Resource Misallocation from Goods Misvaluation: When Psychological Underpinnings of Demand "Matter"

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I. Introduction

Economists are seldom concerned with *why* consumers desire the goods that they acquire in the market. This follows from the reasonable presumption that the preferences underlying demand are irrelevant to changes in observed behavior, as long as those preferences are stable. One need not concern oneself with the "ice cube" motive for buying a refrigerator vis-a-vis the "fresh produce" motive, for their (fixed) relative importance is immaterial to the price and income demand elasticities of concern to economists. Even on the rare occasions in which economists do focus on underlying motivations (as, for example, with the asset, precautionary, and medium-of-exchange motivations for money holdings), that attention adds nothing of import to empirical analysis. It is still changed economic opportunities (e.g. income and interest rates, or better, interest rate differentials between money and other assets, in the case of money demand) that are considered.

I argue here that there exist many important classes of goods for which the underlying psychological motives matter greatly to optimal resource allocation decisions. There are two reasons why this is so, one being well-known and one being emphasized here for the first time. Section II provides a background for the case of pure public goods valuation, arguing that such goods are likely to be under-produced for a reason unrecognized in the literature. It is noted in this section that the "clashing values" that seem so important for pure public goods, are not usually seen as a contentious issue for many other goods. However, Section III reveals that the points made in Section II extend not only to a broad range of impure public goods, but also to certain types of private goods (regardless of ownership). Because non-use values are seen as systematically undervalued, resources are systematically misallocated. Section IV concludes with some thoughts on the practical relevance of the observations made.

II The Valuation of Pure Public Goods

For pure public goods, Samuelson (1954) showed that optimal provision levels would result if individual willingness-to-pay were aggregated (added vertically, in a graphical setting) to get marginal benefits to be compared to marginal provision costs. This follows from the non-rivalrous nature of public goods; any individual receiving benefits does not reduce the benefits received by others. Aggregating in this manner would, he argued, result in levels of public good provision exactly paralleling the desirable efficiency conditions typically associated with perfectly-functioning private markets.

Samuelson was aware that the application of his recommended methodology for optimal public goods provision would be very difficult in practical policy settings. True aggregate marginal willingness to pay would be difficult to infer, since each individual will have an incentive to understate preferences when asked to contribute. This is the well-known demand revelation ("free rider") problem for public goods, due to inability to exclude users, that has been addressed elsewhere (see Clarke 1971, Groves and Ledyard 1977). In most of what follows I will assume that this demand revelation problem has been solved.[1] With assumed perfect demand revelation, it has been argued for the past half-century that the Samuelson methodology would result in the efficient relative amounts of all goods, public and private.

In his 1954 discussion, Samuelson noted that inputs can be handled just like outputs, but with a minus sign preceding them. What he, and other economists since that time, failed to realize is that whenever conditions (non-excludability and non-rivalry in consumption) lead to an output market failure, there will be a concomitant input market failure. In the case of ordinary

[1]Since this problem is unlikely to be solved in practice, further weight is added to the argument in the main text that current provision levels of a broad class of goods fall differ from the socially optimal levels.

private goods one would certainly expect that there would be neither a demand revelation problem nor a supply revelation problem. That is, we must reveal our willingness-to-pay for the marginal pizza slice or beer in order to acquire it. Moreover, we also realize that for private goods, in a world without theft or philanthropy, we must give up resources–notably leisure–to acquire the goods we desire. More importantly for present purposes, however, we also realize that if we *do* give up our leisure on the margin we can in fact increase our private good consumption.

At the very heart of how economists think is the notion that we work to get the things that we want. Indeed, rational individuals will attempt to balance their goods demands with their leisure demands, so that the utility gain from goods purchased with the after-tax wage from the last hour worked exactly balances the utility value of the foregone leisure to get those goods.

Following Graves 2003a and the more formal treatment of Flores and Graves 2004, consider the leisure choices that result from desires for pure public goods. Regardless of the extent of a rational individual's desire for pure public goods, each person will recognize that any income generated to acquire such goods will be inconsequential–the public goods outcome is collectively determined. Since leisure is scarce and valuable, those caring about public goods (everybody to varying degrees) will generate too little income, in extreme cases perhaps "dropping out," like hippies of earlier generations.

Hence, using benefit-cost analysis to value pure public goods, implicitly starts out with a given income that is presumed optimal when it is, in fact, sub-optimal. As illustrated in Figure 1, there are an infinite number of apparent Samuelson optima, one for each level of leisure, but only one choice of leisure, private goods, and public goods represents the "optimum

optimorum."[2] The curve labeled MB_{True} represents the marginal willingness-to-pay if people *could* increment public goods by their individual decisions to generate income, as they can with ordinary private goods, with G_{True}* being the socially optimal provision level. The dashed $MB_{"free\ ride"}$ curve depicts a hypothetical measured demand for the public good when individuals have the long-recognized incentive to under-reveal their demands, resulting in provision level G_0. $MB_{Apparent}$ shows marginal willingness-to-pay *out of current income* that would result if the demand revelation problem were solved (perhaps with a practical variant of a Clarke or Groves and Ledyard mechanism). Aggregating the seemingly properly measured individual demands and comparing them with marginal provision cost would yield an apparent social optimum, $G_{Apparent}$* in Figure 1. However, the $MB_{Apparent}$ curve implicitly holds income constant at the levels holding at the time of the evaluation. This is not normally a problem, since the overall work-leisure decision is unlikely to be affected by demands for specific goods. But benefit-cost analysis at G_0 for a pure public good fails to incorporate the fact that rational individuals will have specifically under-supplied any labor that would have been given up to acquire the public good, since their individual labor supply decisions would negligibly alter what they get, a "supply revelation problem" akin to the well-known demand revelation problem.

