

A Common Fallacy About In-Kind Subsidies:
A Housing Program Application

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I. Introduction

The relative effects of different types of subsidies on recipients are well known from the theory of public finance. The general conclusion is that a recipient's level of well being will be smaller with an in-kind subsidy than with a cash grant of equal size. This paper, however, undertakes to show that this is not necessarily the result involving the subsidization of a public good within a collectivity. This may occur if a locality is the recipient collectivity of an intergovernmental grant or a family is the recipient of benefits under a welfare program.

If the good has public good characteristics, and if the recipient is a collectivity (as opposed to an individual), these aspects should be incorporated into our welfare economic analysis; this, however, has not typically been done. The literature on intergovernmental grants is an exception. Some aspects of that literature will be summarized in Section II and the analysis will be extended to the issue at hand. The results derived in Section II have implications not only for the evaluation of intergovernmental grants but also for the evaluation of housing programs. These programs can be viewed as subsidizing the consumption of a good (housing) having public good characteristics within a collectivity (the family). In Sections III and IV I will explore how the analysis of housing subsidy programs in general and public housing programs in particular is affected by this consideration. Section V offers some concluding remarks.

II. Perspectives on Intergovernmental Grants

Consider a situation in which there are two levels of government, the "state" and a "locality". Each individual within the locality consumes two goods, X and Y. The relative effects of two different grants from the state to the locality will be considered: (1) a matching grant in which the state agrees to pay a fraction m of the cost of providing X; and (2) a lump sum grant of equal size.

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Such situations have traditionally been analyzed by thinking of the locality as an individual decision making unit. Two conclusions are apparent. First, the level of provision of X would be higher with the matching grant than with the lump sum grant; second, the locality would be better off (it achieves a higher indifference curve) with the lump sum grant. These, of course, are the standard results achieved when analyzing the relative effects of excise versus lump sum subsidies (Scott 1952, Haskell 1964, Wilde 1971, Gramlich 1977, Hirsch 1970, pp. 128-30).

This individual choice model, however, is clearly inappropriate if X is a public good consumed within the locality, since its level of provision would undoubtedly be the result of some collective decision making process by residents (Bradford and Oates, 1971a). A better method of analyzing such a situation would take these collective choice aspects of the problem into account in an effort to see if the standard conclusions still hold.

Goetz and McKnew (1972) have described a special case within which a matching grant would lead to a smaller level of consumption of a subsidized public good than would a lump sum grant; this was done by explicitly incorporating the collective decision making aspects of the problem into the analysis. Bradford and Oates (1971a) show that the standard result concerning the relative consumption quantities of the public good still holds in the case where there is a single public good, fixed tax shares, and decisions are made via simple majority voting. Nitzan (1977) shows that Bradford and Oates' result does not hold under more general voting schemes, in particular, any case where there are multiple possible equilibria. Nevertheless, Bradford and Oates' framework is quite useful for the purposes at hand. At this stage I will summarize their argument, as it serves as the basis for much of the present analysis.

Consider a locality as above, in which each individual consumes X (the public good) and Y (the private good). There are n individuals (where n is odd for simplicity), each of whom votes. The level of provision of X is determined by simple majority voting. The public good is financed through local taxes such that each person i pays a fraction h_i (where the h_i sum to one) of the cost of its provision. Units are defined so that the price of each good is unity; the cost per unit of X for person i is then h_i dollars. Person i 's situation is illustrated in Figure 1.

