\bar{p})$), this must improve the welfare of the As since their willingness to pay for good z exceeds c at the price control equilibrium. By publicly providing z, the government can reduce or

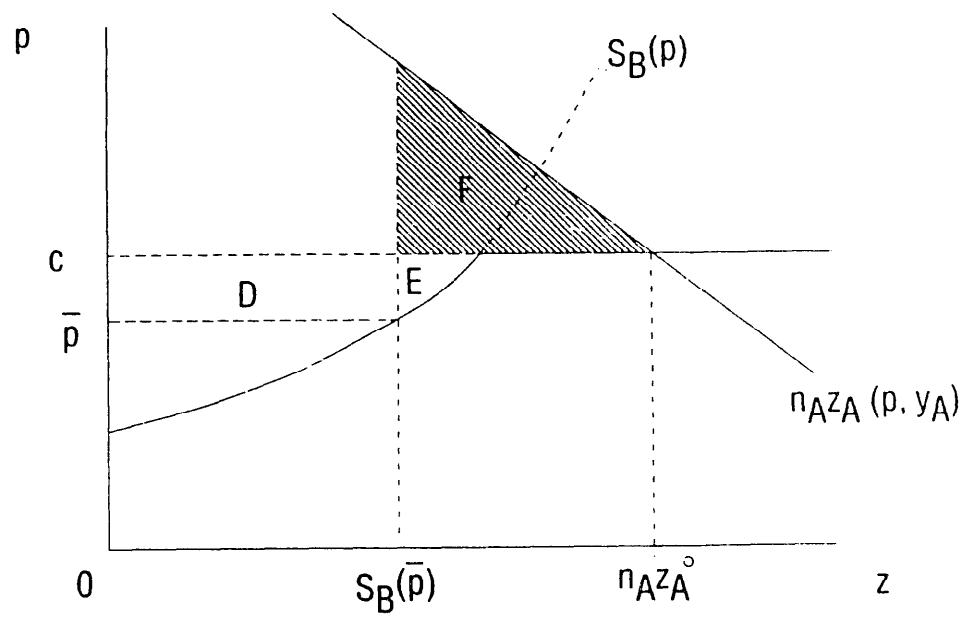

Fig. 3.

eliminate the deadweight loss area F. Since the Bs are not negatively affected, we conclude that introducing public provision can result in a Pareto improvement over a pure price control policy.

Given the price control $\bar{p}$, the efficient level of public provision solves the problem:

$$\max_{g} v_A(\bar{p}, g), \tag{2}$$

where $v_A(\bar{p}, g) \equiv u_A(y_A - \bar{p}S_B(\bar{p})/n_A - cg/n_A, S_B(\bar{p})/n_A + g/n_A)$. The first-order condition for this problem reveals, not surprisingly, that the efficient level, $g^*(\bar{p})$, is such that the As' marginal rate of substitution between the two goods is just equal to c. It follows that the price ceiling, $\bar{p}$, will still be binding at this level of public provision; that is $S(\bar{p}) < n_A z_A(\bar{p}, y_A + (\bar{p} - c)g^*(\bar{p})/n_A)$. Thus it is not generally optimal to publicly provide an amount such that the price ceiling is redundant. The Pareto-efficient policy involves the use of both instruments. This conclusion would change if account were taken of the rent-seeking likely to be associated with a binding price ceiling.

Finally, note that the allocation which is achieved with a price control $\bar{p}$ and public provision of $g^*(\bar{p})$ is exactly the allocation which would be achieved if the government were to simply use a "discriminating" price control; that is, a control which applied only to the units of z supplied by Bs. Interestingly, discriminating rent controls are commonplace in housing markets. New apartment buildings are not subject to rent controls in many U.S. cities. Again, the choice between a discriminating price control and public provision is likely to depend on the administrative feasibility of distinguishing the two types of supply. In the housing market this would appear straightforward, in the food case, less so.

