ON THE RELATIVE EFFICIENCY OF CASH TRANSFERS AND SUBSIDIES

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Abstract

This paper considers the problem of the relative efficiency of cash grants versus subsidies when society's goal is to raise the welfare of a household. It asks why subsidies are used when they would appear to be less efficient than cash grants at raising the utility of the recipient. The analysis largely focuses on the study of three simple special cases. When the head of the household makes all consumption decisions for the household, a principle-agent problem is created: the head acts as the agent of the government in allocating the transferred resources. If the head makes decisions by maximizing a household welfare function that gives less weight to other members' utilities than society would wish, subsidies to commodities with particular characteristics may be more efficient than cash grants. Though related to the old notion of paternalism, this theory is more specific in that social preferences do respect individuals' actual utility functions, but they combine them with different weights. This leads to more specific predictions regarding the kinds of commodities that can be efficiently subsidized, as well as the description of conditions under which subsidies are relatively inefficient.

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I. Introduction

Economic theory has long argued that to raise the welfare of an individual at the lowest possible cost, cash grants are more efficient than subsidizing the consumption of specific commodities. Indeed, a demonstration of this result must now constitute part of many undergraduate price theory courses, and most undergraduate courses in public finance. Quite simply, cash grants do not create the deadweight losses in consumption that would result from the distortion of relative prices.

As well known as this may be, subsidies to selected commodities, notably housing, education, food and health care, represent a substantial fraction of government aid to the disadvantaged citizens of many countries.[1] It is natural for us to ask why this is so. Gary Becker [1983 and 1985] has recently argued that it is in no government's interest to transfer resources in a Pareto-inefficient manner. If a switch to cash grants could make both recipients and donors better off by reducing the deadweight loss, why would any government not make such a change?

The public finance literature does offer some possible explanations, all amounting to arguments for the relative efficiency of subsidies.[2] A couple of these have been around for a long time. Paternalism, the evaluation of another's welfare using one's own utility function, is an obvious possibility. The taxpayers of a society may be interested in the welfare of those less fortunate, but they may not be willing to provide cash if some fraction will be applied toward the purchase of alcohol, tobacco or other luxury or disreputable commodities. It may also be that there exist certain goods that society feels should be distributed more equally than free market allocations would provide. Tobin [1970] has referred to this as "specific egalitarianism".[3] As intuitively appealing as these explanations might seem, it is not clear why people should feel this way. And, absent a theory explaining why taxpayers care about some commodities and not others, it is a difficult theory to test.[4]

It is also possible that the consumption of some commodities will provide external benefits to others that have nothing to do with altruism. Subsidies to housing might eliminate the eyesore of slum dwellings. Food stamps, by improving nuitrition, might reduce the demand of the poor for socially-provided medical care. And the arguments regarding the positive externalities that may flow from education are, by now, very familiar.

Some recent research has focused on the inefficiencies possible when cash programs are made available to different types of recipients. Blackorby and Donaldson [1987] model the adverse selection problem that can result when it is difficult for a government to determine who is truly deserving and who is not.[5] Subsidies may serve to help discourage illigitimate claims while still providing assistance to those who need it. Fallis [1986] has argued that the relative efficiency of cash grants is less clear when lump sum transfers are ruled out and recipients represent heterogeneous households facing different market wage rates and making labor supply decisions. Making the size of the cash grant depend upon the income of the recipient will distort the labor-leisure choice, creating its own deadweight-loss.

The purpose of this note is to propose still another efficiency-based explanation for the choice of subidies over cash grants. This theory views the subsidy approach as a way to address the agency problem that arises when consumption decisions for an entire household are made by the head of that household. We are simply recognizing the fact that the government as the principle must use the head as an agent to see that the resources provided are shared optimally. Though taxpayers may be quite happy to let a single recipient spend cash as he sees fit, they may not like the way parents share resources with their children. Given that it may be difficult to give cash directly to children, subsidies might help by distorting household consumption decisions in a direction that helps the children.

