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## Indirect taxation in an integrated Europe: Is there a way of avoiding tax distortions without sacrificing national tax autonomy?

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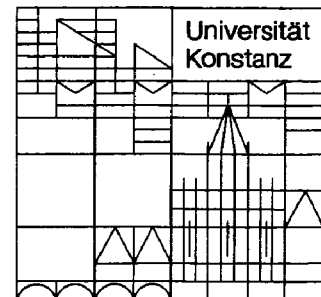
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**Sonderforschungsbereich 178**  
**„Internationalisierung der Wirtschaft“**

Diskussionsbeiträge



Juristische  
Fakultät

Fakultät für Wirtschafts-  
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**Indirect Taxation in an Integrated  
Europe: Is there a Way of Avoiding  
Tax Distortions without Sacrificing  
National Tax Autonomy?**

**INDIRECT TAXATION IN AN INTEGRATED EUROPE:  
IS THERE A WAY OF AVOIDING TAX DISTORTIONS  
WITHOUT SACRIFICING NATIONAL TAX AUTONOMY?<sup>1</sup>**

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## **Abstract**

The paper discusses the main arguments for destination- versus origin-based commodity taxation in the European Community's Internal Market. Destination-based solutions necessarily distort commodity trade in the Community because final consumer purchases can only be taxed in the origin country. On the other hand, an origin-based general consumption tax is not only neutral in a European context but it can also be combined with destination-based taxation in third countries in a non-distortive way. Furthermore, it is shown that the introduction of capital mobility does not affect the neutrality of an origin-based consumption tax. Finally, the paper addresses the administrative and political implications of a switch to the origin principle in the European Community.

## **Zusammenfassung**

Das Papier beschäftigt sich mit den zentralen Argumenten einer Güterbesteuerung im EG-Binnenmarkt nach dem Bestimmungslandprinzip gegenüber dem Ursprungslandprinzip. Auf dem Bestimmungslandprinzip basierende Steuersysteme lösen im EG-Binnenhandel Verzerrungen aus, da eine Konsumnachfrage durch steuerarbitrageinduzierte Direktimporte jeweils nur im Ursprungsland besteuert werden kann. Dagegen sind allgemeine Gütersteuern, die weltweit nach dem Ursprungslandprinzip erhoben werden, allokativ neutral, und es treten auch keine Verzerrungen auf, wenn die Ursprungslandbesteuerung in geeigneter Form mit einer Besteuerung nach dem Bestimmungslandprinzip mit Drittländern verbunden wird. Weiterhin läßt sich zeigen, daß auch die Einführung internationaler Kapitalmobilität diese Neutralitätseigenschaft nicht zu Fall bringt. Schließlich greift das Papier administrative und politische Aspekte einer Systemumstellung zu einer allgemeinen, verzerrungsfreien Güterbesteuerung nach dem Ursprungslandprinzip im EG-Binnenmarkt auf.

# 1 Introduction

In the literature on international taxation there has been a long standing debate on the relative merits of the origin principle and the destination principle of commodity taxation<sup>1</sup>. Under the origin principle, goods are taxed in the country where they are produced, whereas the destination principle implies taxation in the country of final consumption.

While the origin principle has found several supporters in academic circles, the destination principle has so far won out in practice and is also the commodity tax principle codified by the GATT. However, because administration of the destination principle has traditionally relied on so-called border tax adjustments, the recent years have witnessed a renewed interest in the origin principle, due to the abolition of border controls in the Internal Market of the European Community.

Against this background, the present paper discusses the possibilities of accommodating cross-country differentials in indirect tax rates without distorting international resource allocation in a world without economic borders. In discussing this issue, we attempt to provide a brief and non-technical overview of the existing knowledge of the allocational effects of alternative commodity tax principles, and to analyse within a simple framework whether conventional neutrality results based on pure trade models will carry over to a world with international capital mobility.

We start out in section 2.1 by briefly considering why the neutrality property of the general destination principle ceases to hold under the conditions of the Internal Market where direct cross-border consumer trade will effectively be subject to the origin principle. Sections 2.2 and 2.3 then review some recent literature suggesting that a switch to a variant of the origin principle in Europe should be able to eliminate the distortions to international trade in a single market with direct consumer purchases. Section 2.4 proceeds to discuss how domestic tax wedges such as differentiated tax rates on different commodities may cause international trade distortions and how such distortions might be neutralized under an origin-based commodity tax regime.