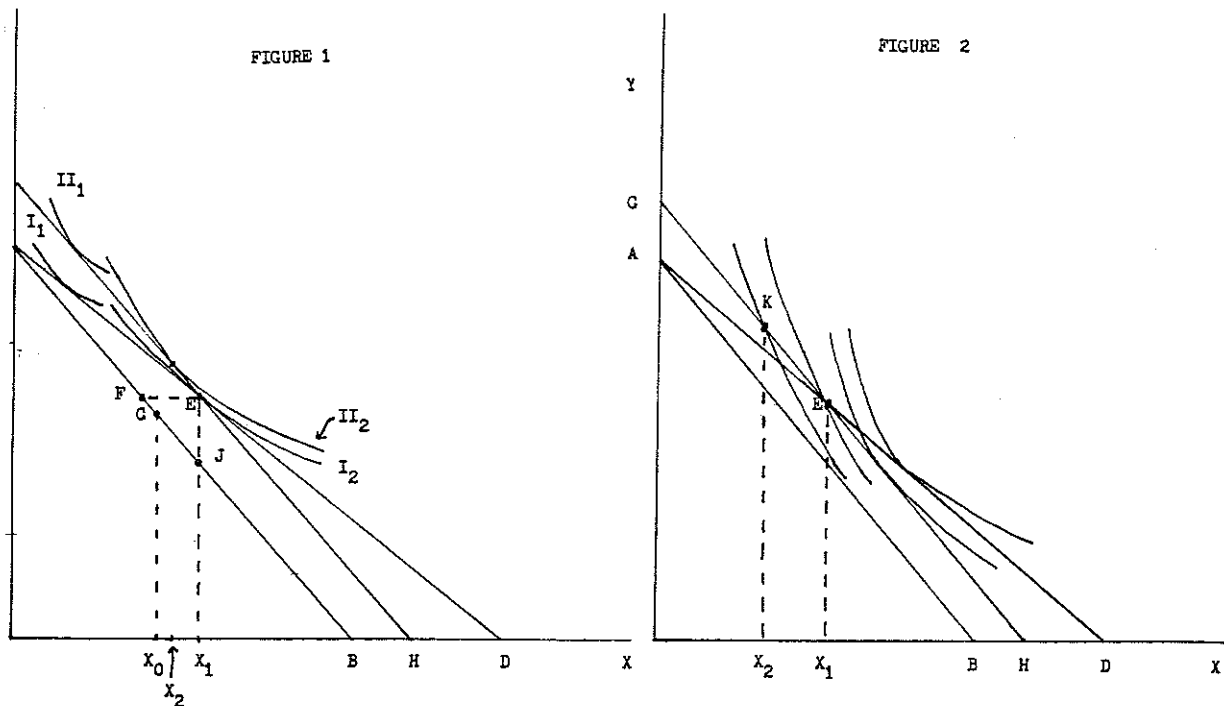
The initial budget constraint is AB , which has a slope (in absolute value) of h_i . Suppose that person i has an indifference curve which is tangent to AB at the point whose abscissa is X_i (not pictured). By the median voter theorem, the level of provision of X under simple majority voting will be the median of the X_i 's, say X_0 . Person i then consumes the bundle represented by point C . Now, suppose that the state agrees to pay a fraction m of the cost of providing X ; the effects of this matching grant are identical to those which would result if the state were to refund a fraction m of each person i 's local tax bill.¹ Person i 's budget line rotates outward to AD , which has a slope (in absolute value) of $h_i(1-m)$. The new level of provision of the public good is the median of the most preferred quantities for the individual residents, say X_1 . Person i then consumes the bundle represented by point E , and the size of the grant to the locality is EF .

A lump sum grant to the locality of a size EF would move person i 's budget constraint to GH ; this grant is equivalent to a set of grants of size EJ to each individual, where $EJ=h_i(EF)$.² Note that it is possible that with the lump sum grant some individuals will prefer more X than with the matching grant; consider an individual with indifference curves I_1 and II_1 . We know, however, that the median voter with the matching grant will prefer less X with the lump sum grant (see I_2 and II_2). Also, every voter who had a most preferred quantity of X with the matching grant less than X_1 will have a most preferred quantity of X with the lump sum grant less than X_1 , by convexity of preferences. For at least $((n+1)/2)$ voters, then, the most preferred level of X with the lump sum grant will be smaller than X_1 . This implies that the median is less than X_1 (say X_2), and hence that the level of provision of X with the lump sum grant will be smaller than with the matching grant. Note that this result does not depend on the assumption that the median voter is the same individual under the two subsidies. Bradford and Oates have then determined that the conclusion reached in the individual choice model concerning the relative levels of provision of X under the two types of subsidies still holds in the case of a single public good, fixed tax shares, and simple majority voting. At this point their analysis ends.