In a way, this is paternalism of a different sort, in which society imposes its own view of a proper household welfare function, even though it may accept individuals' preferences. This theory has advantages over the more famililar version however, in that it is more specific and offers more testable implications. Under the general theory of paternalism, any sort of subsidy program could be theoretically justified by claiming that "social preferences" were just of the form as to make that program optimal. In the theory offered here, we have less freedom to infer unlikely social preferences. Society's household welfare function simply combines the true individual utility functions of the household's members, as the head of the household does, but it allows for greater weight to be put on the welfare of those not making the consumption decisions. It can then be shown that subsidies of goods with specific properties may be more efficient at raising household welfare that cash grants.

The next section lays out the simple model used here. Section III then demonstrates the potential efficiency of subsidies through the study of three special cases. The final section offers a brief summary and conclusions.

II. The Model

To keep things simple, we consider a two-person household with one parent (the "head") and one child. The parent will be assumed to make all the household consumption decisions for both agents. Let $x = (x_1, x_2, \ldots x_n)$ represent the consumption vector over n goods for the parent and $z = (z_1, z_2, \ldots z_n)$ that, over the same goods, for the child.

The parent will not necessarily be totally selfish. He will be assumed to maximize a weighted sum of his own utility, U(x) and the child's, V(z). We call this weighted sum W(x,z):

$$W(x,z) = U(x) + \gamma V(z) \quad . \tag{1}$$

Society's welfare function for this household takes the same form, but may involve a different value for the relative weight γ. Without any loss of generality on this score, we assume that society chooses to weight the utilities equally, so the social welfare function for this household can be represented in the Benthamite fashion as,

$$W^*(x,z) = U(x) + V(z) \quad . \tag{2}$$

There is clearly a great deal that is arbitrary about this specification of household and social preferences. Nevertheless, it will serve as a useful and simple approach, allowing us to focus on the role of subsidies when society places a greater weight on the welfare of children than do the heads of households. In fact, since we will need fairly explicit solutions to solve for household demand functions, we will be forced to put even more restrictions on the forms of U(x) and V(z) in order to demonstrate our propositions.

The parent's problem in the absence of government intervention is to maximize $W(\cdot)$ subject to the household budget constraint $Y = p(x + z)$, where Y is the household income and p the vector of commodity prices. Given a cash grant of G and a vector of commodity subsidies of s, this budget constraint becomes:

(3) $$Y + G = (p - s)(x + z) \quad .$$

The government's objective is to select G and s to maximize $W^*(\cdot)$ subject to two sets of constraints: (i) the first-order conditions from the parent's optimization problem, and (ii) a government budget constraint:

(4) $$B = G + s(x + z) \quad .$$

The purpose of what follows in the next section is not to fully solve this problem, but, through the analysis of some interesting special cases, to demonstrate conditions under which the solution will involve the use of subsidies and not cash grants, or subsidies in conjunction with grants. Notice that in the absence of the child, or if $\gamma = 1$, the familiar logic would instruct us to use only cash grants. Here we ask whether, in the presence of the principle-agent problem observed when $\gamma < 1$, subsidies can be beneficial as a way to redirect consumption decisions in the child's favor without causing an even greater loss to the parent.

Obviously, it is important to this anaysis that society place a higher value on the welfare of children than parents. Why this might be so is a question that deserves a better answer than we give it here. It may simply represent a form of paternalism as described above. It could also be that society enjoys certain external benefits from raising disadvantaged children's welfare; for example, lower juvenile crime rates, or the development of better citizens as the children become adults. Finally, it may not be that society wants to give special assistance to children as much as it wants to keep aid programs from being too attractive to recipients who could take actions to avoid the need to draw on these programs. Presumably, there is no such moral hazard problem with the children.

III. Analyzing the Special Cases

The purpose of this section is to demonstrate that there are circumstances under which subsidies are more efficient on the margin than cash grants at raising W*(•). The examples also serve to illustrate some of the limitations of subsidies.

(i) Case 1: Parent and Child have different tastes.