4.2. *PRK versus distortionary taxation*

Obviously, if it is feasible to impose lump-sum taxes on Bs, then there is no case for PRK. One does not, however, need to make the extreme assumption of the availability of lump-sum taxation to rule out PRK. It is enough to suppose that the government can tax the sales of good z by Bs. As we saw in the previous section, the effect of public provision on Bs is to reduce the price they can get for selling their holdings of good z. Exactly the same effect can be achieved by levying an excise tax of $c - p(g)$ on the units of good z sold by Bs, or by imposing a proportional tax at the rate of $1 - p(g)/c$ on the income they derive from sales of good z. The government can then transfer the revenues raised by such taxes to As in the form of a cash transfer. As a consequence, in contrast to public provision, deadweight loss on the recipient side of the market (area E in Fig. 2) is eliminated. In

effect, then, public provision is a more clumsy method of transferring rents from Bs than would be an excise or income tax.[13]

It follows that, if there is to be a case for public provision, then it must be in an environment where a tax on the sales of good z by Bs is not feasible. One possibility is that the government is unable to distinguish or discriminate between different sellers of good z. This is plausible in the third interpretation of our model, where the rent earners are foreign suppliers. International agreements, such as GATT, may prevent a government from imposing taxes that discriminate against foreign suppliers. Alternatively, constitutional provisions may prevent discriminatory taxes against specific classes of individuals. A second possibility is that the government is simply unable to observe sales of good z. In the housing case, for example, it may be that the government's infrastructure is not sufficiently developed to monitor and record transactions in the housing market. More generally, this would certainly be the case if Bs were black-market sellers of good z. We will discuss the case for PRK in both these cases.

Consider first an environment in which the government is unable to discriminate between suppliers. In this situation the government may still be able to impose a tax on the sales of good z and distribute the proceeds in the form of a cash transfer to As. It cannot, however, target the tax solely to Bs.

Suppose that the government were to levy an excise tax t^0 on good z. The resulting equilibrium is depicted in Fig. 4. Here, p^0 denotes the post-tax equilibrium price. Group B supplies $S^0 \equiv S_B(p^0 - t^0)$ units of good z. Government tax revenue is $t^0 \cdot S^0$ and each A receives a cash transfer of $t^0 \cdot S^0/n_A$. Shaded area D (which equals $[c - (p^0 - t^0)]S^0$) represents the rents transferred from Bs. Notice that p^0 must be less than $c + t^0$ if the policy is to transfer rents successfully. This implies that the tax will crowd out all new production. Area E represents the deadweight loss from the Bs consuming too much z, and shaded area F the deadweight loss from the As consuming too little z.

Now consider replacing this excise tax policy with a policy under which the government imposes an excise tax of $\tau \equiv c - (p^0 - t^0)$ on good z, produces an amount $g = n_A z_A(c, y_A + \tau S^0/n_A) - S^0$, and sells its production in the market. It is easy to see that c is the equilibrium price of good z under this policy. In this equilibrium, the net-of-tax price of good z is $c - \tau = p^0 - t^0$. As a consequence, Bs continue to supply S^0 units of good z. Tax revenues are $\tau \cdot S^0$ and each A receives a transfer of $\tau \cdot S^0/n_A$. Public provision generates no net deficit since the price of good z equals its production cost.

[13] This corresponds to the result in the trade literature that in an undistorted economy a subsidy to domestic producers is dominated by a tariff on foreign producers [see Bhagwati and Srinivasan (1983)].

