eJournal of Ters Eo

nomy: A lV abe Dc ision-

Mak ng Procedure

eJournal of Tax Research (2005) vol. 3, no. 2, pp. 151-169

Commodity Tax Reforms In A Many Consumers Economy: A Viable Decision-Making Procedure

Total tax revenue is used to purchase the public good *r*. In order to analyze the welfare effect of a reform which (for example) increases the tax rate on good 1 and recycles the additional revenue by reducing the rate on the arbitrary good *n*, we differentiate the social welfare function:

$$U = U\ \ V_A\left(\mathbf{q}(\mathbf{t}), y_A, r\right),\ V_B\left(\mathbf{q}(\mathbf{t}), y_B, r\right) \tag{5},$$

where *V* is the indirect utility function. Using Roy's identity, we obtain:

$$dU^{(1,n)} = -\left(\left(\gamma_A \cdot x_A^1 + \gamma_B \cdot x_B^1\right) \cdot dt^1 + \left(\gamma_A \cdot x_A^n + \gamma_B \cdot x_B^n\right) \cdot dt^n\right) \tag{6},$$

where $\gamma_j = \frac{\partial U}{\partial V_j} \cdot \frac{\partial V_j}{\partial y_j}$ represents the social evaluation of the marginal utility of individual *j*'s income (j=A, B), which corresponds to the weight in the social utility function (we will later assume that the policy maker does not assign higher priority to individual B's utility, so that $\gamma_A \geq \gamma_B$). By definition of the reform, $dt^1>0$ and $dt^n<0$.

By differentiating the government budget constraint, we derive the relation between tax rate variations implied by the condition of revenue-neutrality[10]. We obtain:

1 _____

1 1

increases. This is the set of reforms which improve both efficiency and distribution. However, it is now possible that social welfare increases also if efficiency decreases ($\alpha>1$), as far as the ratio between the two revenue potentialities is smaller than the ratio between the distributional characteristics. In these cases, efficiency decreases but distribution improves, and the latter effect is big enough to offset the former.

Condition 9 provides a policys ,3.889.

If $\gamma_A \geq \gamma_B$, this is a sufficient condition for:

$$\gamma_A \cdot \left(\frac{x_A^n}{x^n} - \alpha \frac{x_A^1}{x^1} \right) + \gamma_B \cdot \left(\frac{x_B^n}{x^n} - \alpha \frac{x_B^1}{x^1} \right) > 0$$

(13),

which ensures an increase in social welfare.

In this case, t^1 dominates t^n. The same result cannot be reached if the reform increases tax distortions ($\alpha > 1$). In this case, in fact, $\frac{x_A^n + x_B^n}{x^n} - \alpha \frac{x_A^1 + x_B^1}{x^1} = 1 - \alpha < 0$, so that at least in the case in which all social weights are equal to each other ($\gamma_A = \gamma_B$), the sign of 10 is negative (Yitzhaki and Thirsk, 1990).

It follows that social welfare increases for every social utility function with a non-negative degree of aversion towards inequality if the reform shifts the burden of taxation towards taxes which levy revenue more easily and if the ratio between the two revenue potentialities is lower than the ratio between the shares of consumption, i.e. if the following conditions hold:

$$\text{(a)} \quad \alpha < 1; \qquad \text{(b)} \quad \alpha < \frac{\frac{x_A^n}{x^n}}{\frac{x_A^1}{x^1}}$$

(14).

Condition 14 is evidently more restrictive than 9. In this case, the possibility that a decrease in efficiency is compensated by an improvement in distribution is not allowed. When (almost) no structure is imposed on the social welfare function, it is necessary at least that efficiency does not decrease (first part of 14). However, if efficiency increases, it is not necessary that the tax burden is shifted towards taxes that are consumed mainly by poor individuals. In some measure, the second part of condition 14 allows that the share of consumption by the poor of the good whose tax increases is bigger than the share of consumption by the poor of the good whose tax decreases, as far as the ratio between the two shares is bigger than the ratio between the revenue potentialities.

The above suggestions can be integrated in order to define a procedure that can be followed by the policy maker who wishes to evaluate the efficiency and distributional effects of a revenue-neutral tax reform. The policy maker can hence proceed as follows:

1. estimating the revenue potentiality of the taxes whose rate is affected (and calculate the parameter α): this is sufficient in order to evaluate the efficiency effects of the reform (efficiency improves if $\alpha < 1$);
2. comparing the modified concentration curves of consumption of the two goods: this may identify cases of welfare dominance, in which the reform increases social welfare for any social utility function which reflects a non-negative degree of aversion to inequality – a very general (and safe) conclusion; in our case this boils down to (knowing the poor people's share of consumption of each good and) verifying that 14 holds;
3. if there is no opportunity of welfare dominance, identifying the social weights which are consistent with an increase in social welfare, given the revenue potentialities. In fact, equation 8 can be worked out in order to

poorer and richer families. The share of consumption by poor households ranges from a minimum of 21 percent for "Chemicals and pharmaceutical" products and "Other services" to a maximum of 42 percent for processed and unprocessed food items.