We must always be a little careful in defining a utility function for children. In V(z), do we have the utility function that rationalizes the choices that the child would make, given the freedom to make all her own selections? Or do we mean that V(z) rationalizes the choices she would have made for herself looking back as an adult; choices that certainly do reflect her particular likes and dislikes, but that also recognize the long-term benefits of the consumption of certain goods like education and the costs of others (e.g. candy)? Here we interpret V(z) this second way, and in this first special case we consider the benefits of subsidies when U(x) and V(z) differ, or more precisely, when marginal rates of substitution differ between parent and child.

Before examining a specific functional form, we take the analysis a little further in more general terms. Consider the effects of a first dollar of subsidy funds for the purchase of good j versus the effects of a first dollar of cash grant. From the parent's first-order condition we know that:

(5) $$U_i(x) = \gamma V_i(z) = \lambda p_i$$

where subscripts denote partial derivatives and λ represents the multiplier on the household budget constraint. From society's viewpoint, the value of a dollar cash grant to this household will be:

$$\frac{dW^*}{dG} = \sum_i U_i \frac{\partial x_i}{\partial G} + \sum_i V_i \frac{\partial z_i}{\partial G}$$

which, using (5), we can rewrite as

(6) $$\frac{dW^*}{dG} = \lambda \left[\sum p_i \frac{\partial x_i}{\partial G} + \sum \frac{p_i}{\gamma} \frac{\partial z_i}{\partial G} \right] .$$

(All summations are from i=1 to i=n.) The first dollar devoted to the subsidization of good j will bring a social benefit of, using (5) as before,

(7) $$\frac{dW^*}{ds_j} \frac{ds_j}{dS} = \lambda \left[\sum p_i \frac{\partial x_i}{\partial s_j} + \sum \frac{p_i}{\gamma} \frac{\partial z_i}{\partial s_j} \right] \cdot \left[\frac{1}{x_j + z_j} \right]$$

where S is the total expenditure on the subsidy program (i.e. $S = s_j(x_j+z_j)$). Substituting the Slutsky equation counterparts for the slopes of the demand curves in (7), we get

(8) $$\frac{dW^*}{ds_j} \frac{ds_j}{dS} = \left\{ \frac{\lambda}{x_j + z_j} \right\} \left\{ \sum p_i \left[\left. \frac{\partial x_i}{\partial s_j} \right|_c + \frac{\partial x_i}{\partial G} (x_j + z_j) \right] + \sum \frac{p_i}{\gamma} \left[\left. \frac{\partial z_i}{\partial s_j} \right|_c + \frac{\partial z_i}{\partial G} (x_j + z_j) \right] \right\}$$

where the $|_c$ signifies that the slope is that of a compensated demand curve.

Reorganizing terms a little, (8) can be written:

$$\frac{dW*}{dS} = [\frac{\lambda}{x_j+z_j}]\left[\sum p_i \frac{\partial x_i}{\partial s_j}\Big|_c + \sum \frac{p_i}{\gamma}\frac{\partial z_i}{\partial s_j}\Big|_c\right] + \frac{dW*}{dG}$$

And recognizing that[6]

$$\sum p_i \frac{\partial x_i}{\partial s_j}\Big|_c = - \sum p_i \frac{\partial z_i}{\partial s_j}\Big|_c$$

we can simplify (8) further, to

$$(8') \qquad \frac{dW*}{dS} = (\frac{\lambda}{x_j+z_j})\left[(\frac{1-\gamma}{\gamma}) \sum p_i \frac{\partial z_i}{\partial s_j}\Big|_c\right] + \frac{dW*}{dG}$$

Clearly, if $\gamma=1$ the first dollar spent will be equally productive under the two programs as there is no principle-agent problem. If $\gamma<1$, then the difference depends upon the sign of $\sum p_i(\partial z_i/\partial s_j)|_c$. This sum represents the change in total expenditures devoted to the child caused by a compensated increase in the subsidy to good j. It can be positive or negative, as demonstrated by the following simple example.