Let us recall, however, that two conclusions resulted from the individual choice model. The first concerned the relative levels of provision of the public good; the second concerned the relative levels of well being of the locality under the two situations. Using the individual choice model, it was concluded that the locality would be better off with the lump sum grant. Does this additional result hold once we consider the collective choice aspects of the problem? This is a question which has to my knowledge been ignored by those who have attempted to include collective decision making aspects into the analysis.

Without making interpersonal utility comparisons, the only basis on which we can say that the locality is better off with the lump sum grant than with the matching grant is by using the Pareto criterion. But it is not necessarily the case that the move from the situation resulting with the matching grant to that resulting with the lump sum grant is one which makes at least one person better off without making anyone worse off. Consider Figure 2, where the budget constraints and levels of consumption of X have been copied from Figure 1. X_1 (for the matching grant) and X_2 (for the lump sum grant) are the levels of provision of X ; E and K are the respective consumption points. Assuming normally shaped indifference curves, any individual who has an indifference curve tangent to GH at or to the right of E is better off at point E than at point K , and is thus better off with the matching grant than with the lump sum grant. The indifference curves shown in Figure 2 represent such an individual. Even though a majority of individuals are better off with the lump sum grant, it is possible that some are worse off. In such a case we cannot use the Pareto criterion to evaluate the relative levels of well being of the locality with the two subsidies.

FIGURE 1



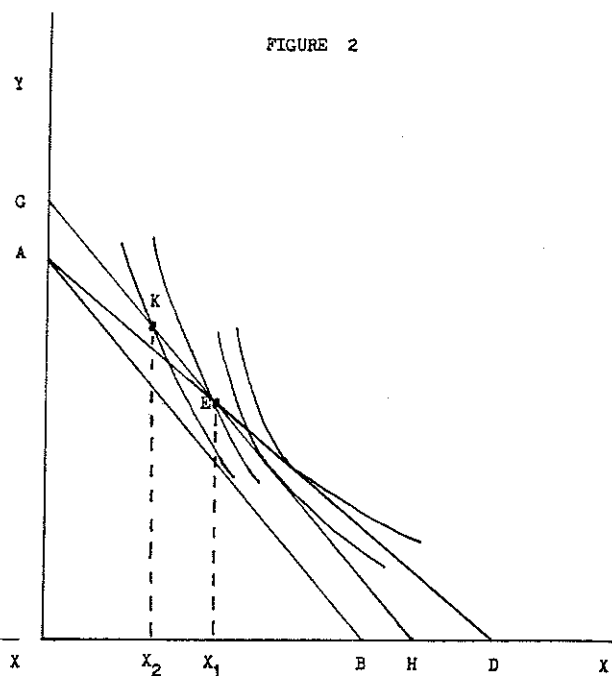
To then be able to even address the question of the relative levels of well being of the locality would require the use of a social welfare function and interpersonal comparisons of utility. The difficulties here are well known. What is perhaps more interesting is that it is possible to create an example where, purely from the point of view of economic efficiency (and disregarding the effects on the distribution of well being), the matching grant is "better" than the lump sum grant. All one needs to do is to postulate a minority of residents who have a very high relative preference for the public good. Since simple majority voting ignores intensity of preferences, it is then possible that the sum (over i) of the benefits of the matching grant will exceed the sum of the benefits of the lump sum grant.

Examples easily come to mind where a minority of a locality's residents might have a very strong preference for a local public good, when the average person does not. Pollution control (for, say, asthma sufferers) falls into this category. If the level of pollution control with a lump sum grant were smaller than with a matching grant, I would expect that asthma sufferers would be better off with the matching grant. This is sufficient to negate the Pareto superiority of the lump sum grant.