The dynamic process underlying Figure 1 is a bit confusing and requires some comment. For historical reasons (e.g. regulatory lags, with for example the EPA coming into existence only as recently as 1970) direct or regulated public good provision will result in initial cautious

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[2]Individuals *will* generate the income to pay higher taxes for existing levels of public goods as well as for the higher private good prices associated with regulations (e.g. catalytic convertors on automobiles to get cleaner air). Moreover, they will generate income to buy private good substitutes for public goods (see Graves 2003c where it is argued that failure to properly provide location-fixed public goods, e.g. school quality or low crime, has led to non-optimally large levels of suburbanization).

interventions well below the true optimum optimorum.[3] Society will be approaching the optimum optimorum from the left in Figure 1, with a persistent supply revelation problem. Supposing, as in Figure 1, that the public good is continuously variable, as e.g. with CO_2 decrements, a benefit-cost analysis would, even with "perfect" demand revelation out of current income, conclude that $G_{Apparent}$* was the optimal level of the public good as discussed above. However, individuals *will* work to pay the higher taxes or prices inevitably made necessary as a result of any increment in public goods. Hence, there will be a new apparent MB curve intersecting the true MB curve at $G_{Apparent}$* (not shown in Figure 1 to minimize clutter). At the apparent optimum, a new benefit-cost analysis would, if conducted, reveal a marginal willingness to pay that exceeds marginal provision cost, and so on–if benefit-cost analysis were conducted continuously for sufficiently small increments to the public good, the (moving) true social optimum would eventually be reached. At this point the slope of the leisure-fixed apparent MB curve would only be negligibly steeper than the true MB curve (when leisure is varied optimally). In the real world, however, decisions get made and are not revisited with great frequency; moreover, the true marginal benefit curve is itself shifting out.[4] Hence, pure public goods are very likely to be under-provided employing standard benefit-cost techniques even with perfect demand revelation.

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[3]Indeed, the true marginal benefit curve, for normal or superior goods such as environmental quality, is itself shifting out over time. It is not even clear in a dynamic setting whether we are getting relatively closer or farther from a (moving) optimum optimorum over time, since fixed costs of conducting benefit-cost analysis preclude continuous evaluation of incrementally-small public good increases, as would be necessary to guarantee that.

[4]The text discussion is one way to interpret the large WTA-WTP disparities seen for public goods relative to ordinary private goods (documented by Horowitz and McConnell 2002, see Graves 2003b for a fuller discussion) as well as possibly accounting for seemingly "faulty" environmental perceptions, perceptions that certain conditions are worsening when official data would suggest that they are improving (see Graves 2003d).

Regardless of whether the levels of public goods provision are optimal or sub-optimal, however, there will be a "clashing values" problem for public goods that does not exist in the same way for private goods. That is, those who greatly desire specific private goods (e.g. hamburgers) can buy all they want at the going price, while those who value alternative goods (e.g. tofu burgers) can so choose. But, consumers of public goods are constrained to consume the collectively determined amount, an amount that, in light of costs, will be too large for some (e.g. clean air for the healthy or poor) and too small for others (e.g. clean air for the rich or sick). Since there can only be one level of a pure public good, however, the inevitability of such clashes of values has no bearing on the efficient public good provision level. As we shall see in the following section this is not the case for a wide range of private and impure public goods.

III. Implications of Non-Use Values for Proper Goods Allocation

It might be thought that the supply revelation problem discussed above might not be terribly important in practice, since pure public goods are quite uncommon. But there is a practical likelihood of widespread resource misallocation under two conditions: 1) when non-use value is a significant component of overall value, and 2) when people are heterogeneous with respect to the relative importance of use and non-use values.

The general point is most readily understood in cases of impure public goods where use is non-excludable but the good in question is rivalrous (e.g. Garrett Hardin's tragedy of the commons).[5] For this case, individual users of the resource *would* be expected to generate the income to use the resource (indeed, and not surprisingly in light of prior discussion, each might generate too much income, in the rush to use the resource before collective over-use destroys it).

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[5]For pure public goods it should be noted that the distinction between use and non-use values is immaterial–each individual gets non-rivalrous benefits in whatever form they receive them.

But, there is a subtlety for this case which depends on the nature of the underlying preferences for the resource. Use values (e.g. breathing the cleaner air, grazing the cattle, catching the fish, drilling for the oil) are much easier for economists to value, employing for example commercial prices, hedonic property value/wage differentials, or travel cost methods. Proper demand revelation is not a great problem for the use value component of common property resource demand, although contentious issues remain among valuation practitioners.