Let there be two goods, 1 and 2, and let the individual utility functions take the additive logrithmic (Cobb-Douglas) form:

$$U(x) = a\ln x_1 + b\ln x_2$$

$$V(z) = c\ln z_1 + d\ln z_2 \quad .$$

Consider the effects of a grant of G and a per-unit subsidy toward the consumption of good 2 of s_2. We normalize the price of good 1 to be 1. This makes the household budget constraint

(9) $$Y + G = (x_1 + z_1) + (p_2 - s_2)(x_2 + z_2) \quad .$$

Straightforward calculations reveal that the parent maximizing $W = U(x) + \gamma V(z)$ subject to (9) will make the following selections:

$$x_1 = a(Y+G)/[a+b+\gamma(c+d)]$$

(10) $$x_2 = b(Y+G)/(p_2-s_2)[a+b+\gamma(c+d)]$$

$$z_1 = \gamma c(Y+G)/[a+b+\gamma(c+d)]$$

$$z_2 = \gamma d(Y+G)/(p_2-s_2)[a+b+\gamma(c+d)] \quad .$$

Increases in G and s_2 will then have the following effects on the quantities chosen:

$$dx_1/dG = x_1/(Y+G) \qquad dz_1/dG = z_1/(Y+G)$$

(11) $$dx_2/dG = x_2/(Y+G) \qquad dz_2/dG = z_2/(Y+G)$$

$$dx_2/ds_2 = x_2/(p_2-s_2) \qquad dz_2/ds_2 = z_2/(p_2-s_2)$$

$$dx_1/ds_2 = dz_1/ds_2 = 0 \quad .$$

Consider first the effect on social welfare, as measured by $W^*(\cdot)$, of an additional dollar of cash grant, in the absence of any subsidies. This will be given by:

(12) $$dW^*/dG = U_1 \cdot dx_1/dG + U_2 \cdot dx_2/dG + V_1 \cdot dz_1/dG + V_2 \cdot dz_2/dG$$

which, substituting from (11), yields,

(12′) $$dW^*/dG = (a+b+c+d)/(Y+G) \quad .$$

The introduction of a per-unit subsidy will, with these preferences, affect welfare only through the consumption of the second good:

(13) $$dW^*/ds_2 = U_2 \cdot dx_2/ds_2 + V_2 \cdot dz_2/ds_2 \quad .$$

Increasing this subsidy by a dollar per unit will raise the total cost of the subsidy program (S) by

$$dS/ds_2 = s_2(dx_2/ds_2 + dz_2/ds_2) + (x_2+z_2)$$

$$= (x_2+z_2) \cdot [p_2/(p_2-s_2)]$$

The welfare effect of an additional dollar spent on the subsidy program will be:

$$(14)\qquad \frac{dW^*}{ds_2}\,\frac{ds_2}{dS} = \left[\frac{b+d}{b+\gamma d}\right]\left[\frac{a+b+\gamma(c+d)}{Y}\right]\left[\frac{p_2-s_2}{p_2}\right].$$

The question then becomes: under what conditions can the quantity in (14) exceed the quantity in (12′)? The first thing to notice is that, if $\gamma = 1$, the familiar result obtains; cash grants must be superior. Notice also that, other things equal, the relative efficiency of subsidies falls as the rate of the subsidy grows. This is due to the rising deadweight loss suffered as a result of the growing distortion in relative prices.

However, if we set the initial subsidy level at $s_2 = 0$, and assume that $\gamma<1$, we find that the quantity in (14) will be greater than that in (12′) if

$$(b+d)/(b+\gamma d)\cdot[a+b+\gamma(c+d)] > (a+b+c+d)$$

which reduces to

$$(15)\qquad d/c > b/a\quad .$$

That is, if the child and parent have different marginal rates of substitution (at identical quantities), then it will be socially optimal to subsidize the good that the child values relatively more highly. It will only be efficient to subsidize up to a certain level, however; as observed above, the rising deadweight loss will make cash grants more beneficial at some point.

An obvious example of a good that produces more benefits for children than for their parents is education at the elementary and secondary level. Thus, we find a reason to subsidize this education rather than simply provide poorer families with the unrestricted funds sufficient to allow them to purchase it.

