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The Laffer curve in schedular multi-rate income taxes with non-genuine allowances: An application to Spain

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ABSTRACT

This paper models the connection between tax revenue and marginal tax rates in modern personal income taxes. In so doing, new analytical expressions for the elasticity of tax revenue to tax rates are derived taking into account global and schedular income taxes in the presence of non-standard allowances. Based on these new analytical elasticities the implicit Laffer curve is characterised and explored in detail. Calculations are performed for the individual taxpayer and the aggregate population. When applied to microdata, the model permits us to locate individually the position of every taxpayer on the entire range of the Laffer curve as well as to characterise the "representative" aggregate Laffer curve. The utility of the model to forecast revenue is illustrated by applying it to Spanish personal income tax. The model confirms that the Laffer curve is essentially an intrinsic individual matter although a virtual aggregate Laffer curve for the whole population can be inferred.

1. Introduction

In the current economic context, which is characterised by a sharp deterioration of public finances, the revenue impact of tax changes is a primary concern of tax authorities. Unfortunately, in the analysis of tax revenue, there is a belief, which is particularly entrenched in politicians and policy-makers, that regulatory changes do not affect taxpayer behaviour. This supposed exogeneity between tax regulations and tax behaviour is incompatible with the principle of rationality recognised in economic agents and especially inadequate in the context of progressive taxes, as precisely this progressiveness configures an innate endogenous relationship between taxable income and marginal tax rates. This endogenous relationship implies that the size of the taxable income is determined to a greater or lesser extent by the magnitude of the marginal tax rates. Therefore, the revenue capacity of a given tax structure, particularly if it is progressive, requires a measure that would enable the determination of the expected reaction of reported taxable income given the change in marginal tax rates. One such measure is the elasticity of taxable income to marginal tax rates, $\eta_{y,\tau}$, or its more popular equivalent: the elasticity of taxable income with respect to changes in the *net-of-tax marginal tax rate*, $\eta_{y,(1-\tau)}$, (ETI). Without taking into account this endogenous response of the reported income, the estimated revenue gain (loss) from an increase (decrease) in the tax schedules will overstate the actual revenue change.

The recent literature on this topic, pioneered by Feldstein (1995) and named *New Tax Responsiveness Literature* by Goolsbee (1999), indicates that the total revenue impact of changes in marginal tax rates requires the taking into account of two effects simultaneously: the (direct) static revenue effect – *mechanical effect or rate effect* – and the (indirect) dynamic revenue effect — *behavioural effect or base effect*. The former captures the revenue impact under the assumption of no behavioural reactions on the part of the taxpayer, whereas the latter incorporates the effects of behavioural changes on revenue as taxpayers' taxable income alters. Slemrod (1995, 2001) noted the heterogeneous nature of this behavioural effect by proposing a three-tier classification of behavioural responses to taxation, which from greatest to least responsiveness is as follows: *timing responses, avoidance responses and real responses*. Timing responses entail any action to alter the timing of income and/or tax relief with the single aim of minimising the tax bill paid. Likewise, avoidance responses involve a wide range of behaviours consisting of shifting income from one pocket to another or from one income type to another. All other things being equal and barring legal limitations, high-tax-bracket taxpayers would prefer to have their income earned by their low-tax-bracket children, spouse or business than earned by themselves. By the same token, for example, taxpayers would be eager to convert ordinary income into other form of income which is taxed favourably — i.e. dividends versus capital gains, labour income earned domestically versus abroad or profits from corporations versus partnerships. In distinction to timing and avoidance responses, real responses encompass proper changes in taxpayers' behaviour which imply changes in arguments of taxpayers' utility or production functions — leisure, goods and services consumed by individuals or inputs used by producers. As highlighted by Slemrod, these non-mutually-exclusive behavioural responses to tax changes are not only important to forecast tax revenue accurately but they are also relevant to the analysis of the incidence and efficiency implications of taxation. Moreover, as highlighted by Antoci et al. (2014), other factors such as tax morale and social motivations, which define a behavioural attitude towards taxation, are also relevant to the level of compliance and consequently to the way taxpayers adapt their behaviour to tax changes. In

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principle, all these responses, including taxpayers' intrinsic motivations to pay taxes, would be captured by the ETI.[1]

The revenue implications of the ETI for simple tax structures and for subsets of taxpayers – normally from the high-income group – have been analysed by authors such as Feldstein (1995), Goolsbee (1999), Hall (1999), Saez (2004) or Giertz (2009). In Creedy (2011) and Creedy and Gemmell (2011), an extensive analysis is conducted in which the revenue implications of changes in marginal rates are demonstrated to respond to two types of factors: structural factors, which are linked to the design of the tax, and behavioural factors, which are identified by the magnitude of the ETI. Similarly, Giertz (2009) relates the ETI to the familiar Laffer curve,[2] and in Creedy and Gemmell (2012, 2014) an additional analytical effort is proposed related to the ETI and the Laffer curve in a progressive income tax context with increasing marginal rates. In this last work, Creedy and Gemmell coin the suggestive notion of *Laffer-threshold elasticity* (ETI^L), which is defined as the value of ETI that, given a tax rate band, would assure the revenue neutrality. In other words, for a given tax schedule, ETI^L identifies the value of *ETI* compatible with the peak of the Laffer curve. Finally, Sanz (2015) explores how consumption taxes may affect the profile of the Laffer curve of the personal income tax (PIT). This author finds that the oversight of the effects of PIT marginal rates on consumption tax revenue is misleading as it induces revenue overestimation and shrinks the, otherwise wider, "prohibitive range" of the Laffer curve.

