

# **OPTIMUM COMMODITY TAXATION WHEN EMPLOYMENT MATTERS**

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Keywords: public policy, employment effects of taxation, commodity taxation, Ramsey rule, employment objective, labour- intensity

JEL Codes: H2, E6, J6

## Abstract

Ramsey's inelasticity rule for optimum commodity taxation has been criticized for indicating tax rates for basic necessities which have lower elasticities of demand than luxury consumption items. However, it is noted that skilful marketing techniques tend to lower the demand elasticities of luxury items so that it is not evident that the Ramsey rule is inequitable. In this paper equity concerns from a macroeconomic viewpoint are introduced, modifying the Ramsey rule approach by including total employment in the decision-maker's utility function. Then it is seen that the relative tax rate of the product which is more labour-intensive in production is lower than under the original Ramsey rule. The weight given by the government to an additional unit of employment relative to additional tax revenue now enters the tax rule specification. It is also observed that when the employment objective is included, the relative tax rates of products such as furniture that are labour-intensive in production will be lower than under the pure Ramsey inelasticity rule.

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## I. Introduction

The theory of optimum taxation traces its beginning to the article by Frank Ramsey almost a hundred years ago. (Ramsey, 1927). Since then there have been a number of extensive additions and modifications, including the explicit formulation of general equilibrium considerations, but the fundamental thrust of the optimization process for raising government revenues by taxation has remained intact. As Stiglitz (2015) has remarked, Ramsey's (1927) paper, complemented by the work of Diamond and Mirrlees (1971) and Mirrlees (1971) shaped the modern field of Public Finance.

In this paper we bring a key macroeconomic variable, total employment, into the picture. A relatively high tax rate on a commodity may augur well for high tax revenue, but what if that commodity is produced by relatively labor-intensive techniques? Such a dilemma was seen in the recent comprehensive tax reforms in India, under the so-called GST initiative: to give an example, a relatively high tax rate on the labor-intensive furniture sector had a negative impact on employment in states such as Kerala. This story would also have implications elsewhere, even thousands of kilometres away, for instance for the city of Grand Rapids, Michigan, fondly called the 'furniture capital of the world'.

Thus, what is novel in this paper is that there is a feedback from macroeconomic objectives to microeconomic decision-making. Almost invariably, otherwise, the causal link runs from microeconomic foundations to macroeconomic decisions and policy-making.

We would like to emphasize that the aim of this presentation is not to trace the developments in optimum taxation theory that has followed in the wake of the seminal Ramsey paper; there is a rich literature that has already done that. Instead, we concentrate on opening a window to a new, lush field of enquiry that becomes visible when macroeconomic objectives are fed into government policies at individual, microeconomic agent levels. In addition, this paper is also to some extent a defence of the original Ramsey contribution from criticisms of not being equity-oriented, as it is shown that equity in a macroeconomic sense can be incorporated within that framework.

The next section provides the background and rationale of the study. The following section derives a new model of optimum commodity taxation, starting with Ramsey's original (1927) model and bringing in total employment into the decision-making process. There is a brief empirical discussion in the concluding section.

## **II. Background of study:**

Ramsey's Inverse Elasticity Rule states that the relative tax rates on two goods should be inversely proportional to their tax elasticity of demand. This rule has been criticized on equity grounds, since the application of the rule might lead to heavier taxation of necessities for which demand is price-inelastic. In this sense, the rule will be furthering inequality within the country's population.

But criticism of the Ramsey rule founded on a relatively low demand elasticity with respect to price – and tax – for necessities can be countered. It is well-known that demand elasticity differs between the short and the long-run. Indeed, the J curve effect on the trade balance of a devaluation is due to the fact that short-run demand elasticity is lower than the long-run elasticity - so that the Marshall-Lerner condition is likely to hold only in the longer-run.