(ii) Case 2: Household public goods.

To keep things simple, suppose there are two goods. The first good we will call food, and it is purely private in the sense that units consumed by any individual are not available for any other individual. The second good, housing (denoted H), is a pure public good within the household. That is, units of housing provide benefits to all household members simultaneously. It might seem intuitive to many readers that subsidies to household public goods might help mitigate the principle-agent problem here, as the parent's ability to appropriate the benefits of the transfer scheme are somewhat restricted. In fact, under some conditions, this is indeed true and subsidies to household public goods can be efficient, even if the parent's and child's preferences are identical. These conditions may be less general than one imagines, however.

Before any transfers, the parent's problem is to maximize

$$W(x_1, z_1, H) = U(x_1, H) + \gamma V(z_1, H)$$

subject to the household budget constraint. The first-order conditions reveal that

(16) $\quad U_1 = \gamma V_1 = \lambda p_1 \quad$ and that $\quad U_H + \gamma V_H = \lambda h,$

where h is the (before subsidy) price of a unit of housing and λ is, again, the multiplier on the budget constraint.

The social value of a dollar cash grant can will then be

$$(17) \qquad \frac{dW^*}{dG} = U_1 \frac{\partial x_1}{\partial G} + V_1 \frac{\partial z_1}{\partial G} + (U_H + V_H) \frac{\partial H}{\partial G} \quad .$$

Substituting from (16), this can be written

$$(18) \qquad \frac{dW^*}{dG} = \lambda \left[p_1 \frac{\partial x_1}{\partial G} + \frac{p_1}{\gamma} \frac{\partial z_1}{\partial G} + h \frac{\partial H}{\partial G} \right] + (1-\gamma) V_H \frac{\partial H}{\partial G} \quad .$$

Letting the subsidy on housing be represented by s, we can derive the effects on W* of a dollar expenditure through the subsidy program:

$$(19) \qquad \frac{dW^*}{ds}\frac{ds}{dS} = \frac{1}{H}\left[U_1 \frac{\partial x_1}{\partial s} + V_1 \frac{\partial z_1}{\partial s} + (U_H+V_H)\frac{\partial H}{\partial s}\right]$$

$$= \frac{1}{H}\left\{ \lambda \left[p_1 \frac{\partial x_1}{\partial s} + \frac{p_1}{\gamma}\frac{\partial z_1}{\partial s} + h\frac{\partial H}{\partial s}\right] + (1-\gamma)V_H \frac{\partial H}{\partial s}\right\}$$

substituting using the first-order conditions. Using the Slutsky equations, as above, and collecting terms, (19) becomes

$$(19') \qquad \frac{dW^*}{ds}\frac{ds}{dS} = \frac{dW^*}{dG} + \frac{\lambda}{H}\left[p_1 \frac{\partial x_1}{\partial s}\bigg|_c + \frac{p_1}{\gamma}\frac{\partial z_1}{\partial s}\bigg|_c + h\frac{\partial H}{\partial s}\bigg|_c\right]$$

$$+ \frac{(1-\gamma)V_H}{H}\frac{\partial H}{\partial s}\bigg|_c \quad .$$

Thus, dW*/dS > dW*/dG iff

$$\lambda \left[p_1 \frac{\partial x_1}{\partial s}\bigg|_c + \frac{p_1}{\gamma}\frac{\partial z_1}{\partial s}\bigg|_c + h\frac{\partial H}{\partial s}\bigg|_c\right] + (1-\gamma)V_H \frac{\partial H}{\partial s}\bigg|_c > 0 \quad .$$

Again using the fact that the sum of the products of the prices and the changes in compensated demands must equal zero, we can rewrite this condition as

$$(20) \qquad \lambda \left(\frac{1-\gamma}{\gamma}\right) \frac{\partial z_1}{\partial s}\bigg|_c + (1-\gamma)V_H \frac{\partial H}{\partial s}\bigg|_c > 0 \quad .$$

Notice first that if $\gamma = 1$, both of these terms are zero and the first dollar spent is equally effective under the two programs. Also note that the second term in (20) is positive, meaning that a sufficient condition for (20) to hold, when $\gamma<1$, is that $\partial z_1/\partial s|_c \geq 0$. That is, if a compensated increase in the subsidy leads to an increase in the amount of the private good allocated to the child, the first dollar of the subsidy is more effective than the first dollar of cash grant.