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<sup>1</sup>Some of the classical references on this topic are the Tinbergen Committee (1953), the Neumark Committee (1963), Shibata (1967), and Biehl (1969). More recent contributions include, among others, Whalley (1979 and 1981), Berglas (1981), Peffekoven (1983), Andel (1986), Cnossen and Shoup (1987), Siebert (1990), Sinn (1990), Krause-Junk (1990 and 1992), Haufler (1992), Lockwood, de Meza and Myles (1993), and Bovenberg (1993). The close links that exist to the taxation of international factor flows are stressed, for example, by Sørensen (1990), Frenkel, Razin and Sadka (1991, Ch. 2), Genser (1992), and Keen (1993).

Because the existing literature on international commodity taxation relies on standard trade models abstracting from international factor mobility, section 3 of this paper develops a simple intertemporal model to investigate whether a general indirect consumption tax will still be non-distortionary in the presence of international capital mobility. We find that the origin principle will indeed be neutral towards international resource allocation even with mobile capital, provided prices or exchange rates are flexible.

While our theoretical analysis thus poses the origin principle in a rather favourable light, section 4 briefly considers some practical and administrative arguments which tend to favour the destination principle over the origin principle. Finally, we sum up our main conclusions in section 5.

## 2 Commodity Taxes in Standard Trade Models

### 2.1 Destination Principle

To discuss the effects of alternative tax principles in models with commodity trade only, we initially assume that the commodity tax is levied at a uniform rate on all products and that factors of production, notably labour, are in fixed supply<sup>2</sup>. With fixed factor supplies it is intuitive that a general commodity tax is equivalent to a lump sum tax in a closed economy. Furthermore, the lump sum character of the tax is maintained in an open economy when international trade is taxed under the destination principle. Let  $p_i^k$  be the producer prices of two final consumer goods  $i \in [1, 2]$  in countries  $k \in [A, B]$  and let  $t^k$  be the general commodity tax rate in country  $k$ . Under the destination principle, the tax rate of the importing country applies equally to domestic and foreign products so that, from the perspective of country  $A$ 's consumers, the following arbitrage condition must hold:

$$(1 + t^A) p_i^A = (1 + t^A) p_i^B \implies p_i^A = p_i^B \quad \forall i \in [1, 2]. \quad (1)$$

Thus, in the absence of transportation costs, consumer arbitrage will equalize producer prices across countries, and relative producer prices will be left undistorted, coinciding with relative consumer prices. Furthermore, tax revenues are not redistributed between countries because the tax base under the destination principle is the value of domestic consumption.

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<sup>2</sup>These assumptions will be relaxed in section 2.4.

The problem in the European Community's Internal Market is, however, that the destination principle cannot be administered for all consumer goods. In the absence of border controls, intra-Community cross-border purchases can only be taxed in the country of origin. If the destination principle is maintained for trade between registered traders, as is the case under both the transitional system adopted by the Community until (at least) the end of 1996 and the international tax credit method envisaged for the period hereafter, a mixed tax principle emerges which does not have the desirable neutrality properties of the general destination principle<sup>3</sup>. Let good 1 be the good purchased by final consumers whereas good 2 denotes the good purchased by registered traders. In the absence of transportation costs, arbitrage yields

$$\begin{aligned}(1 + t^A) p_1^A &= (1 + t^B) p_1^B, \\ p_2^A &= p_2^B,\end{aligned}\tag{2}$$

so that, for  $t^A \neq t^B$ , relative producer prices in the two countries differ and trade is distorted under this mixed tax regime. In the following, this scheme will be labelled "restricted destination principle" because the underlying approach is to maintain the destination principle for the Community's internal trade, but a consistent use of the destination principle is precluded by the abolition of border controls.