III. An Application to Housing Programs

The analysis presented in Section II is relevant whenever the problem is to evaluate the relative effects of grants to a collectivity, when the good being subsidized has public good characteristics therein. A family is one type of collectivity, and if there were a good X which was a public

FIGURE 2



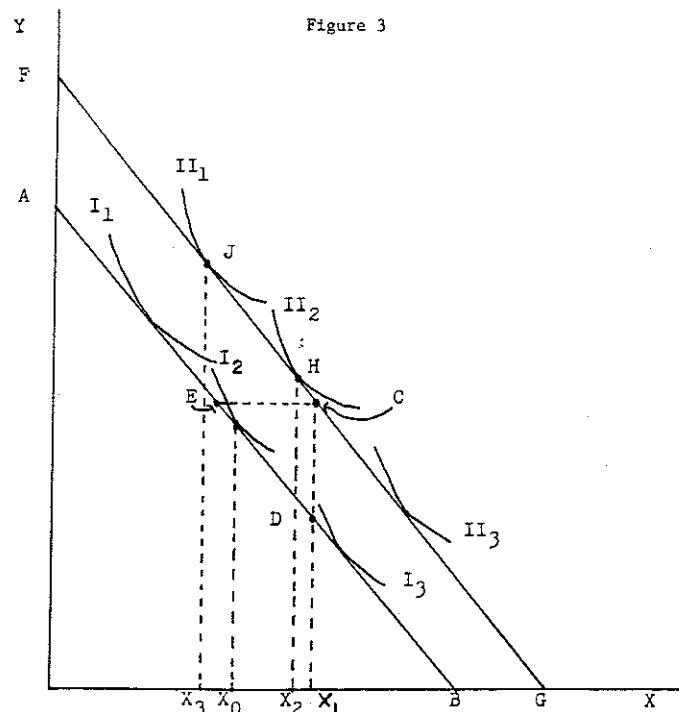
good within the family, then the relative effects of a matching grant (an excise subsidy) for X and a lump sum grant of the same size could easily be evaluated using the framework developed in Section II. Clearly, it would not necessarily be the case that each family member would be better off with the lump sum grant.

Housing is a good which, at least to some extent, has public good characteristics within a family. Certain common areas, such as living rooms and kitchens, are shared in consumption. Although some areas are not shared (e.g. bedrooms), and there is at least the possibility of congestion, it is clear that consumption is not totally rival. Therefore, housing does (at least to some extent) have public good characteristics, and incorporating this and the collective choice problem which results into the analysis of housing subsidies is then an important step toward a complete evaluation of the effects of such programs on recipients.

Consider a family within which each individual consumes two goods, housing services (X) and a composite private good (Y), each of which has a price of unity. Consumption of housing is totally nonrival; that is, housing is a pure public good within the family (in section IV this assumption will be relaxed). The family chooses its level of consumption of X through some collective decision making process. The family's income which remains after housing expenditure is divided in the fractions h_i among family members. That is, for a family with income Z , person i consumes $h_i(Z-X)$ units of Y . The fraction h_i is then the analogue of the tax share of person i .

The framework developed in Section II can easily be applied to analyze an excise subsidy (a matching grant) for housing. Since there may be some family members who are better off in the situation with the excise subsidy than in that which results with a cash grant of the same size, we cannot necessarily say that the family as a whole is better off with the cash grant. A more common type of housing subsidy program, however, is public housing. The primary result of the traditional individual choice analysis is that a family will generally be better off with a cash grant of the same size as the subsidy implicit in its public housing program. (DeSalvo 1971, Olsen and Barton, 1983). But does this result still necessarily hold once we consider the family as a collectivity and incorporate the resulting collective choice aspects of the problem?

For a first example, consider the "egalitarian" family. This family has three members, and decisions on the consumption of housing (X) are made by simple majority voting. Each individual gets one-third of the family's income after housing expenditure for use in purchasing Y . The situation for each individual is pictured in Figure 3. The pre-subsidy budget constraint is AB , which has a slope (in absolute value) of one-third. I_i and II_i are indifference curves of person i ; these are shown for each of the three family members. In the absence of the public housing program the level of consumption of X is the median of the most preferred levels, in this example X_0 . The public housing program offers the family a dwelling



unit containing X_1 units of housing at a below market rent R . This allows each family member to consume at point C , where the ordinate of C is $(1/3)(Z-R)$. The size of the subsidy to the family is CE . A cash grant of CE to the family (which is equivalent to a set of cash grants of size CD to each individual) would change the budget constraint to FG . The family would then consume X_2 units of housing, with each individual at point H . Comparing the outcomes of the two programs, it is clear that persons 1 and 2 are better off with the cash grant, but person 3 is better off with public housing. We cannot then necessarily say that the family is better off with the cash grant.³