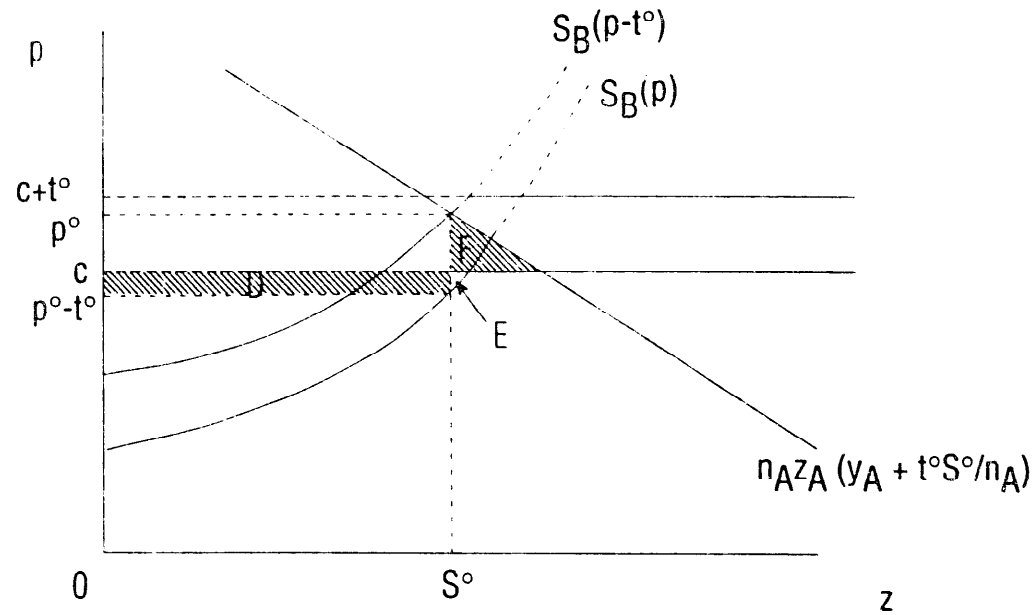

Fig. 4.

The Bs are made no worse off by the new policy, since they face the same net-of-tax price of good z. But the As are better off.[14] The same amount of rent is transferred from Bs. However, the deadweight loss area F is now eliminated. We may therefore conclude that introducing this mixed policy of excise tax and public provision results in a Pareto improvement over the pure excise tax policy. Thus in an environment where the government is unable to discriminate between suppliers of good z, there may still be a role for public provision.

Consider next an environment in which the government is unable to observe sales of good z. This means that the government is unable to get directly at the income Bs get from z by taxation. Thus it may wish to employ the more clumsy device of PRK. The desirability of PRK will, however, depend on what other tax instruments the government has available. For example, it may be that Bs have another source of income which is taxable. Alternatively, the government may be able to tax certain commodities which the Bs consume. The question then becomes one of understanding how PRK compares with these alternative distortionary taxes.

Obviously, the answer to this question will depend on the particular

[14] This intuition may be verified formally as follows: let $v_A^0 \equiv v_A(p^0, y_A + t^0 S^0/n_A)$ denote an A's utility under the pure excise tax policy and define Δ from the equation $v_A(c, y_A + \tau S^0/n_A - \Delta) = v_A^0$. Solving for Δ using the expenditure function reveals that Δ is positive, which implies that the As are better off.

circumstances and the alternative taxes that are available. One way of extending the model to get more precise results is to model the incomes y_A and y_B as being generated by labor supply decisions and allow the government to operate a (non-linear) tax on labor income. Assume, therefore, that each individual in group i has wage rate (or income-generating ability) a_i and suppose that $a_A < a_B$, so that Bs have higher wage rates as well as owning stocks of good z. Suppose the government knows the number of individuals in each group, but cannot observe any individual's wage rate; hence group membership is unclear. Individuals now have preferences over labor ℓ as well as the two goods x and z.

In the context of this framework, if individuals have identical preferences which are weakly separable between labor and the two consumption goods, we have proven that, under relatively weak conditions, government provision of good z will enhance the efficiency of the redistributive process.[15] We do this by establishing the desirability of a discriminating subsidy and appealing to the equivalence between such subsidies and public provision noted in section 3. Intuitively, it should be clear that (at the very least) a small discriminating subsidy will be desirable. There will be no loss of efficiency from a very small reduction of price below c, since all deadweight loss terms are of second order. But, on the other hand, a small reduction of price will have a first-order distributional effect.

