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Wage growth and income tax revenue elasticities with endogenous labour supply

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Abstract

Analytical expressions for income tax revenue elasticities treat earnings as exogenous, so that they do not accommodate the endogenous response of labour supply to the income tax system. This paper shows how these expressions can be adapted to allow for endogenous labour supply. It identifies how far, and in what circumstances, labour supply effects are quantitatively important for revenue responsiveness estimates, both for individual taxpayers and in aggregate. It is shown that even a relatively simple tax-benefit structure can produce labour supply responses, which lead the tax-wage elasticity to differ from the tax-income elasticity.
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Keywords: Elasticity; Tax benefit structure; Wage

1. Introduction

The literature on the built-in flexibility of taxation has concentrated on the analysis of tax revenue elasticities with respect to income growth at the individual and aggregate level. Approaches have been based on regression or simulation models, or calculations using analytical expressions.[1] These methods are statistical in that there is

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[1] Analytical expressions for the UK and US tax systems were first developed by Hutton and Lambert (1980, 1982) and Fries et al. (1982). Empirical estimates for the UK can be found in Johnson and Lambert (1989) and Creedy and Gemmell (2003); see Creedy and Gemmell (2002) for a review of analytical expressions and references to alternative methods.

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no modelling of economic behaviour; they treat income changes as exogenous. For example, the UK revenue forecasting models employed by H.M. Treasury and the Institute for Fiscal Studies (IFS) either estimate or impose tax revenue elasticities. These capture the relationship between the tax revenue yield and a measure of the tax base such as income, for given tax rates.[2]

However, where it is desired to consider the effects on revenue growth of long-run growth in the economy arising, for example, from productivity growth, it is the relationship between tax revenue and wage rate growth which is more relevant. In this case, elasticities with respect to income or earnings provide only part of the story. Changes in wage rates and gross incomes may be quite different, especially in the neighbourhood of income thresholds in piecewise-linear tax structures. This can be important for projecting revenue growth in practice. In the UK, for example, the Treasury projects income growth forward based on projections of average income levels and employment. Over the long-run, average income is assumed to grow at the economy's long-run rate of productivity growth (approx. 2.5%) plus the expected inflation rate, with judgemental adjustments in the short-run as the economy moves to or from its long-run trend. There is therefore no allowance for labour supply effects and if real wage rate growth approximates productivity growth over the long-run, this will also be the assumed rate of average income growth.

This paper explores the income tax revenue responsiveness arising from wage rate changes when labour supply is endogenous. It shows how analytical expressions can be extended to incorporate these endogenous labour supply responses. Numerical examples are constructed to examine revenue elasticities in the face of highly non-linear tax structures where multiple local optima may exist and large discrete jumps in labour supply can arise from non-convex ranges of budget sets. An objective is to identify how far, and in what circumstances, labour supply effects can alter the revenue responsiveness estimates that are typically computed, both for individual taxpayers and in aggregate.

Section 2 shows how the revenue elasticities with respect to income and wages are related to each other and to labour supply elasticities at the individual level. The elasticity of revenue with respect to the wage rate depends on both the revenue elasticity with respect to income and the elasticity of income with respect to the wage. Furthermore, the latter is a function of the elasticity of hours worked with respect to the wage rate. When the tax-wage relationship is of interest, it is therefore necessary to consider how a change in wages affects labour-leisure choices, given the existing tax schedule.[3] Section 3 provides an indication of potential orders of magnitude. Section 4 turns to aggregate revenue elasticities and again provides numerical examples. Brief conclusions are in Section 5.

[2] For discussion of H.M. Treasury and IFS revenue forecasting methods, see Pike and Savage (1998) and Giles and Hall (1998) respectively. Though Giles and Hall (1998, p. 91) refer to the tax base for income tax forecasting in the IFS TAXBEN model as 'nominal wage growth', this refers to growth of the total wage bill not the wage rate. Sentance et al. (1998) provide a comparison of a number of methods, none of which allow for endogenous labour supply effects on revenue elasticities.

[3] To the extent that there is any automatic indexation of tax thresholds, these are usually in relation to income, rather than wage changes.

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