It might seem that this condition is unlikely to be met and, indeed, in the linear-logrithmic case analyzed above, it is easily see to not hold. A familiar result with these type of preferences is that the ordinary demand for each good is independent of the prices of other goods, hence the substitution effect must be negative to offset the positive income effect. In fact, with only two goods and identical preferences we would always expect the two goods to be substitutes under compensation. The interested reader can easily verify that (20) will not hold with these types of preferences.

There are preferences, however, under which (20) will hold. Consider the following example in which identical preferences are assumed to avoid complicating these results with those of the previous case. Suppose the parent maximizes a function of the following form:

$$W = (ax_1)^{½} + (bH)^{½} + \gamma[(az_1)^{½} + (bH)^{½}] \tag{21}$$

which yields demand curves of the form

$$\begin{aligned} x_1 &= Y/Q \\ z_1 &= \gamma^2 Y/Q \\ H &= \frac{b}{a}\left[\frac{1+\gamma}{h}\right]^2 \frac{Y}{Q} \end{aligned} \tag{22}$$

Where $Q \equiv (1+\gamma^2) + (b/a)(1+\gamma)^2/h$.

Straightforward calculations reveal that the social value of a single dollar of cash grant will be:

(22) $$dW^*/dG = (1/2Y)[(ax_1)^{\frac{1}{2}} + (az_1)^{\frac{1}{2}} + 2(bH)^{\frac{1}{2}}]$$

while the value of the first dollar of subsidy to housing is:

(23) $$dW^*/dS = -(1/2Y)[(ax_1)^{\frac{1}{2}} + (az_1)^{\frac{1}{2}} + 2(bH)^{\frac{1}{2}}] + 2(bH)^{\frac{1}{2}}/(hH) \quad .$$

Thus, $dW^*/dS > dW^*/dG$ if

(24) $$\frac{2(bH)^{\frac{1}{2}}}{hH} > \frac{(ax_1)^{\frac{1}{2}} + (az_1)^{\frac{1}{2}} + 2(bH)^{\frac{1}{2}}}{Y} \quad .$$

Inequality (24) has a simple interpretation. The left-hand side is the average social welfare generated per dollar spent on housing. The right-hand side is the overall average social welfare generated per dollar. Substituting from (22) we find

$$\frac{2(bH)^{\frac{1}{2}}}{hH} = 2(YaQ)^{-\frac{1}{2}}(1+\gamma)^{-1}\left[a(1+\gamma^2) + \frac{b(1+\gamma)^2}{h}\right]$$

$$\frac{(ax_1)^{\frac{1}{2}} + (az_1)^{\frac{1}{2}} + 2(bH)^{\frac{1}{2}}}{Y} = (YaQ)^{-\frac{1}{2}}(1+\gamma)\left[a + \frac{2b}{h}\right] \quad .$$

Further manipulations reveal that inequality (24) will hold whenever $(\gamma-1)^2 > 0$, or in other terms, whenever $\gamma \neq 1$, even if it is greater. Thus, we find it possible for subsidies to household public goods to dominate cash grants on efficiency grounds, at least up to a point. Recall that the example employed identical preferences for parent and child. To the extent that the child's welfare function places a relatively higher value on the public good, the dominance of subsidies will be enhanced.

If we imagine the parent's optimization problem to be different from the maximization of W, as we have it here, other possible benefits of subsidies to household public goods suggest themselves. A parent with little regard for the welfare of his child (i.e. $\gamma \approx 0$) will provide her with very little food, perhaps just enough to sustain her (and avoid trouble with the authorities). A subsidy to a household public good like housing, however, will generate spillover benefits to the child as the parent is induced to purchase more housing services. Notice, however, that to the extent that parents can recapture some of this spillover by reducing the child's consumption of other goods, this approach can be frustrated.