This result should be contrasted with those of Atkinson and Stiglitz (1976) and Stiglitz (1982). These authors are concerned with the role that commodity taxes and subsidies should play, when the government can impose non-linear income taxes. Their major result is that when individuals' preferences are weakly separable between labor and consumption goods, there should be no commodity taxes or subsidies. Thus we are not simply picking up the fact that subsidies are in general efficiency enhancing in the presence of non-linear income taxation. Rather, it is because reducing the price of z plays a rent-shifting role in our model that it enhances efficiency. When $\bar{z} = 0$, the model collapses to a special case of the standard optimal tax model and we get the usual no subsidy result.

5. Cautions

The previous two sections focused on the normative role for public provision. In section 3 we demonstrated that a government unable to tax a

[15] The reader is referred to our discussion paper [Coate et al. (1992)] for the details.

particular group may nonetheless be able to expropriate rents from that group through public provision. In section 4 we expanded the range of possible instruments that government could use and showed that public provision might still play a useful role in enhancing the efficiency of the transfer process. A basic message emerges: PRK is a tool that governments can employ to the net benefit of society. The purpose of this section, however, is to offer some cautions about the use of this instrument.

The first caution concerns the potential effect of PRK on investment. To the extent that it transfers quasi-rents, PRK will damage agents' incentives to stay in a market.[16] In the food case, for example, farmers may reduce their production of food or even migrate to the urban area in the face of persistent PRK. In the housing case, potential landlords might seek alternative outlets for their capital if they anticipate that public housing will be built. By taking the source of rents ($\bar{z}$) as exogenous, our model abstracts from these effects. They would, however, both reduce the redistributive power of PRK and increase the distortions it creates.

PRK's effect on investment incentives raises commitment problems similar to those discussed in the literature on the taxation of capital income [see, for example, Chari and Kehoe (1990)]. Society might be better off if government could commit to limit its PRK activities. This would prevent investors from abandoning markets vulnerable to PRK. However, such commitments would not be credible, since administrations cannot bind their successors. Whatever commitments were made, once a new generation of investors got locked in, the then administration would choose to unreservedly engage in PRK. The government appears to have few mechanisms by which to make binding commitments, and the usual means – promises by leaders, constitutional amendments, or other kinds of legislation – might be difficult to use for this purpose.[17]

The second caution concerns the incentive effects of the potential for PRK on government officials. Public provision proves beneficial precisely where it enables society to compensate for inherent limitations in the sophistication of the policy-making process, or to overcome limits on observability and jurisdiction. This ability to slip bonds, however, may prove undesirable if society has imposed constraints it would wish to have honored. PRK offers many enticements to government officials. They may wish to employ it even if it is undesirable in some second-best sense.

[16] There is nothing particularly special about PRK in this respect. Most taxes are taxes on quasi-rents and hence negatively affect investment. Income taxes, for example, affect human capital investments as well as labor supply decisions.

[17] See Rodrik and Zeckhauser (1988) for a discussion of this "dilemma of government responsiveness".

In particular, to an agency trying to advance its parochial interests, PRK might be an inviting means of getting more personal bang for its buck (i.e. for the dollars it has been allocated) even if it happens to be socially wasteful. Consider an agency with a budget of $10 million that cares only about helping the elderly. Giving the elderly cash yields them $10 million of benefits. Spending the same amount on the construction of retirement homes lowers housing prices enough to reduce the living expenses of the elderly by $12 million. However, the reduction in the market price of existing retirement units causes a windfall loss of $5 million to private landlords. The parochial agency would choose the construction program – a highly wasteful way to provide the extra $2 million in benefits.

