



On the efficiency of equal sacrifice income tax schedules[☆]



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ARTICLE INFO

Article history:

Received 2 July 2013

Accepted 10 June 2014

Available online 30 June 2014

JEL classification:

H21

D63

Keywords:

Efficiency

Equal sacrifice

ABSTRACT

In an economy which primitives are exactly those in [Mirrlees \(1971\)](#), we investigate the efficiency of tax schedules derived under the equal sacrifice principle. For a given exogenous government consumption level we assess whether there is an alternative tax schedule that raises more revenue while delivering less utility to no one. For our preferred parametrizations, we find that inefficiency only arises at the top of the income distribution for marginal tax rates well above the ones we currently observe in most countries. We also recover the implicit marginal social weights associated with the equal sacrifice schedule and find them not to be monotonic in types for the environments we study.

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0. Introduction

[Mirrlees \(1971\)](#) has defined the standard for normative income tax analysis: the maximization of a social welfare functional subject to incentive and resource constraints. Despite its indisputable methodological advantages, the consensus regarding this procedure has obscured the fact that Welfarism need not reflect a society's actual view of what a just tax system is. Alternative non-welfarist views of distributive justice may capture more accurately the ideas that underlie not only the political debate but also the actual policy making.

In this paper, we study a non-welfarist approach which has played a central role in the policy debate for most of the 19th and the early 20th century: equal sacrifice. This principle, aptly described in the words of John Stuart Mill: "...whatever sacrifices the government requires should be made to bear as nearly as possible with the same pressure upon all" — see [Mill \(1844\)](#), appears to still be playing an important role in public debate as well as actual policy making.¹ Not only does the equal sacrifice principle appeal to people's perception of fairness but also income taxes derived from it possess very sensible properties that may explain its presence in public debate.²

[☆] This paper has been circulated under the title "Sacrifice and Efficiency of the Income Tax Schedule." *First Version: July, 2010.*

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¹ [Young \(1990\)](#) has shown that most tax schedules that prevailed in the US for the period 1957–1987 may be rationalized by direct applications of the equal sacrifice principle while survey evidence gathered by [Weinzierl \(2012b\)](#) suggests that public opinion does not strictly adhere to the welfarist approach that dominates the normative tax literature. In fact, three-fifths of survey respondents in [Weinzierl's \(2012b\)](#) work prefer the use of the equal sacrifice principle to a Utilitarian metric to guide policy.

² [Young \(1988\)](#) has shown that any method of apportioning taxes such that (i) the way that taxpayers split a given tax total depends only on their own taxable incomes; (ii) an increase in the tax total leads everyone to pay more; (iii) every incremental increase in tax is apportioned according to taxpayers' current after-tax incomes, and; (iv) the ordering of taxpayers by pre-tax income and after-tax income is the same as that of an equal sacrifice schedule for some utility function.

Opposing these appealing features of equal sacrifice there are two potential drawbacks of applying this principle. First, the equal sacrifice principle need not lead to Pareto efficient schedules. Second it does not allow for purely redistributive taxation. In this paper, we address both issues by (i) asking whether equal sacrifice leads to inefficient schedules under 'real world' circumstances, and; (ii) verifying if these schedules are redistributive in the sense of being locally rationalized by a concave social welfare function.³

Efficiency may not be addressed using the framework of the early equal sacrifice literature, since it does not explicitly model behavioral responses to taxation. We shall, then, derive equal sacrifice schedules in a [Mirrlees' \(1971\)](#) environment, i.e., an economy inhabited by a continuum of individuals with identical preferences defined over consumption and labor, who only differ with respect to their labor market productivity, w , which is private information. The efficiency question boils down, in this case, to whether welfare losses due to the informational structure of the problem are minimal when taxes are based on the equal sacrifice principle.

Let $T(\cdot)$ be an income tax schedule derived under the equal sacrifice principle. Associated with this schedule is an equilibrium utility profile $v(\cdot)$, where $v(w)$ is the utility attained by an individual with productivity w . We ask whether there is an alternative tax schedule that generates at least as much revenue and which induces a utility profile $v^*(\cdot)$ such that $v^*(w) \geq v(w)$, $\forall w$, with strict inequality for a subset of positive measure of individuals.