Tax bases in each country also differ from the case with border controls, redistributing tax revenues from the importer to the exporter of the good which is purchased through cross-border shopping and is thus taxed in the country of origin. This issue is most serious when the possibility of trade deflection is considered (cf. Krause-Junk, 1990, pp. 258-261): one can imagine that residents of a high-tax country purchase *domestic* goods through a *foreign* dealer in order to save taxes. No extra transportation costs are incurred by this deflection of trade when goods do not physically leave the country and all transactions with the foreign intermediary occur only on paper. If the effect on tax revenues induced by this kind of arbitrage activities is sufficiently strong, policymakers in each country have an incentive to

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<sup>3</sup>Under the transitional system, border tax adjustments are maintained despite the abolition of border controls and the zero-rating of exports is based on the proof that goods have been sold to a trader registered in another member state. Under the international tax credit method, traders prepay taxes which are based on the tax rate of the origin country but the recouping effect, which occurs at subsequent processing stages, ensures that the effective tax payment depends only on the tax rate of the destination country. The economic effects of the transitional system and the international tax credit method are thus very similar when the latter is accompanied by a clearing mechanism, which restores the allocation of tax revenues to the country of final consumption (cf. Haufier, 1992, pp. 251-253).



lower the domestic tax rate in order to attract foreign cross-border shopping and increase the national tax base (cf. also Sinn, 1990).

## 2.2 The General Origin Principle

One attractive feature of the origin principle is that its implementation does not require border controls. Under the origin principle, goods bear the tax rate of the producer country, and for any good  $i$ , arbitrage thus yields

$$(1 + t^A) p_i^A = (1 + t^B) p_i^B \quad \forall \quad i \in [1, 2]. \quad (3)$$

While it is fairly obvious that the arbitrage condition (3) must hold for final consumer goods, it is less obvious that it should also hold for intermediate goods and capital inputs under a multi-stage tax like the value-added tax, since purchases of intermediate inputs and capital goods are deductible from the base of a value-added tax of the consumption type. Since it is crucial for the allocative effects of a general origin-based consumption tax whether or not condition (3) holds for all categories of goods, the design of the value-added tax is of great importance under the origin principle. If, for example, the VAT were designed according to the so-called "notional tax credit method" (Krause-Junk, 1990, pp. 262–264; cf. also Cnossen and Shoup, 1987, p. 71), arbitrage would indeed enforce condition (3) for inputs as well as outputs. Under this method, for a producer in country A purchasing intermediate inputs from a domestic supplier there is no difference to the conventional tax credit method. If he buys inputs  $I$  at a producer price of  $p_I^A$  and sells final output  $C$  at a producer price of  $p_C^A$  he would have a VAT bill of

$$VAT = t^A p_C^A C - t^A p_I^A I, \quad (4)$$

and would earn a net cash flow of

$$p_C^A (1 + t^A) C - p_I^A (1 + t^A) I - VAT = p_C^A C - p_I^A I. \quad (5)$$

However, if the producer were to purchase his intermediate inputs from a supplier in country B at a tax-inclusive price of  $p_I^B (1 + t^B)$ , the notional credit method requires that this purchase be treated for VAT-purposes as if it had borne the domestic rate  $t^A$  rather than the foreign rate (hence the term "notional"). The tax credit is calculated by applying the domestic tax rate to the gross-of-tax import expenditure  $p_I^B (1 + t^B) I$ , deflated by the domestic tax factor  $(1 + t^A)$ , and the domestic VAT liability becomes

$$VAT = t^A p_C^A C - t^A p_I^B \frac{(1 + t^B)}{(1 + t^A)} I. \quad (6)$$

implying that the producer's net cash flow is equal to

$$p_C^A (1 + t^A) C - p_I^B (1 + t^B) I - VAT = p_C^A C - p_I^B \frac{(1 + t^B)}{(1 + t^A)} I. \quad (7)$$

Comparing equations (5) and (7), we see that producers will not be indifferent between purchasing their inputs at home or abroad, unless the condition  $p_I^A (1 + t^A) = p_I^B (1 + t^B)$  holds for all intermediates and capital goods. Thus, under the notional credit method, condition (3) will indeed be enforced for all goods by international arbitrage<sup>4</sup>. Therefore, *relative* producer and consumer prices are unaffected by international differences in tax rates and the international pattern of production will be efficient under a general origin-based consumption tax. In each country, producer prices and thus factor returns fall by the level of the domestic tax, implying a real devaluation in the high-tax country. Consumers are compensated for the lower factor incomes through the lump sum government transfers financed by the consumption tax, and are therefore able to maintain their purchasing power. If factors are immobile internationally the fall in factor returns in the high-tax country, relative to those of the low-tax country, has no further implications. The sensitivity of this result to the opening of international factor markets will be discussed in section 3.