Although housing is a good example, and a commodity often subsidized, the list of potential household public goods is probably not a long one. Somewhat related, however, will be goods and services like health care, which can produce important, within-household externalities.

(iii) Case 3: Parent claims all marginal resources for himself

Finally, for our last example consider the following example of parent and child preferences over two purely private goods:

Parent: $U(x) = a\ln x_1 + bx_2$

Child: $V(z) = a\ln z_1 + bz_2$

Notice that their preferences are identical and that they exhibit constant marginal utility of good 2. The parent maximing $W(\cdot)$ will in this case set $z_2=0$ if $\gamma<1$. Assuming enough resources that x_2 is not also equal to 0, the other quantities chosen will be (setting $p_2 = 1$ for convenience):

$$x_1 = a/(bp_1)$$

$$z_1 = \gamma a/(bp_1)$$

$$x_2 = Y - (1+\gamma)a/b \quad .$$

With these preferences, and assuming that $\gamma<1$, any additional dollar given in the form of a cash grant will be spent exclusively on x_2. This creates a social welfare gain of:

$$dW^*/dG = b \quad .$$

If a subsidy to good 1 was used instead, x_2 would not be affected, but the other quantities would change according to (assuming the initial subsidy rate was equal to 0):

$$dx_1/ds_1 = x_1/p_1$$

$$dz_1/ds_1 = z_1/p_1 \quad .$$

The social welfare effect of the first dollar spent on this program will then be:

$$\begin{aligned}(dW^*/ds_1)(ds_1/dS) &= [(a/x_1)(x_1/p_1) + (a/z_1)(z_1/p_1)]\cdot[1/(x_1+z_1)] \\ &= (2a/p_1)\cdot[bp_1/a(1+\gamma)] \\ &= 2b/(1+\gamma) > b = dW^*/dG \quad .\end{aligned}$$

Thus, social welfare rises more when a subsidy is used in this case and $\gamma<1$. Whereas a cash grant would be entirely devoted to the purchase of good 2 for the parent, a subsidy for the consumption of good 1, together with the unitary elasticities of demand for the good, guarantee that all the additional funds are devoted to the purchase of good one for both individuals.

If it is felt that larger cash grants will be devoted to the purchase of goods for the parent only, perhaps luxury items (e.g. entertainment, alcohol and tobacco), it may be optimal to subsidize the purchase of non-luxury items such as food and shelter.

IV. Summary and Conclusions

We have seen above that, under certain circumstances, subsidies for the purchase of certain commodities may be a more efficient way to raise the welfare of a household than cash grants. This can happen if society, while accepting every individual's utility function as the true measure of his welfare, nevertheless combines the welfare of household members differently than does the head of the household. Specifically, we have assumed that society is more concerned with the welfare of children, and thus gives their utility greater weight in the household welfare function.

When this is true, we have proven conditions under which subsidies can dominate, though only up to a point: subsidies still create deadweight loss and become increasingly ineffective as the rate of subsidy increases. If the parent and child have different tastes, a subsidy for the good relatively preferred by the child could raise household welfare more effectively than a cash grant by shifting consumption toward a good that is more highly valued socially than privately (i.e. by the head).

Depending upon the behavior of the head of the household, it may also be effective for a government to subsidize the consumption of household public goods as a way to ensure that some benefits are reaching the child. Finally, we showed that if the parent spends all marginal funds on himself, then even if the child's preferences are identical, it may be desirable to subsidize the purchase of goods that both consume, as a way to force the parent to share some of the benefits. Again this expands the consumption of goods that were underconsumed from a social point of view.

This is by no means the last word on these questions. The extent to which subsidies can be more efficient than cash grants obviously depends critically on the nature of the household choice mechanism about which we have said relatively little.[7] Parents may not maximize a weighted sum of household members' individual utilities, for example; rather, they may maximize their own utility subject to certain constraints on the utility levels or consumption levels of the other members. This change in the parent's problem could have implications for the choice between subsidies and cash grants, as suggested by the discussion of household public goods in the previous section.

