

The benefit and sacrifice principles of taxation: A synthesis

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Abstract. The implications of equal sacrifice taxation have only been pursued in a very narrow context. This note applies this principle to the problem of levying taxes to provide public goods. Its purpose is to determine how taxes used to finance public goods must be structured in order to benefit each agent equally. This tax structure may be viewed as a benchmark against which to compare tax regimes with redistributive intent.

Equality of taxation, therefore, as a maxim of politics, means equality of sacrifice . . . This standard, like other standards of perfection, cannot be completely realized; but the first object in every practical discussion should be to know what perfection is.

J. S. Mill

1 Introduction

One well-known ethical principle for levying taxes is the principle of equal sacrifice. Despite its shortcomings and advanced age, it is still viewed by some as “one of the fundamental concepts of distributive justice.”¹ Thus, though equal sacrifice is no longer the dominant view of fairness, it continues to be a common theme in the public finance and social welfare literature.²

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¹ Ok (1995), p. 454. As Young (1990) observes, “Fairness is the dominant theme in almost every political debate about income tax policy.” Equal sacrifice is of course simply one formal characterization of fairness.

² Recent and notable articles in which equal sacrifice is a theme are Ok (1995), Berlaint and Gouveia (1993), Young (1990, 1988, 1987), Buchholz et al. (1988), Richter (1983).

Another principle of taxation with a long history is the benefit principle of taxation. This principle holds that the taxes which an agent pays should reflect the benefit that he receives from the mix of goods and services supplied by the state. Like equal sacrifice, this principle has found its way into the political arena, most recently, as the Thatcher government's defense of the poll tax.³

However, the ethical appeal of the benefit principle is rather obscure. If we grant that an agent's tax should be related to the benefit he receives from public goods and services, important questions remain: exactly what should this relationship be and does vertical equity obtain from benefit taxation? Thus, the benefit principle is more easily defended on efficiency grounds.⁴ On the other hand, in ignoring the benefits that agents enjoy from consuming such goods and services, equal sacrifice completely ignores the question of whether or not consumption of publicly provided goods and services is efficient, as well as the question of how these benefits affect the burden imposed by a tax. After all, if one agent benefits more than another from the expenditure of tax revenues, it would seem appropriate, even necessary, to consider that benefit in determining each agent's tax burden.

Mill justified ignoring the benefits from government expenditure with the argument that gauging this benefit requires "setting definite values on things essentially indefinite, and making them a ground of practical conclusion."⁵ Of course, modern economists are considerably more sanguine about this possibility. The public good is a standard analytical tool, with the preferences of agents for public goods determining what allocation of resources between the private and public sector is efficient, a major concern of welfare economists today.

The fact that each of these paradigms offers something that the other does not invites some sort of synthesis of the two. One such synthesis would be an equal benefits paradigm; that is, taxes and expenditures could be structured so that the benefit to each agent is the same. The purpose of this note is to contrast the tax regime resulting from adherence to equal sacrifice with that produced by following an equal benefits paradigm when the purpose of taxation

³ Smith (1991), pp. 424–25. According to Blum and Kalven, "sacrifice analysis has been the most prominent form of argument for progression both at a popular and at a sophisticated level. Although the doctrine is not as fashionable as it was a generation ago, the doctrine as a whole makes up a curious and fascinating chapter of intellectual history." For example, Edgeworth (1910) notes that "the scheme of graduated death duties, introduced by Sir William Harcourt's Budget of 1894, was rested by Mr. Courtney on the first principles of taxation . . . Mr. Courtney, in answers which he submitted to the Royal Commission on Local Taxation, maintained 'that taxation for common purposes should be levied from each member of a community according to the law of equal sacrifice.'"

⁴ The most well-known benefit principle of taxation is due to Lindahl. See Musgrave, Chapters 4 and 5 for a synopsis of classical and neo-classical taxation theory. For more recent research on the benefit principle see Burgat and Jeanrenaud (1996), Maital (1975), and Aaron and McGuire (1970).

⁵ Mill, p. 807.

is to provide agents with a pure public good. We offer this paradigm as a benchmark against which any tax intended to be redistributive can be placed. After all, if the benefit from the provision of public goods rises as income rises, it could be difficult to argue that there has been redistribution in the direction of lower income agents.

Whatever the appeal of this approach, it should be kept in mind that there is an important tradition of using taxes to redistribute income.⁶ Obviously, equal benefit taxation has no effect on the distribution of utility and in that sense, is not redistributive. Thus, equal benefit taxation serves as an important benchmark in that changing the distribution of utility will require taxes above and below those indicated by this paradigm.