## 2.3 The Restricted Origin Principle

The above discussion has been restricted to a two-country setting, which has ignored trade relations with non-member states. It is obvious that the neutrality of the origin principle carries over to a many-country world when the origin principle is applied worldwide. In current practice, however, the destination principle is the general scheme of international commodity taxation, which is also implicitly codified by GATT rules. Since non-EC countries have no motive to move away from the destination principle, a worldwide switch to the origin principle is beyond the reach of the European Community and is therefore hardly a realistic alternative. In the policy debate and in the academic literature it has therefore traditionally been assumed that the feasible alternative from an EC perspective is the *restricted origin principle* where intra-Community trade is taxed in the country of production but all trade between EC members and the rest of the world is taxed in the destination country.

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<sup>4</sup>Condition (3) will also obtain under the so-called 'international subtraction method' of administering an origin-based value-added tax. Under this method imported inputs would be deductible from the value of sales at their foreign *tax-inclusive* prices (e.g. Sinn, 1990, p. 496). A brief discussion of the administrative differences between these two schemes of origin taxation is given in section 4.

To discuss the role of intra-Community tax differentials under the restricted origin principle, assume a trade structure where A and B are the members of a tax union while country C represents the rest of the world. Country A exports good 1 to both other countries, country B exports good 2, and country C exports good 3. Arbitrage equalizes consumer prices in the trading countries if an international transaction is taxed under the origin principle. If the destination principle is applied instead, international differences in tax rates are irrelevant for the choice between imported and domestically produced goods and producer prices are equalized between the trading nations. The following set of arbitrage conditions must then hold in equilibrium:

$$\begin{aligned} p_1^A &= \frac{(1 + t^B)}{(1 + t^A)} p_1^B = p_1^C, \\ \frac{(1 + t^A)}{(1 + t^B)} p_2^A &= p_2^B = p_2^C, \\ p_3^A &= p_3^B = p_3^C. \end{aligned}$$

Forming relative prices, these equations imply that

$$\begin{aligned} \frac{p_1^A}{p_3^A} &= \frac{(1 + t^B)}{(1 + t^A)} \frac{p_1^B}{p_3^B} = \frac{p_1^C}{p_2^C}, \\ \frac{(1 + t^A)}{(1 + t^B)} \frac{p_2^A}{p_3^A} &= \frac{p_2^B}{p_3^B} = \frac{p_2^C}{p_3^C}. \end{aligned} \tag{8}$$

Thus, unless tax rates are harmonized within the union, relative producer (and consumer) prices will differ both within the union and between union countries and the rest of the world, and international trade will therefore be distorted (cf. Berglas, 1981, p. 382).

Furthermore, two routes of trade deflection arise under the restricted origin principle when tax rates differ between union countries: consumers in the high-tax country channel their imports from the rest of the world through the low-tax union partner whereas traders in the low-tax member state export to the rest of the world via the high-tax union country to receive the higher tax rebates (Shibata, 1967, p. 212). When transaction costs for deflected trade are linear and lower than the intra-Community tax differential, trade is fully deflected and tax collections in the high-tax country will be zero (Georgakopoulos and Hitiris, 1992, pp. 119-121).

Even if trade deflection can be controlled by tax authorities, tax revenues are redistributed from the country which runs a deficit in its bilateral trade balance with the union partner to the country with an intra-union trade surplus (Berglas, 1981, pp. 383-385). By lowering its tax rate, each of the union countries can systematically improve its intra-union trade balance and expand the domestic tax base. Therefore,

a process of downward tax competition becomes a possible scenario under the restricted origin principle (Haufler, 1993). In sum, the effects of intra-Community tax differentials are very similar under the restricted destination principle and the traditional version of the restricted origin principle, which has been discussed so far<sup>5</sup>.