As a second example, consider the same family shown in Figure 3, except now assume that person 1 is a "dictatorial head." That is, person 1 chooses the level of housing consumption without considering the preferences of the other family members. In this case the consumption of housing with the cash grant is X_3 and each family member is at J . Person 3 is better off at the public housing consumption point C than at J . For person 2, whether J or C is on a higher indifference curve is unclear. In any case, it is clear that we cannot say that the family is necessarily better off with the cash grant.

IV. Housing as an Impure Public Good

The obvious criticism of the above examples is that housing is not a pure public good within a family, because of congestion problems. Congestion problems have most clearly been discussed in the literature on the theory of clubs; a survey of this literature is given by Sandler and Tschirhart (1980). In this literature, an impure public good is one which is partially rival in consumption or for which there is some excludability of benefits (Sandler and Tschirhart, 1980). Partial rivalry is the key for the present analysis. In the club theory literature a crowding function is typically incorporated as one argument of the utility function to show that consumption of the public good by others affects the individual in question

(Sandler and Tschirhart, 1980). A different approach will be used here which is more adaptable to the problem at hand. This will be presented in the context of a simple example which reinforces the analysis of Section III by showing that the incorporation of congestion does not significantly affect the analysis.

Consider a family with three members, each of whom consumes housing (X) and a composite private good (Y), where units of each are defined so that prices are unity. Each individual receives one-third of the income which is not spent on X for consumption of Y . The collective choice rule is simple majority voting.

We must make the distinction between the family's consumption of housing and an individual family member's consumption of housing. If the family occupies a dwelling unit containing X units of housing services, each family member is assumed to consume $f(X)$ units of this commodity, where the function f has the following properties:

- (1) $f(X)$ is the same for each i ,
- (2) $X/3 < f(X) < X$ if $X > 0$, $f(X) = 0$ if $X = 0$,
- (3) $f'(X) > 1/3$ for $X > 0$, and
- (4) $f''(X) > 0$ for $X > 0$.

Condition (3) shows that the housing consumption of a family member responds positively to X , and that additional units of X are at least partially nonrival. Condition (4) suggests that congestion (for a fixed family size) becomes less and less severe as X increases.

What does this imply about the budget frontier of individual i ? Individual i chooses between units of Y and units of $f(X)$. The slope (in absolute value) of person i 's budget frontier for a given X is $(1/3f'(X))$. This implies that the budget frontier for each individual is convex to the origin. Since choosing the level of housing consumption for the family is equivalent to each individual choosing his or her level of housing consumption, the only real difference between this situation and that discussed in section III is that the budget frontier is not linear. But clearly an example could be constructed in which there is at least one individual who prefers the situation with public housing to that resulting from a cash grant of the same size.

V. Concluding Remarks

This paper has shown that, when a subsidized good has public good characteristics within the recipient collectivity, it is not necessarily the case that a cash grant will be preferable (from the point of view of the recipient collectivity) to an in-kind subsidy. This occurs because there may be one or more individuals within the recipient collectivity who are better off in the situation resulting with the in-kind subsidy. This result can occur in reference to any collectivity, be it a locality receiving an intergovernmental grant or a family receiving a welfare subsidy. Note that this result does not depend on the presence of externalities or interdependent utility functions. A number of examples have been constructed illustrating this possibility; clearly many more could be imagined. Although the frequency of such examples is an empirical question

which has never been addressed, it is clear that added research in this area would be appropriate. In any case, caution in invoking the traditional result would seem wise.

NOTES

1. Bradford and Oates (1971b) describe a set of conditions under which a grant to a collectivity is equivalent to a set of grants to the individual inhabitants.
2. EJ, of course, is different for different i . The i subscript has been omitted for notational simplicity.
3. Note that it is still possible that the lump sum grant is Pareto superior to public housing. The simplest example would be where all three family members have the same tastes represented by I_2 and II_2 .

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