2 The model

Consider a set of n agents with the same indirect, cardinal utility function, $u(y, x)$; y is the agent's income and x is the quantity of a public good that he consumes.⁷ The principle of equal sacrifice holds that taxes should impose the same burden or sacrifice on each agent, where this burden is defined as the agent's utility when he is taxed minus his utility when he is not taxed. Formally then, if taxes imply equal sacrifice,

$$u(y_i - t_i, x) - u(y_i, x) = u(y_j - t_j, x) - u(y_j, x) \quad \forall i, j \quad (1)$$

However, if taxes are used to provide agents with a public good, the i th agent's utility when he pays a tax of t_i is $u(y_i - t_i, x)$, where x is the quantity of the public good the tax regime supports. In contrast, if there are no taxes, his utility is $u(y_i, 0)$, since without taxes, the government is unable in the long run to provide the public good. From this perspective, equal sacrifice would require that taxes be imposed so that

$$u(y_i - t_i, x) - u(y_i, 0) = u(y_j - t_j, x) - u(y_j, 0) \quad \forall i, j \quad (2)$$

Now, if the government operates under the Paretian principle, the tax regime and the quantity of the public good provided must be such that at least one agent is better off than he is without taxation. So then, incorporation of the benefits from government expenditures and superimposition of the Paretian principle transform the principle of equal sacrifice into the principle of equal benefit. Thus, the key elements of the benefit and sacrifice principles are brought together by the paradigm whose formal statement is Equation (2). The benefit from government expenditures and equity in distributing those benefits both play a role in determining how taxes will be levied. It is a fairly

⁶ See for example, Mirrlees (1971).

⁷ The prices of private goods are suppressed and thus assumed to be constant. Note that a Von Neumann-Morgenstern utility function would allow for the comparisons necessary to apply our paradigm.

straightforward exercise to show that efficiency obtains when the quantity of the public good supplied is that which maximizes this benefit.

3 Implications of the equal benefits paradigm

When taxes are used to provide public goods, all that can be said about the tax regime that equalizes the burden of taxation is 1) with a diminishing marginal utility of income, an agent's tax must increase as his income increases; 2) the tax must be progressive if the elasticity of the marginal utility of income is greater than one in absolute value, regressive if this elasticity is less than one, and proportional to income when it is unity. We now wish to contrast equal sacrifice taxation with equal benefit taxation.

First, it is important to realize that the benefit from the government's tax and spend decision may rise or fall as income rises under equal sacrifice taxation. And whether this benefit rises or falls is entirely dependent upon the effect of the public good on the marginal utility of income. Let u_1 and u_2 denote the marginal utility of income and the marginal utility of the public good respectively, with u_{ij} denoting the second order partials of the agent's utility function. Then

Proposition 1: *Let $e(y)$ denote the equal sacrifice tax when x units of the public good are provided. Then $u(y - e(y), x) - u(y, 0)$ is an increasing function of income if $u_{12} > 0$. If $u_{12} < 0$, this benefit decreases as income rises. If $u_{12} = 0$, this benefit is the same for all agents.*

Proof: Since $u(y - e(y), x) - u(y, x)$ is constant as y changes,

$$\begin{aligned} 0 &= u_1(y - e(y), x)(1 - \partial e / \partial y) - u_1(y, x) \\ &< u_1(y - e(y), x)(1 - \partial e / \partial y) - u_1(y, 0) \end{aligned}$$

if $u_{12} > 0$, etc. Thus, to have equal benefits when $u_{12} > 0$, it is necessary to tax some agents more than they would be taxed under equal sacrifice and to tax some agents less, with those being taxed less having lower incomes than those being taxed more Q.E.D.

As for the need for progressive taxation, the magnitude of the elasticity of the marginal utility of income is not the deciding factor under the principle of equal benefits. The effect of consumption of the public good on the marginal utility of income also must also considered. What we discover is

Proposition 2: *If the elasticity of the marginal utility of income (EMU) is less than or equal to one and $u_{12} < 0$, equal benefit taxation must be regressive. On the other hand, if EMU is greater than or equal to one and $u_{12} > 0$, equal benefit taxation must be progressive.*

Proof: To prove this claim, we simply need to sign the change in an agent's utility increment (his benefit) as his income changes keeping his tax rate con-

stant. With a constant tax rate, the change in benefit would be

$$u_1(y - ty, x)(1 - t) - u_1(y, 0) \quad (3)$$

But

$$\begin{aligned} & (1 - t)u_1(y - ty, x) \\ &= u_1(y, x) + \int_{[0, t]} -u_1(y - \tau y, x) - (1 - \tau)y u_{11}(y - \tau y, x) d\tau \end{aligned}$$

If EMU is greater than or equal to 1 then, the second term in the right hand side of this equality is non-negative. Therefore, if $u_{12} > 0$, $u_1(y, x) > u_1(y, 0)$ and so (3) must be positive. Of course, if EMU is less than or equal to one, this integral is non-positive, etc. Q.E.D.