However, as recently demonstrated by Lockwood, de Meza and Myles (1993, pp. 5-7), it is possible to combine the destination principle and the origin principle in a non-distortive way: if EC member states tax their exports to *all* trading partners whereas non-members tax all their imports, then a general tax principle is applied from the perspective of each country and the neutrality properties of the worldwide destination and origin principle carry over to this international tax scheme<sup>6</sup>.

Since EC countries levy no tax on imports, this solution implies that exports from the rest of the world to each of the union countries remain tax-free. Arbitrage conditions are thus given by

$$(1 + t^A)p_i^A = (1 + t^B)p_i^B = p_i^C \quad \forall \quad i \in [1, 2, 3]. \quad (9)$$

On the other hand, exports from EC member states to the rest of the world are taxed in both the exporting and the importing country since the rest of the world applies a uniform tax on both imported and domestically produced goods. Consumer prices in country C are thus given by

$$(1 + t^C)p_i^C = (1 + t^C)[(1 + t^A)p_i^A] = (1 + t^C)[(1 + t^B)p_i^B] \quad \forall i \in [1, 2, 3] \quad (10)$$

which reduces to (9) because the tax factor  $(1 + t^C)$  cancels out. Hence, relative producer (and consumer) prices will be unaffected by taxes in all parts of the world. While the neutrality of this scheme may not be intuitive at first sight, the underlying idea is fully in line with our earlier discussion: the double taxation of EC exports ensures that factor returns in each member state fall by the full amount of the domestic tax so that border prices are equalized worldwide<sup>7</sup>. Taxes in the destination

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<sup>5</sup>To avoid confusion, recall that under the restricted destination principle the destination base is restricted to apply only to a subset of *goods* (because direct consumer trade follows the origin principle), whereas under the restricted origin principle the tax principle is restricted to a subset of *countries*.

<sup>6</sup>Lockwood, de Meza and Myles (1993) label this tax scheme 'restricted origin principle' even though their proposal differs substantially from the tax principle that has been known under this label since the pioneering work of Shibata (1967). The crucial difference is that there is an element of reciprocity in Shibata's version of the restricted origin principle (union countries and third countries both tax their imports from the other trading block, and tax-exempt their exports), which is absent in the tax principle proposed by Lockwood, de Meza and Myles.

<sup>7</sup>Border prices refer to the price of a good when it enters the destination country, prior to the imposition of taxes or tariffs in the importing country.

country are either zero (EC members) or apply equally to domestic and foreign goods (country C) so that import decisions are not distorted in any country by this tax scheme. At the same time, no border controls are required for intra-Community trade while the rest of the world maintains border controls under the destination principle.

## 2.4 The Role of Domestic Distortions

The above discussion may be criticized on the grounds that it abstracts from existing domestic distortions. Two types of distortions have to be distinguished: if factor supplies – notably labour – are endogenous, a general commodity tax distorts the individual's trade-off between the consumption of goods and leisure. Under both the general destination and the general origin principle the disposable real wage rate (i.e., the price of leisure relative to the aggregate consumption good) falls as a result of the general commodity tax, and this tax wedge is larger in the high-tax country. International tax differentials will thus lead to cross-country differences in the marginal rate of substitution between leisure and commodity consumption, but they will *not* prevent the cross-country equalization of relative commodity prices and thus will not distort import and export decisions at the margin (cf. Frenkel, Razin, and Sadka, 1991, p. 39).

The second type of distortions concerns non-uniform indirect tax rates, implying that different groups of commodities are taxed at different rates. A split VAT rate structure can be observed in most EC countries and a reduced rate is still permitted on a specified list of goods in the Internal Market, just as excise taxes continue to play an important role in the tax structure of several member states. Again, a domestic distortion is introduced but the distortion now applies to traded goods as well if tax rates differ between countries. Non-uniform indirect tax structures within each country will then lead to international differences in either the marginal rate of substitution or the marginal rate of transformation between the different categories of goods bearing different tax rates. Which margin is affected depends on the tax principle chosen. Under the destination principle, relative producer prices in equation (1) are still equalized across countries, even if country A levies different tax rates on goods 1 and 2. Therefore, even though consumer choices are distorted, world output is still efficiently produced if the destination principle is applied. In contrast, it can be inferred from the arbitrage conditions (3) that relative producer prices are distorted by non-uniform national VAT structures if tax rates differ across countries and the origin principle is applied (Frenkel, Razin and Sadka, 1991, pp. 35-39).