Most of the abovementioned literature has derived analytical expressions for the elasticity of the tax bill to changes in marginal tax rates. Notwithstanding, these elasticities have focused on the general case of a tax with extensive taxable income in the manner of Haig–Schanz–Simons, where the taxpayer's income is accumulated and taxed jointly. However, during the early 1990s the Nordic countries initiated a deliberate move away from global income taxation towards schedular taxation. This trend in tax reform soon found imitators and many countries have adhered to it since then. In fact, it can be said that nowadays most modern tax systems recognise some type of segmentation in the way personal income is taxed. In addition to this, standard elasticities existing in the literature assume that personal and family allowances take the form of deductions. However, many current tax codes have converted these deductions into tax credits. As a result of all this, the standard elasticity expressions found in the current literature are not applicable to most modern tax designs.

This paper tries to fill this gap by modelling tax revenue for a number of more complex tax designs. As mentioned above, income tax systems can be designed on either a global or schedular basis. A global income tax aggregates all sources of income while a schedular income tax imposes liability on each source of income separately. In addition, family and personal circumstances can be implemented in different formats: as deductions or in the form of tax credits. The former, known as "genuine allowances", implies that allowances reduce gross income before applying the tax schedule. The latter, named "non-genuine allowances" or "false allowances", consists of applying the tax schedule to the personal and family allowances in order to subtract the obtained result from the derivative of applying the same tax schedule to taxpayer's gross income. In what follows, all these complexities are modelled in order to explore their implications on tax revenue and subsequently on the Laffer curve.

This paper proceeds as follows. In Section 2, we obtain the analytical expressions of the revenue elasticity to marginal tax rates in a progressive tax structure with non-genuine allowances. The calculations are conducted for two alternative tax structures: one defined with an extensive taxable income and the other with a segmented taxable income (schedular tax). Continuing in the context of the individual taxpayer, Section 3 characterises the Laffer curve by identifying the revenue-maximising tax rates (Laffer-marginal tax rates) as well as the threshold-elasticity of taxable income, introduced by Creedy and Gemmell (2012). The fourth section offers analytical expressions to determine aggregate revenue change from a population of N taxpayers that experiences a modification of one or more marginal tax rates. In the fourth section, the aggregate Laffer curve is also derived. Finally, Section 5 conducts an empirical application to Spanish data. To be specific, Section 5 evaluates the revenue consequences of the most recent increase in marginal tax rates conducted in Spain after the approval of the Royal Decree-Law 20/2011. This empirical application is conducted using microdata from the Spanish Institute for Fiscal Studies (IEF).

2. Marginal tax rates and the tax bill of an individual taxpayer

As mentioned at the outset, analytical expressions of the revenue elasticity to changes in marginal tax rates have already been derived in the literature. Notwithstanding, these elasticities have focused on the general case of a tax with extensive taxable income and genuine allowances. However, for most present PIT designs this modelling is out of date and no longer usable. Therefore, in order to incorporate the extensive peculiarities of modern income taxation, in this section we derive new analytical expressions for the elasticity of the tax bill to changes in marginal tax rates. These new expressions extend the standard model in two ways. As a prior step, we consider non-genuine allowances. Subsequently, we extend the model to schedular income taxation.

2.1. Global income taxes and non-genuine allowances

Let us assume a tax band defined as an increasing sequence of marginal tax rates such as $\zeta=(\tau_1,\ldots\tau_K)$, that is applied to gross taxable income (before deduction of allowances),y_i, according to the set of income thresholds defined by the vector $A=(a_1,\ldots a_K)$ in such a way that the fiscal burden associated to the level of income y_i will be determined as follows:

$$T(y_i)\begin{cases}\tau_1\cdot(y_i-a_1) & \text{if } a_1<y_i\le a_2\\ \tau_1\cdot(a_2-a_1)+\tau_2\cdot(y_i-a_2) & \text{if } a_2<y_i\le a_3\\ \tau_1\cdot(a_2-a_1)+\tau_2\cdot(a_3-a_2)+\tau_3\cdot(y_i-a_3) & \text{if } a_3<y_i\le a_4\\ \cdots & \cdots\\ \cdots & \cdots\\ \tau_1\cdot(a_2-a_1)+\cdots\tau_{k-1}\cdot(a_K-a_{k-1})+\tau_K\cdot(y_i-a_K) & \text{if } y_i>a_K\end{cases}$$

Under such a taxation structure, the tax paid by a taxpayer i with (gross) taxable income y_i and entitled to a set of (nominal) non-genuine allowances, M_i^n, will be determined by the following tax function T_i^I:

$$T_i^I=T_i-\theta_i \tag{1}$$

[1] Some recent contributions by Chetty (2008, 2009) and Saez et al. (2012) have tried to shed light on whether ETI is a sufficient statistic for tax revenue and welfare analysis. In this respect, some caveats are in order. For example, when retiming economic decisions is feasible, the reduction in current reported income can be compensated for by an increase in future reported income. By the same token, when income shifting exists, the reduction in reported income could be due to a shift away from taxable individual income towards other forms of taxable income, such as corporate taxable income. In such cases, the ETI is not a sufficient statistic to estimate either the tax revenue or the deadweight losses of a tax change. Under these circumstances, at least two new parameters are needed: the elasticity of the income deferral and the elasticity of the transfer of taxable incomes among different taxes. In addition, personal income tax reforms can also have consequences for other taxes such as consumption taxes or social security contributions. If this were the case, these "fiscal externalities" should also be considered in revenue and welfare computations; see Sanz (2015).

[2] Although this well-known curve is named after Arthur Laffer, who allegedly drew it on a napkin to convince President Reagan of the disadvantages of high marginal tax rates, its underlying ideas, as recognised by Professor Laffer himself, were presented long before by other economists and thinkers, for example, Adam Smith (1776) or Dupuit (1844).