However, when marketing strategies are brought into the picture, the contrary may apply: the long-run demand elasticity of a luxury good or a high-tech item may be lower than the short-run demand elasticity because skilful marketing strategies build up brand loyalty over time. (see Bucklin, et.al, 1998; Denoue & Saykiewicz, 2009). This will enable firms to decrease the demand elasticity for their products and increase company revenues. Thus, it is not self-evident that the demand elasticity for necessities will be necessarily lower than that for luxury goods, so that the main criticism against applying the Ramsey rule is not iron-clad, can be questioned.

To address this issue, Diamond (1975) and Mirrlees (1975) consider more than one consumer and modify the problem by considering a poll tax along with commodity excise taxes and find

that an individual with greater social marginal utility of income pays less excise taxes, so that the inequity problem is addressed.

In the present paper, equity may be considered to be addressed in a macroeconomic sense, as the provision of employment is made a concern. As in the derivation of the Ramsey Rule, the assumption of no cross-price interdependence is maintained. And, with no general equilibrium endogenous price-determination, the demand elasticity with respect to the commodity tax will be the same as that with respect to price.

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Some work has been done on altering the Ramsey rule for optimum taxes by introducing factors which also belong to the microeconomic scenario. Thus, Lim & Rodriguez-Zamora (2010), introducing substitution between goods and time in home production, show that it is optimal to impose higher taxes on market goods used with a lower elasticity of substitution between goods and time. Our model brings in factors from the macroeconomic scenario that can influence the optimality condition of the Ramsey rule.

### **III. The Model:**

The Ramsey results for optimum commodity taxation are derived in a two-commodity, single consumer framework, and may be briefly presented in a simple fashion as follows:

The objective is to choose tax rates  $t_1$  and  $t_2$  so as to maximize tax revenue given as

$$T = x_1 t_1 + x_2 t_2 \dots\dots\dots(1).$$

$x_1$  and  $x_2$  are outputs satisfying total demand in the two sectors.

The maximization process gives

$$(\partial x_1 / \partial t_1) t_1 = 0 \dots\dots\dots(2)$$

&

$$(\partial x_2 / \partial t_2) t_2 = 0 \dots\dots\dots(3)$$

so that

$$t_2 / t_1 = (\partial x_1 / \partial t_1) / (\partial x_2 / \partial t_2) \dots\dots\dots(4)$$

(4), which is the Ramsey inverse elasticity rule result in partial differential form, states that the commodity tax rates are to be set in inverse relation to the tax elasticity of demand in the respective sectors. Thus,  $t_2/t_1$  will be higher when the tax elasticity of demand in sector 1 is relatively high compared to that in sector 2.

#### **IV. The Model with Employment as an Objective.**

Now we proceed to incorporate total employment as an objective - in addition to tax revenue- in the model. We specify the following utility function for the decision-maker, the government:

Maximize.  $U(T, L)$  .....(5)

where  $T$  is given by (1), and total employment 'L' is given as

$$L = L_1 + L_2 \text{ .....(6),}$$

$L_1$  and  $L_2$  being employment in the two sectors.

Now, it is assumed that employment is demand-determined, as is output. In this sense, it is a Keynesian model, and is consistent with the horizontal supply curve assumption implicit when deriving the Ramsey rule.

Utility maximization with respect to  $t_1$  yields

$$(\partial u / \partial T) \cdot (\partial x_1 / \partial t_1) \cdot t_1 + (\partial u / \partial L_1) \cdot (dL_1 / dx_1) \cdot (\partial x_1 / \partial t_1) \cdot t_1 = 0 \text{ .....(7)}$$

Simplifying,

$$t_1 \cdot (\partial x_1 / \partial t_1) \cdot [ (\partial u / \partial T) + \alpha_1 \cdot (\partial u / \partial L_1) ] = 0 \text{ .....(8)}$$

where

$\alpha_1 = (dL_1 / dx_1)$  is termed the labour-intensity of production in sector 1.

Similarly, utility maximization with respect to  $t_2$  yields

$$t_2 \cdot (dx_2 / dt_2) \cdot [ (\partial u / \partial T) + \alpha_2 \cdot (\partial u / \partial L_2) ] = 0 \text{ .....(9)}$$

where

$\alpha_2 = (dL_2 / dx_2)$  is the labour-intensity of production in sector 2.