The final caution concerns the "fairness" of PRK, which can well violate the principles of horizontal and vertical equity. By using PRK, the government *sticks the stuck*. Thus two individuals in similar wealth positions, but with differing degrees of flexibility, would end up differentially effected by a PRK policy. Moreover, the owners of appropriable rents may be in dramatically different wealth positions. As a referee remarked, wealthy slumlords may own low-income housing, as may poor little old ladies, but Rockefellers do not!

PRK also violates Hochman's (1974) notion of *transitional equity*:

> Transitional equity . . . [is concerned] with entitlements to certainty that pre-existing rights and endowments sanctioned by a social contract will continue undiminished. The basic issue is the fairness of windfall declines in the absolute wealth of some individuals that occur when the community-at-large, in its quest for a preferable long-run allocative or distributional income, alters its rules and institutions (p. 330).

While PRK may impose less arbitrary, more intentional, changes in welfare than do rule changes or institutional reforms, it may be no less offensive to people's sense of entitlement to security in their property.

6. PRK in practice

As we noted at the outset, a substantial amount of government redistributive activity is directed to in-kind transfers. In some instances this represents PRK in practice. Salient examples include a range of efforts from the production of low-income housing to expansion of the capacity of the health-care sector. In the 1960s and 1970s, for example, the United States substantially increased the ranks of medical students and added substantially

to hospital capacity, in the expectation that adding to supply – whatever the level of demand – would lower medical prices.[18]

One of the arguments for building new low-income housing has long been that it would lower demand pressure, and therefore price, for units competing in the same market.[19] There is no doubt that it has often had this effect. In the 1960s, for example: "The development of Co-Op City in the Northeast Bronx induced many Italians and Jews to vacate their older lower-quality walk ups in the South Bronx. Landlords faced with a tremendous drop in demand for these units lowered their prices, and poor blacks and Hispanics moved in. Landlords suffered a wealth loss" [Hughes and Vandoren (1990, p. 104)].

Developing nations have frequently responded to the political pressures of urban citizens to redistribute to them and away from the rural population, which is usually both poorer and less capable of exerting political pressures. PRK is a popular strategy for effecting such redistribution. For example, in his book on government intervention in Tropical Africa, Bates (1981) notes that:

> In seeking to maintain low consumer prices, the (state) marketing agencies attempt to increase urban food supplies. They do so by importing food from abroad and distributing it in the urban market. Government-sponsored food imports have become a regular feature of the agricultural cycle in Africa: as the planting season begins and domestic stocks dwindle, African governments enter the world market in search of food. And by importing food, the marketing agencies in effect compete with the local farmers in supplying the urban market, thereby lowering the price of the farmers' product (p. 39).

Importing food is not the only way in which African governments have sought to transfer rents. Bates reports that "Many directly engage in

[18] Interestingly, the justification for increasing the supply of physicians was usually expressed as overcoming a shortage, rather than containing prices: "The Commission believes that there is currently a shortage of physicians and that this shortage will worsen in relation to growing demand . . . The production of physicians should be increased beyond presently planned levels by a substantial expansion in the capacity of existing medical schools and by continued development of new schools" [Report of the National Advisory Commission on Health Manpower (1967, pp. 18–19)]. In retrospect, it seems clear that, from a cost-containment standpoint the most salient effect of additional physicians was to expand the total amount of medical care delivered.

[19] Supply expansion has not always been the goal, witness the unusual 'legal requirement, present in the first low-rent public housing legislation of 1937, for "equivalent elimination". That requirement, later somewhat modified, made it impossible for the national government to fund or subsidize low-rent public housing unless each project was accompanied by the removal from the market of an equal number of existing units" [Starr (1985, pp. 85–86)].

agricultural production, using the public treasury to offset production costs and thereby providing cheap food for the urban market. In effect, they enter the market for food and set themselves up as rivals to the peasant producers" (p. 46).