The first step toward our goal is to derive the minimum equal sacrifice allocation, i.e., an incentive compatible allocation which generates excess resources that are sufficient to finance the government consumption needs while imposing an identical utility loss on all individuals. We use a truthful direct mechanism to find the incentive compatible equal sacrifice allocation. This is the same approach used by [Berliant and Gouveia \(1993\)](#), which, to the best of our knowledge, was the first work to explicitly take into account labor supply responses in an equal sacrifice based tax problem.⁴ From the allocation we recover the equal sacrifice schedule, $T(\cdot)$, using the taxation principle. Finally, we check whether this schedule satisfies an efficiency condition which we derive using [Werning's \(2007\)](#) approach.

Throughout the paper, we adopt a separable specification for preferences. Separability is necessary for us to apply [Werning's \(2007\)](#) methodology for assessing efficiency. If not only preferences but also their specific utility representation is separable, labor supply is shown to be independent of the level of sacrifice. It is only through reduced consumption, i.e., through total taxes paid, that sacrifice is imposed on agents. The invariance of taxable income with respect to the level of sacrifice, therefore, rationalizes the abstraction from labor supply responses in the early literature thus justifying our discussion of [Young's \(1990\)](#) findings.

For commonly used parametric distributions of skills, regions of inefficiencies for the equal sacrifice schedule are intervals of the form $[y_a, \infty)$, with y_a representing the lowest level of income for which the marginal tax rate is 'too high'. y_a is usually large and associated with very high marginal tax rates. In fact, only a very small share of the population has income in the region of inefficiency.

As for the other typical criticism of equal sacrifice, namely, that pure redistributive taxation is not allowed, we recall that, despite the fact that under equal sacrifice either everyone pays positive taxes or no-one does, there is a sense in which redistribution may still be taking place. For large enough Government expenditures, an efficient tax system may prescribe positive taxes for the worse off individuals even if the associated social welfare function is concave. We ask whether this is the case for the equal sacrifice schedule.

To answer this question, we devise a procedure to extract the marginal social welfare weights – see [Diamond and Mirrlees \(1971a, 1971b\)](#), [Saez and Stantcheva \(2013\)](#) – associated with the equilibrium allocations. We first relate these weights to the Lagrange multipliers of the Pareto problem from which [Werning's \(2007\)](#) efficiency bounds are derived. Then, we show how to express them as a function of observed variables only.⁵ Once we extract the marginal weights, we ask whether they are decreasing in agents' types, i.e., if the social welfare function that rationalizes the tax system is concave. We find this not to be the case: the very poor receive too little weight under the equal sacrifice principle. Although these weights do increase as Government consumption increases, we get an inverted u-shaped pattern of weights in all our exercises.

Finally, we consider non-separable representations for the separable preferences. Non-separability means that society perceives the sacrifice imposed by reduced consumption as being dependent on the level of effort one is making. Invariance of labor supply is lost, but the efficiency tests remain valid and we are still able to characterize the marginal social welfare weights associated to the equal sacrifice schedule. Being able to handle non-separability is also important if one wants to disentangle the role of preferences from that of the society's perception of sacrifice in both the derivation of an equal sacrifice schedule and in the assessment of its efficiency.

We explore two different parametrizations of preferences; one associated with positive and other with negative cross-sectional elasticities of taxable income. By varying the utility representations associated with each parametrization of preferences, we are able to generate a rich variation in the shape of equal sacrifice schedules as well as in the pattern

³ From [Kaplow and Shavell \(2001\)](#) we know that any non-welfarist criterion will eventually lead to violations of the Pareto principle. Our question is whether this is the case for empirically relevant circumstances.

⁴ Although [Berliant and Gouveia \(1993\)](#) raise the issue of efficiency, they do not address it formally. Indeed, while declaring that "One of the aspects of the model we still need to clarify are its welfare properties" and suggesting that inefficiency should result since, "The condition of a zero marginal tax rate at the top ability level, emphasized in [Sadka \(1976\)](#) and [Seade \(1977\)](#), is not generally satisfied", they never produce a systematic discussion of the issue.

⁵ This procedure connects [Werning's \(2007\)](#) efficiency bounds and [Bourguignon and Spadaro's \(2012\)](#) revealed social preferences methodologies for assessing efficiency.

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