However more difficult this result may make arguing for or against progressive taxation, there is at least one case where the principle of equal benefits is unequivocal. As was noted, equal sacrifice requires a positive relationship between the agent's tax and his income. Quite interestingly, a tax regime that equalizes benefits may instead require that an agent's actual tax falls as his income rises. More precisely, when there is diminishing marginal utility of income the following is true:

Proposition 3: *If a pure public good is not a normal good, the equal benefit principle requires the agent's tax to decrease as his income increases.*

Proof: To keep his utility increment constant, the agent's tax must be such that

$$\partial t / \partial y = 1 - (u_1(y, 0) / u_1(y - t, x)). \quad (4)$$

Clearly, the effect of the public good on the marginal utility of income is crucial to *both* the magnitude and the sign of $\partial t / \partial y$. Though the marginal utility of income may be a decreasing function of income, it is still possible that $u_1(y, 0) > u_1(y - t, x)$; if the public good and income are close enough substitutes – in the utilitarian sense – this inequality would hold. This turns out to be exactly the case when the public good is not normal.

To establish this, note that if the public good is not normal, it must be that

$$\partial(u_2/u_1) / \partial y = (u_{21}/u_1 - u_2 u_{11}/u_1^2) \leq 0.$$

Let w denote the agent's willingness to pay for x . Thus, $u(y - w, x) = u(y, 0)$ and $y - w < y - t$ since each agent benefits from being taxed and consuming x units of the public good. Since

$$\partial u_1 / \partial x_{u \text{ const}} = -u_{11}(u_2/u_1) + u_{21} \leq 0$$

it follows that $u_1(y, 0) \geq u_1(y - w, x) > u_1(y - t, x)$ by a diminishing marginal utility of income. As a consequence, 4) must be negative Q.E.D.

4 Discussion

The principle of equal sacrifice has been a fixture in the taxation literature for well over 150 years. However, the implications of this principle have only been pursued within a very narrow context. The preceding analysis shows that when the benefits from taxation are explicitly accounted for, the effect of income on its marginal utility is no longer the only magnitude which must be determined to establish if an income tax must be progressive or regressive to equalize the “burden” of the tax. In fact, our analysis shows that there are situations where even very regressive taxes (per capita) can be justified on equity grounds.

This is certainly the most notable conclusion that this note leads us to. Of course if it happens that non-normal public goods are rarities, this result would have little more than epistemological value. Given the difficulties inherent in determining the demand for non-market goods, it may be hard to say how relevant this finding is. But there have been a number of empirical studies of the demand for non-market goods and a review of some of these suggests that non-normal public goods are very much the exception.

For example, the study by Murdock, Rahmatian, and Thayer (1993) found that income has a significant, negative effect on the demand for local recreation expenditures. They conclude “the median voter considers recreation supplied by local governments as inferior goods. This is reasonable because numerous opportunities to replace public recreation with private facilities become available with increasing income”.⁸ And an empirical study of the demand for income-redistribution benefits by Husted (1990) also observed significant, negative income effects.⁹

On the other hand, Borcharding and Deacon (1972) estimated the demand for eight publicly provided goods, and though in eight of their 24 demand equations, income was not significant, there was not a single case where income had a negative effect on demand.¹⁰ Likewise, Bergstrom and Goodman (1973) failed to uncover evidence of inferiority in their study of the demand for public goods. They estimated 30 demand equations for general expenditures of municipalities, expenditures on police, and expenditures on parks and recreation. Though in 11 of these equations, income was not significant, it had a positive coefficient in the other 19 demand equations. The studies by Gramlich and Rubinfeld (1982) Taylor (1992), Todo-Rovira (1991), and Chicoine et al. (1989) produced similar results. It was sometimes observed that income had no effect on the demand for public goods but more typically, there was a positive effect.

⁸ Murdoch et al., p. 347.

⁹ Some types of social insurance may very well be inferior. Unemployment insurance in the United States immediately comes to mind. A survey by Eva Mueller (1963) found that support for unemployment insurance fell sharply as income increased.

¹⁰ These goods are: local education, higher education, highways, health-hospitals, police, fire, sewers-sanitation, and parks-recreation.

Certainly these empirical findings cannot be construed to mean that non-normal public goods are a common occurrence since the statistical insignificance of a coefficient does not allow us to reject normality.¹¹ In short, it does appear that non-normal public goods are a fairly rare commodity. In view of this, it would seem then that the assumption of a positive relationship between a public good and the marginal utility of income ($u_{12} > 0$) is the most reasonable a priori position. If so, our analysis implies that, according to the equal benefit principle, taxes which would equalize the burden of taxation are unfair to lower income agents. Therefore, if equal benefit is our measure, fairness in taxation requires more progressivity than is indicated by the principle of equal sacrifice.

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¹¹ Note that even the negative relationships observed by Husted could be spurious. In short, it is very difficult using voter models to determine the effect of income on the demand for non-market goods.

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