By the aggregate production efficiency theorem, the equalization of marginal rates of transformation across countries is a necessary condition for a second-best optimum so that the destination principle is to be preferred over the origin principle in this second-best framework<sup>8</sup>. It can be shown, however, that harmonizing the *relation* between the standard and the reduced VAT rate is sufficient to restore aggregate production efficiency under the origin principle (Fратиanni and Christie, 1981, pp. 414–419). Let  $t^A$  and  $t^B$  be the standard VAT rates in the two countries, which are applied to good 2. The tax-inclusive price of good 1, which bears the reduced tax rate, should then be  $h(1+t^k)p_1^k$  in each country where  $1/(1+t^k) < h < 1$  and the fraction  $h$  must be identical across countries. Arbitrage conditions are then given by

$$\begin{aligned} h(1+t^A)p_1^A &= h(1+t^B)p_1^B, \\ (1+t^A)p_2^A &= (1+t^B)p_2^B, \end{aligned} \tag{11}$$

and it is obvious that relative producer prices are equalized internationally when these conditions are met<sup>9</sup>.

Our discussion of international commodity tax principles in a setting with international factor immobility may therefore be summarized as follows: under the conditions of the European Internal Market, indirect taxation will follow a type of 'restricted destination principle' which will distort intra-European trade unless EC members are willing to harmonize both the level and structure of indirect tax rates. On the other hand, if European countries adopt a consistent origin principle in their trade with all countries in the world, and if they are still willing to harmonize their *structures* of indirect taxation (a rather strong requirement indeed), each country can choose its tax *level* independently without interfering with free trade.

One limitation of the literature surveyed above is that it tends to abstract from international factor mobility despite the fact that factors (in particular capital) are becoming increasingly mobile internationally. The following section will therefore investigate whether the neutrality of the origin principle carries over to a more realistic setting with international capital mobility.

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<sup>8</sup>The aggregate production efficiency result is originally due to Diamond and Mirrlees (1971). For an application of this theorem to international taxation, see Frenkel, Razin, and Sadka (1991, pp. 100-105).

<sup>9</sup>The illustrative example used by Frатиanni and Christie (1981, p. 415) assumes that commodity tax rates in country A are 8 % and 20 %, respectively, as compared to 5.3 % and 17 % in country B. This implies a common value for  $h$  equal to 0.9 in both countries.

### 3 Introducing International Capital Mobility

At first glance, it might seem that the neutrality of the origin principle is bound to break down in the presence of capital mobility. The basis for this observation is that, with mobile capital, it is not the trade balance but rather the current account balance which must equal zero in long run equilibrium. If the value of net foreign assets measured in domestic currency is denoted by  $V$ , and if one assumes that the physical quantities of exports  $X$  and imports  $M$  depend on the relative price of domestic goods (thereby allowing for imperfect substitutability of traded goods), the current account equation for the domestic economy under the origin principle will read

$$p(1+t)X \left( \frac{p(1+t)}{Ep^*(1+t^*)} \right) - Ep^*(1+t^*)M \left( \frac{p(1+t)}{Ep^*(1+t^*)} \right) + r^*V = 0.$$

Division by  $Ep^*(1+t^*)$  yields

$$\frac{p(1+t)}{Ep^*(1+t^*)}X \left( \frac{p(1+t)}{Ep^*(1+t^*)} \right) - M \left( \frac{p(1+t)}{Ep^*(1+t^*)} \right) + \frac{r^*V}{Ep^*(1+t^*)} = 0, \quad (12)$$

where  $p$  is the producer price of domestic goods,  $t$  is the general domestic commodity tax rate,  $p^*$  is the foreign-currency price of foreign goods,  $E$  is the exchange rate,  $t^*$  is the foreign commodity tax rate, and  $r^*$  is the world interest rate. In the absence of capital mobility we have  $V = 0$ . It is then easily seen that if relative producer prices  $p/Ep^*$  flexibly adjust by the factor  $(1+t^*)/(1+t)$ , relative consumer prices and hence trade flows will be unaffected by taxes, and trade will still be balanced despite international differences in the origin-based commodity tax rate. However, with capital mobility where  $V$  generally differs from zero, such complete adjustment of producer prices will not guarantee neutrality unless the third term in equation (12), the value of net foreign assets deflated by the tax-inclusive price of foreign goods, remains unchanged.