From (8) and (9),

$$(t_2 / t_1) = \frac{(\partial x_1 / \partial t_1) [ (\partial u / \partial T) + \alpha_1 \cdot (\partial u / \partial L_1) ]}{(\partial x_2 / \partial t_2) [ (\partial u / \partial T) + \alpha_2 \cdot (\partial u / \partial L_2) ]} \dots\dots\dots(10)$$

It may be seen that the terms within the square brackets in the numerator as well as the denominator of (10) are now supplementing the Ramsey formulation in (4). The determinants of tax policy are now more complex:

- (i) A relatively low tax elasticity of demand for a good will invite a relatively high tax on that good.
- (ii) A relatively high labour-intensity of production in a sector will tend to lower the tax on that good. Thus, a higher  $\alpha_2$  will tend to reduce  $t_2$ .

(10) can be simplified further. It is reasonable to assume that the marginal utilities of employment from the two sectors do not differ.

Thus,  $\partial u / \partial L_1 = \partial u / \partial L_2 = \partial u / \partial L$

Now, denote  $\phi = (\partial u / \partial L) / (\partial u / \partial T)$ .

' $\varphi$ ' reveals how much the government values employment creation relative to tax revenue generation.

(10) may be then rewritten as

$$t_2 / t_1 = \frac{(\partial x_1 / \partial t_1) \cdot [ 1 + (\varphi / t_1) \cdot \alpha_1 ]}{(\partial x_2 / \partial t_2) \cdot [ 1 + (\varphi / t_2) \cdot \alpha_2 ]} \dots\dots\dots(11)$$

(11) saves us the trouble of assuming values for the marginal utilities appearing in (10). All that is now required to estimate the relative commodity tax rates is to have an idea of how much the government values additional employment generation relative to additional tax revenue accrual.

## IV. Concluding Remarks: Impact on Existing Tax Structure

The India GST rates are 12.5 percent for furniture and 18 percent for capital goods. Labour intensities in these sectors have been noted to be 0.31 and 0.2 respectively (Das & Kalita, 2009; Jinjara & Naknoi, 2011).

Now, consider a simplified world with only these goods, and the relative tax rates as according to the Ramsey rule. Incorporating employment concerns, but keeping ' $\phi$ ' = 1, the relative tax rates can be derived to be, using (10), putting  $\alpha_1 = 0.31$ ,  $\alpha_2 = 0.2$ ,  $t_1 = 0.125$  and  $t_2 = .18$ , as equal to 2.22.

Hence, if  $t_2$ , the tax on capital goods is to stay at 18%, then  $t_1$  has to be reduced to 5.63; i.e., the tax rate on labour – intensive furniture should be 5.63%, not the current GST rate of 12.5%.

To consider another example, note that the manufacture of sports goods is quite labour intensive, at a labour-intensity of 0.6 (Das & kalita, 2009). It has a GST rate of 18%. In a simplified world with only sports goods and capital goods, the relative tax rate can be derived to be, using (10) as (putting  $t_1$  &  $t_2$  equal to .18 initially,  $\alpha_1 = 0.6$ ,  $\alpha_2 = 0.2$ ) as 3.90.

In other words, if the tax on capital goods is 18%, the tax ( $t_1$ ) on the labour-intensive sports goods sector should be 4.6%.

Admittedly, these empirical results are obtained in a two-commodity world, but it serves to illustrate the fact that when employment is brought into the picture, the differences in labour-intensities of production in sectors assume importance, serving to alter the relative tax rates of goods from that according to the Ramsey rule. However, it has to be stressed that, especially for developing nations, factors other than employment need to be considered. For instance, the tax rate on life-saving drugs is, even in the current GST scheme in India, lower than the tax slab in

which pharmaceutical products and drugs in general are placed. Still, the main message in this paper, that macroeconomic welfare objectives can enter policy-making at the microeconomic level, should give the decision-makers some room for thought.

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