Developed nations employ PRK to change terms of trade, extracting rents from foreigners to the benefit of their citizens. Tariffs would be handy instruments to this end, but GATT rules and international norms tend to constrain or preclude their use. The subsidy of domestic competition, however, may be a transfer mechanism that skates by the rules. Thus, the Airbus, subsidized by France and England made the commercial aircraft market more competitive. Rents that had gone to Boeing or Lockheed got transferred to air travelers and airlines.

7. Conclusion

This paper has explored a previously unstudied rationale for in-kind programs; namely, that they allow the government to transfer rents from one group in society to another. The practice works through pecuniary effects. By expanding the supply of a good, an in-kind program lowers its price and thereby transfers rents from suppliers to consumers. Using in-kind programs in this way may be the most efficient mode of redistribution in environments where certain groups are difficult or impossible to tax directly. This rationale appears to be behind the use of many such programs in practice.

Using in-kind programs to effect pecuniary redistribution is not without its drawbacks. PRK may create disincentives for future investment and its operation may violate standard public finance notions of equity. Moreover, PRK can only work if the supply curve for the good in question is upward sloping, reflecting rents being earned by suppliers. When it is feasible, PRK may be attractive to politicians because of the indirect way in which it works.

This paper has focused on government programs that provide goods directly, or subsidize their production by others. Pecuniary redistribution can also be implemented through other types of government programs.[20] For example, taxing the consumption of bread and transferring the proceeds back to consumers will lower the price of bread and thereby redistribute from farmers to consumers. Similarly, introducing rural public works projects in developing countries will transfer rents from landlords to workers by bidding up rural wages [Ravallion (1990)]. The trade literature on the

[20] We are grateful to Lawrence Summers and the referees for stressing this point.

transfer problem shows that even lump sum cash transfers can have significant effects on prices and hence strong additional distributional consequences.[21]

The pecuniary effects of in-kind programs, or indeed of many government endeavours, can be significant. It is important to understand how and when these effects can be harnessed to enhance the efficiency of redistributional efforts.

Appendix

This appendix presents a parallel analysis of the welfare effects of public provision based on the equivalent variation measure of welfare change. To simplify notation, let $z_A(g)$ and $z_B(g)$ denote the demands of group A and B individuals, respectively, when the government provides g units; that is, $z_A(g) \equiv z_A(p(g), y_A + (p(g) - c)g/n_A)$ and $z_B(g) \equiv z_B(p(g), y_B + p(g)\bar{z})$. In addition, let $v_A(g)$ and $v_B(g)$ denote the utility levels of individuals in the two groups.

Now define $\Delta_A(g)$ to be a group A individual's *equivalent variation* associated with public provision; that is, the amount of the numeraire an A would have to be given to make him as well off in the original situation as he would be with public provision of g. Formally, it is defined by the equation $v_A(c, y_A + \Delta_A(g)) = v_A(g)$. Similarly, define $\Delta_B(g)$ to be a B's equivalent variation associated with public provision of an amount g. This is defined by the equation $v_B(c, y_B + c\bar{z} - \Delta_B(g)) = v_B(g)$.

By using the consumer's expenditure function and Shephard's lemma, the reader may easily verify that

$$\Delta_A(g) = \int_{p(g)}^{c} [z_A^h(p, v_A(g)) - g/n_A]\, dp\,, \tag{A1}$$

where $z_A^h(p, v_A)$ is a group A individual's *Hicksian* (or *compensated*) demand function for z. This is the analogue to area D in Fig. 2, except the integrand is the Hicksian demand curve rather than the Marshallian. Similarly, it can be shown that

[21] The literature on the transfer problem dates back to Keynes (1929) who argued that the burden of any German reparations after World War I would be increased by a deterioration in that nation's terms of trade. The issue proved moot, since little was paid in reparations. Later work focused on the question of whether one country giving aid to another could make the recipient country worse off. For further details see Bhagwati and Srinivasan (1983).

$$\Delta_B(g) = \int_{p(g)}^{c} [\bar{z} - z_B^h(p, v_B(g))]\, dp\,, \tag{A2}$$

where $z_B^h(p, v_B)$ is a group B individual's Hicksian demand function for z. This is the analogue to area $D + E + F$ in Fig. 2.