Table 1, eventually, reports the revenue potentiality of each single consumption tax, estimated through simulations of marginal tax rate changes in a numerical model of the Italian economy[15]. Additional revenue can be obtained with the lowest cost in terms of efficiency (we could say most easily) by increasing the tax rate on the consumption of unprocessed food items (RRP=0.009237) and electrical equipment (RRP=0.009215). At the other extreme, the taxation of energy consumption is most distortionary and new revenue can be risen from it only at high efficiency costs (RRP=0.007192) – though this statement considers consumption distortions only and does not account for environmental externalities.

A policy maker interested in modifying a couple of tax rates within a revenue neutral tax reform and who cares for both efficiency and equity can start by verifying if conditions 14 hold. In this case, social welfare would increase for every social utility function consistent with a non-negative degree of aversion to inequality. It would not be necessary to quantify the preference for poor people's welfare with respect to rich people's, i.e. to set γ_A and γ_B, but only to accept that the former is not less important than the latter, i.e. that $\gamma_A \geq \gamma_B$. Table 2 shows the results of all possible tax reform. Rows refer to the goods whose tax rate increase, columns to the ones whose tax decrease. Cells background is shaded when the first of the two conditions holds, i.e. when the reform increases efficiency (the revenue potentiality of the tax which grows is higher than the revenue potentiality of the one which decreases, hence $\Omega < 1$). In a subset of cases, the reform is desirable on both efficiency and

characterized by the lowest revenue potentiality, because energy consumption is associated with the production of major negative environmental

the policy maker can determine the minimum value of γ_A necessary in order to make the reform convenient, according to equation 15. In this specific case, any value above 1.053 guarantees that condition 8 holds – indeed a very reasonable degree of preference for poor.

CONCLUSIONS AND POLICY RECOMMENDATIONS

This paper deals with revenue-neutral marginal commodity tax reforms in economies with heterogeneous individuals. In a simple model with two classes of consumers, we originally develop a decision rule based on revenue potentialities. The relationship with the streams of research dealing with specific weights in the social welfare function (Ahmad and Stern (1984)) and looking for cases of welfare dominance ((Yitzhaki and Thirsk (1990); Mayshar and Yitzhaki (1991)) is analyzed.

The use of a simple two consumers model makes the relationship between efficiency and distributional considerations particularly explicit. The former can be studied in terms of ability of different taxes to collect new revenue, an indicator of distortion which does not depend on assumptions about utility functions. The latter is related to shares of expenditure by poor and rich for the different goods involved in the reform.

The analysis allows defining a procedure that the policy maker can follow in order to identify welfare increasing opportunities, starting from the lowest amount of hypothesis, structure and information. When the most desirable opportunities are not available, the policy maker can identify welfare improving commodity tax reforms only by imposing more structure. Operationally, the first step is to study the effects of the reform in terms of efficiency, i.e. to measure the revenue potentiality of different taxes. These indicators can be used together with information on distribution of consumption in order to determine if the reform in which the policy maker is interested increases welfare according to any social welfare function characterized by a non-negative degree of aversion towards inequality. If this does not happen, the policy maker can calculate the minimum degree of preference for the worse-off group (with respect to the better-off) necessary to make the reform socially desirable – and check if this assumes a sensible value, upon which society can agree.

Table 2 - Tax reforms which increase welfare according to any SWF with a non-negative degree of aversion to inequality. Shaded background indicates cases in which efficiency would increase. Value 1 indicates that SW would increase according to any SWF with a non-negative degree of aversion to inequality (a subset of shaded cells).

	Sector whose tax rate descreases (n)															
	1	2	5	9	10	11	12	13	14	15	17	19	21	22	25	29
1	0	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	**1**	0	0												
9	0	**1**	**1**	0												

ranked so that the social weights (γ_h) are non-increasing in *h*, this is a sufficient condition for the following expression to hold:

$$\sum_{h=1}^{H} \gamma_h \cdot \left(\frac{x_h^n}{x^n} - \alpha \frac{x_h^1}{x^1} \right) > 0$$

Slemrod, J. and S. Yitzhaki (1996), "The Social Cost of Taxation and the Marginal Cost of Funds", *International Monetary Fund Staff Papers*, 43, 1, (March).

Yitzhaki, S. (2003), "Cost-Benefit Analysis and The Distributional Consequences of Government Projects", *National Tax Journal*, Vol. LVI, No. 2 (June): 319-336.

Yitzhaki, S. and W. Thirsk (1990), "Welfare Dominance and the Design of Excise Taxation in the Côte D'Ivoire", *Journal of Development Economics*, 33: 1-18.