Also, further research is clearly needed to refine the theory behind the examples studied here, to reveal the precise conditions under which subsidies can dominate cash grants in the presence of this type of agency problem.

NOTES

[1] On the growth of importance of this kind of aid in the United States, see Browning [1975a].

[2] Rosen [1985], pp. 80-95, contains a nice review of the traditional explanations, together with some data on the relative importance of in-kind transfers.

[3] Tobin [1970] suggested that the following may be candidate commodities for specific egalitarianism: civil rights, food, shelter, education and medical care. He suggests that in some cases society would like the distribution to be completely equal (e.g. voting rights), while in others the concern is only that everyone have a certain minimum quantity (e.g. food, shelter and education).

[4] Browning [1975b] describes the difficulties inherent in using in-kind transfers to affect Pareto optimality in the presence of consumption externalities. In Browning [1981], he argues that actual in-kind transfers do not achieve a Pareto optimum; rather they cater more to the preferences of donors than recipients.

[5] On this idea, see also Nichols and Zeckhauser [1982].

[6] Some elaboration of this point might be helpful. Each of these compensated demand derivatives is actually the sum of two derivatives, one with respect to p_j charged for x_j and one with respect to p_j charged for z_j, for example:

$$\frac{\partial x_i}{\partial s_j}\bigg|_c = -\left[\frac{\partial x_i}{\partial p_j^x}\bigg|_c + \frac{\partial x_i}{\partial p_j^z}\bigg|_c\right]$$

Combining this with the well known property, derivable from the Slutsky equations,

$$\sum_i p_i \left(\frac{\partial x_i}{\partial p_j} x \Big|_c + \frac{\partial z_i}{\partial p_j} x \Big|_c \right) = 0$$

we can then derive the equation from the text.

7 Notice that this question is related to, but distinct from, the question of how parents allocate resources between children. On this question see, for example, Becker and Tomes [1976], and Behrman, Pollak and Taubman [1982]. Here our concern with the allocation between parent and child.

REFERENCES

Becker, G., "A Theory of Competition Among Pressure Groups for Political Influence", Quarterly Journal of Economics, Vol. 98, 1983, pp. 371-400.

Becker, G., "Public Policies, Pressure Groups, and Dead Weight Costs", Journal of Public Economics, Vol. 28, 1985, pp. 329-347.

Becker, G. and N. Tomes, "Child Endowments and the Quantity and Quality of Children", Journal of Political Economy, Vol. 84, August 1976, pp. S143-S162.

Behrman, J., R. Pollak and P. Taubman, "Parental Preferences and the Provision for Progeny", Journal of Political Economy, Vol. 90, February 1982, pp. 52-73.

Blackorby, C. and D. Donaldson, "Cash Versus Kind, Self-Selection, and Efficient Transfers", Discussion Paper 87-01, Department of Economics, University of British Columbia, January 1987.

Browning, E., "A Theory of Paternalistic In-Kind Transfers", Economic Inquiry, Vol. 19, October 1981, pp. 579-597.

Browning, E., Redistribution and the Welfare System, American Enterprise Institute, Washington D.C., 1975a.

Browning, E., "The Externality Argument for In-Kind Transfers: Some Critical Remarks", Kyklos, Vol. 28, 1975b, pp. 526-544.

Fallis, G., "Optimal Transfer Payments: In Cash or In Kind Revisited", Working Paper 86-01, Department of Economics, York University, January 1986.

Nichols, A. and R. Zeckhauser, "Targetting Transfers Through Restrictions on Recipients", American Economic Review, Vol. 72, May 1982, pp. 372-377.

Rosen, H., Public Finance, Homewood, Illinois: Richard D. Irwin, 1985.

Tobin, J., "On Limiting the Domain of Inequality", Journal of Law and Economics, Vol. 13, 1970, pp. 263-277.