The obvious measure of the inefficiencies created by the policy is the amount by which the loss of the Bs exceeds the gain of the As. Using (A.1) and (A.2), we obtain:

$$n_B\Delta_B(g) - n_A\Delta_A(g) = \int_{p(g)}^{c} n_A[z_A(g) - z_A^h(p, v_A(g))]\, dp + \int_{p(g)}^{c} n_B[z_B(g) - z_B^h(p, v_B(g))]\, dp\,. \tag{A3}$$

The first term on the right-hand side of (A.3) is the analogue to area E in Fig. 2, and the second the analogue to area F. This expression reveals, not surprisingly, that it is goods for which the substitution effect is large that result in large deadweight loss from PRK.

References

Atkinson, A. and J. Stiglitz, 1976, The design of tax structure: Direct versus indirect taxation, Journal of Public Economics 6, 55–75.

Bates, R., 1981, Markets and states in tropical Africa (University of California Press, Berkeley, CA).

Besley, T. and S. Coate, 1991, Public provision of private goods and the redistribution of income, American Economic Review 81, 979–984.

Bhagwati, J. and T.N. Srinivasan, 1983, Lectures on international trade (MIT Press, Cambridge, MA).

Blackorby, C. and D. Donaldson, 1988, Cash versus kind, self selection, and efficient transfers, American Economic Review 78, 691–700.

Bruce, N. and M. Waldman, 1991, Transfers in kind: Why they can be efficient and non-paternalistic, American Economic Review 81, 1345–1351.

Chari, V. and P. Kehoe, 1990, Sustainable plans, Journal of Political Economy 98, 783–802.

Coate, S., 1989, Cash versus direct food relief, Journal of Development Economics 30, 199–224.

Coate, S., S. Johnson and R. Zeckhauser, 1992, Robin-Hooding rents: Exploiting the pecuniary effects of in-kind programs, National Bureau of Economic Research Working Paper No. 4125.

Garfinkel, I., 1973, Is in-kind redistribution efficient?, Quarterly Journal of Economics 87, 320–330.

Hochman, H., 1974, Rule change and transitional equity, in: H. Hochman and G. Peterson, eds., Redistribution through public choice (Columbia University Press, New York).

Hughes, M. and P. Vandoren, 1990, Social policy through land reform: New Jersey's Mount Laurel controversy, Political Science Quarterly 105, 97–112.

Keynes, J., 1929, The German transfer problem, Economic Journal 39, 1–7.

Nichols, A. and R. Zeckhauser, 1981, Targeting transfers through restrictions on recipients, American Economic Review 72, 372–377.

Ravallion, M., 1990, Market responses to anti-hunger policies: Effects on wages, prices and employment, in: J. Drèze and A. Sen, eds., Hunger, economics and policy (Oxford University Press, Oxford).

Report of the National Advisory Commission on Health Manpower, Vol. 2, 1967 (Government Printing Office, Washington, DC).

Rodgers, J., 1973, Distributional externalities and the optimal form of income transfers, Public Finance Quarterly 1, 266–299.

Rodrik, D. and R. Zeckhauser, 1988, The dilemma of government responsiveness, Journal of Policy Analysis and Management 7, 601–620.

Starr, R., 1985, Twenty years of housing programs, The Public Interest 81, 82–93.

Stiglitz, J., 1982, Self-selection and Pareto efficient taxation, Journal of Public Economics 6, 213–240.

Thurow, L., 1974, Cash versus in-kind transfers, American Economic Review 64, 190–196.

Usher, D., 1977, The welfare economics of the socialization of commodities, Journal of Public Economics 8, 151–168.