More important for present purposes, there will also not be a failure to generate income for the use value component of the value of a common-property resource. Non-use values (most importantly, preservation values), on the other hand, are not only much more difficult to value out of a given income, but such values will give rise to under-generation of income as argued in Section II. In many, if not most, cases those with important use values for resources (e.g. ANWR oil drillers, old growth timber cutters, air polluters) have values that clash with preservationists who value non-use.[6] For such clashes to be resolved so as to optimally use our common property resources, it is necessary to accurately gauge the true values of both types.

Illustrating, as one example among many, 55,000 snowmobilers have historically entered the West Yellowstone National Park entrance each the winter. This represents a large amount of use value, $5,500,000 taking each snowmobile day trip to be worth $100, with perhaps an upper bound of ten times that amount, or $55,000,000. However, the Greater Yellowstone Coalition points to a number of significant environmental issues, including noise and air pollution (winter air pollution at the West Entrance is at levels akin to a smoggy day in Denver or Atlanta) as well as disruption and danger to park wildlife. The most recent, temporary regulations will allow 720 snowmobiles per day into Yellowstone (below recent averages) and those snowmobiles must be

[6]Non-*current* use is one type of non-use value, for those having a lower discount rate (caring more about future generations) than those with high current use values.

of the newer 4-stroke engine type which is quieter and less-polluting. Such compromises might reduce the value clashes among snowmobilers, other users, and non-users. But it is important to point out that *if* the typical American household would be willing to pay $1/year–out of either current or newly-generated income–to have a Yellowstone free from snowmobilers, that would add up to *twice* any plausible upper bound to the use values received by snowmobilers.[7]

A great many resource allocation controversies surround impure public goods (cutting the old-growth forests versus preserving them, drilling for oil or gas versus preserving pristine areas, polluting the air versus cleaning it, and so on). Such controversies involve clashes among some with very high use values and many others with non-use values of varying magnitude.

But the argument here is broader, having implications for the practical significance of the Coase Theorem. For any good–public or private–and *regardless* of ownership, the valuation difficulties discussed here are relevant. Whether privately-owned or a national forest, the non-use values might swamp in magnitude the use values, leading to resource misallocation when the non-use values are mismeasured due to either demand or supply revelation problems.[8] The focus here is on the efficiency implications of the supply revelation problems for non-use values that broaden the arguments of Section II for public goods to a large class of private and impure public goods.

IV. Much Ado About Nothing? Closing Thoughts.

What is the likely significance of the failure to properly value pure and impure public

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[7]Some non-snowmobiling winter users, campers or backpackers for example, of Yellowstone would presumably add somewhat to the preservationists' demands, though their values would be easier to incorporate into a decision.

[8]Of course, on equity grounds many would feel that private owners should be compensated for the loss of their use value from those receiving the (higher) non-use values, but equity, like beauty, is in the eyes of the beholder.

goods and certain private goods, when non-use values matter? One might conclude that the overall utility loss to typical economic agents is not huge due to the problem discussed here, since most goods are private and have negligible non-use values. This conclusion will not be appealing to those who have unusually large demands for public goods and/or for preservation of common property resources and certain private goods. While the overall welfare loss might not be large because of the primacy private goods have in utility, the amount of resource misallocation for goods having important non-use components, whether pure or impure public goods or privately owned, might be quite large.

Illustrating with the case of environmental quality, Freeman (2000) has calculated that the U.S. spent at the time of his study roughly $225 billion annually on all major environmental programs instituted since 1970, say $240 billion in current dollars. A mere one-percent increase in income generated to go toward such environmental goods would amount to $120 billion at a current $12 trillion GDP. Solving a supply revelation problem of even such small hypothetical magnitude would result in a 50% increase in resources going toward environmental public goods provision.

Only if there were *perfect* private good substitutes for all public goods–and for the non-use values associated with impure public goods and certain private goods–would the correct amount of income generated and the correct flow of goods (private, public, and common property not being distinguishable) be optimal. This is highly implausible.

There are many cases of clashing values, notably use values versus non-use values for a host of impure public good and private good resources. The supply revelation problem discussed here suggests that there will be a systematic bias in public (and, indeed, private) benefit-cost analyses of policies determining how to use those resources. Not only are the non-

use values difficult to determine (hence frequently ignored in the quantitative benefit-cost assessments of economists) out of existing income, but it is only the non-use values that suffer from the supply revelation incentive problems of particular concern here.

In stated-preference studies, people routinely claim far larger values than seem plausible at their income level (but note that current income is what is elicited, when it is the income that *would be* earned to acquire the good in question that is of relevance). That is, the stated preference results *might* be at least somewhat closer to the "truth" than previously thought, with actual behavior "false" because of the supply revelation problem for the classes of goods discussed here with important non-use values.

Since real income (output) has risen dramatically over time, marginal values of the plethora of ordinary goods desired primarily for their use value will have fallen relative to marginal values of public goods and goods with important non-use value. The gap between optimal and actual provision of public goods is likely to be increasing not decreasing, despite cases of measured progress.

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Figure 1. True Versus Apparent Public Goods Optimum