1. Introduction

A central result in the theory of optimal taxation is that both source-based taxes on capital income and origin-based taxes on commodities are inefficient instruments with which to raise revenue in a small open economy. The first formal statement of this proposition is due to Diamond and Mirrlees (1971): source- and origin-based taxes cannot be part of an optimal system of linear taxation since they prevent the attainment of productive efficiency by inserting a wedge between domestic and foreign producer prices. Subsequent literature strengthens the conclusion of Diamond and Mirrlees by showing that taxes on internationally immobile factors always dominate source- and origin-based taxes in economies with identical individuals (Gordon 1986, Bucovetstky and Wilson 1991, Haufler 1996 inter alia). The intuition is simple: if world prices are unaffected by national policies, the burden of source- or origin-based taxes falls completely on immobile factors. Hence, it is more efficient to tax these factors directly.

In the light of such clearcut theoretical conclusions the experience of many countries appears quite puzzling especially in the field of capital taxation. For example, despite the downward trend in statutory tax rates for corporate income, the effective tax rates for both inward and outward direct investment remain high in several small open economies (Chennels and Griffith 1997).

In the literature there are several explanations which rationalize existing tax policies but none of them provide a satisfactory answer. Following Feldstein and Horioka (1980), many question the assumption of perfect capital mobility. This suggests that even a small open economy may enjoy some monopoly power that could be exploited through source-based taxation. However, Gordon and Bovenberg (1996) show that capital immobility gives countries an incentive to

subsidize foreign capital and is therefore not sufficient to explain source-based taxation.

Gordon (1992) argues that small countries may find it optimal to tax capital income if they act as Stackelberg followers of a dominant capital exporter that operates a credit system for taxing foreign source income. This argument may well fit both the fact that United States was the dominant capital exporter during much of the postwar period and the roughly simultaneous implementation of corporate tax reforms among the major industrialized countries in the Eighties. On the downside, Chennels and Griffith (1997) point out that Gordon's analysis does not explain why a capital-exporting country should operate a credit system instead of a deduction system.

Finally, Huizinga and Nielsen (1997) maintain that a source based tax is an indirect means of taxing profits that accrue both to foreign and to domestic investors when a tax on pure profits is not feasible. Yet, their results are based on the restrictive assumption that investors cannot avoid the tax by selling their shares. If this assumption is dropped, domestic shares must always pay the profit rate that could be earned on the world equity market. Consequently, any direct or indirect tax on profits is shifted entirely onto immobile domestic factors.

This paper investigates whether the pursuit of redistributive objectives can provide an alternative rationale for source-based taxes on capital income and origin-based taxes on commodities.

The use of redistributive source-based capital taxation has been advocated by Haufler (1997) and Lopez et al. (1996). Both papers argue that a source-based tax can be an efficient tool to redistribute income from capital owners to workers when residence-based capital taxation cannot be implemented. However, this conclusion rests on the assumption that national economies are large with respect to the rest of the world, so that capital taxation is not shifted completely onto immobile labour. The government can then exploit differences in capital endowments to

redistribute income between individuals. Such a strategy is ruled out in a small open economy where capital owners can always invest abroad to earn the exogenous world interest rate.

This paper takes an alternative view and looks at source- and origin-based taxes as substitutes for labour taxation rather than as substitutes for residence-based taxes on capital and destination-based taxes on commodities. The analysis combines the theory of optimal taxation in small open economies with the conventional model of redistributive income taxation between skilled and unskilled wage earners. I assume that the government can directly observe neither the individual wage nor the labour supply, but only labour income. I then investigate whether a small open economy would resort to source-based taxation once an optimal, linear or non-linear, labour income tax has been implemented.

The analysis delivers the following main conclusions. In the presence of linear income taxation, source-based taxes can increase the government's ability to redistribute income only if wage differentials are endogenous. With a fixed wage ratio, a source-based tax affects only the wage level and adds nothing to the linear income tax. With completely endogenous wages a source-based tax results in a differential burden on the two types of labour: the government can then exploit the differential incidence to improve on the allocation obtained with the linear income tax. Welfare can be further increased with differential origin-based commodity taxation. When an optimal non-linear tax is implemented, a different marginal tax rate can be set for each type of labour. Hence, source- and origin-based taxes cannot improve on the distribution of net wages. However there may be, an alternative rationale for source- and origin-based taxes: by changing the distribution of gross wages, source- and origin-based taxation can relax the self-selection constraint that binds the nonlinear tax.

I am aware of two papers that offer related analyses. The first is Gerber and Hewitt (1987).

This paper is based on the framework with skilled and unskilled labour but considers a different set of tax instruments. On the one hand, Gerber and Hewitt assume that the government can observe individual skills and levy linear taxes at different rates on the two types of labour, on the other, they assume that institutional constraints hinder the provision of any positive transfer to workers. The main result is that countries have an incentive to *subsidize* investment in order to transfer income to the unskilled indirectly by raising the wage level. In the present paper differential linear taxation on the two types of labour is ruled out endogenously on the basis of asymmetric information between agents and the government. Consequently, the analysis reveals the role played by the differential incidence and shows that even strictly positive source-based *taxes* are Pareto efficient.

The second related paper is Huber (1999), which analyses the problem investigated here but considers exclusively source-based linear taxes on capital income and non-linear labour income taxes. The present paper extends Huber's analysis to linear labour income taxation and studies the role of differential origin-based commodity taxation. As noted earlier, it turns out that source-based capital taxation is Pareto efficient both with linear and with non-linear income taxes. Further, rather surprisingly, the structure of origin-based commodity taxation does not depend on whether the labour income tax is linear or non-linear.

The paper is organised as follows. Section 2 sets up the model. Section 3 discusses the desirability of source- and origin-based taxes given optimal linear taxes on labour. Section 3.1 analyses the benchmark case with differential linear labour taxation. Section 3.2 studies the optimal source-based taxation when the government levies a linear tax on labour income. Section 3.3 extends the analysis to origin-based taxes. Section 4 discusses the optimality of source- and origin-based taxes under optimal non-linear taxation of labour income. Finally,

section 5 considers further extensions of the analysis and section 6 concludes.

2. The model

The economy is represented as a standard general equilibrium model with perfect competition. Two traded goods are produced using capital and two different types of labour.

Consumers have identical tastes and own the same quantity of capital. They are endowed with just one of the two types of labour required in production. Hence they can be divided into two homogeneous categories according to the type of labour they offer. The indirect utility function for consumers of type i is

$$V\left(\pi^1, \pi^2, \omega^i, I\right) \tag{2.1}$$

where π^j is the consumer price of good j, ω^i is the consumer wage for labour of type i, and I is lump-sum income, i.e.

$$I = (1+\rho)\,\overline{K} + b \tag{2.2}$$

where ρ is the consumer interest rate, $\overline{K}$ is the capital endowment and b is a lump-sum tax or subsidy. The population is normalised to 1 and n denotes the fraction of consumers of type 1.

As regards production, I assume constant returns to scale and rule out joint production. In order to maintain mathematical tractability and to avoid complications that are of secondary importance, I also assume that each type of labour is a sector-specific input, so that the same superscript denotes both a productive sector and the type of consumer supplying labour in that sector (hence $i = 1, 2$). Further, I adopt the non-restrictive convention that the producer wage