Since it is not immediately clear that this condition will be met, section 3.1 sets up a simple intertemporal model of an open economy to show that the neutrality of the origin principle carries over to a setting with capital mobility. In section 3.2 we return to the current account balance equation (12) and argue that the net foreign asset term will in fact be unchanged, thus demonstrating the neutrality of an origin-based consumption tax in an alternative way.

### 3.1 A Simple Two-Period Model With Commodity Taxes

We consider a small open economy producing a single internationally traded good which is used for consumption as well as investment<sup>10</sup>. This domestic good is a perfect substitute for foreign goods, so under the origin principle commodity price arbitrage implies that the domestic producer price  $p$  will be governed by

$$p(1+t) = E p^*(1+t^*) \equiv 1, \quad (13)$$

where we have normalized the foreign tax-inclusive price level at unity. Recall from our discussion of equation (3) above that this arbitrage condition holds for both consumer and capital goods if either the notional credit method or the international subtraction method are applied under an origin-based consumption tax.

The representative domestic consumer lives for two periods and maximizes a well-behaved utility function of the form

$$U = U(C_1, C_2), \quad (14)$$

where  $C_1$  is consumption during the first period of his life, and  $C_2$  is consumption during the second period. The consumer is the owner-manager of a domestic competitive firm. At the beginning of period 1, this firm is endowed with a pre-determined, non-depreciable initial stock of capital  $K_1$ , but during period 1 the consumer can spend part of his earnings on physical investment (or sell part of his initial capital stock) so that he may enter period 2 with a different capital stock  $K_2$ .

On the other hand, since the consumer's life ends after period 2, he may finance part of his consumption during this period by the proceeds from the sale of his capital stock at the end of the period. Production in any period is a function of the physical capital stock existing at the beginning of the period and of the consumer's fixed labour supply, which is subsumed in the production function  $f(\cdot)$ . In addition to his earnings from the firm, the consumer receives a lump sum government transfer  $T$  in each period. In the *absence* of international capital mobility, the consumer must thus maximize (14) subject to the two budget constraints

$$p(1+t)C_1 = [p f(K_1) - p(K_2 - K_1)] + T_1, \quad (15)$$

$$p(1+t)C_2 = [p f(K_2) + p K_2] + T_2, \quad (16)$$

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<sup>10</sup>Note that the one-good assumption made here is not incompatible with international trade in commodities. Rather, the one-good assumption implies that commodity trade nets out in the aggregate when international capital flows are absent.



where the terms in square brackets represent the net cash flows from the firm after payment of commodity taxes. The term  $p(K_2 - K_1)$  in (15) indicates expenditure on physical investment during period 1. This is valued at producer prices because investment expenditure is deductible from the base of a general origin tax of the consumption type [cf. equation (5)]. Similarly, the term  $pK_2$  in equation (16) is the revenue from the sale of the capital stock at the end of period 2. Since this revenue is taxable, the net cash flow to the consumer is again determined by the producer price  $p$ . Note that even though only the domestic producer price enters the budget constraint (15), the arbitrage condition (13) ensures that (15) will in fact hold regardless of whether the firm purchases its capital goods from domestic or foreign suppliers, given that VAT liabilities are calculated according to the notional credit method or the international subtraction method described in section 2.2.

To complete the description of our simple model, we must specify the lump sum government transfers which are financed by the commodity tax. As mentioned in section 2.2, an origin-based commodity tax of the consumption type will exempt investment expenditure but tax the proceeds of the sales of all goods, including investment goods, so the tax revenue and hence the transfer payments in the two periods will be given by

$$\begin{aligned} T_1 &= t[p f(K_1) - p(K_2 - K_1)], \\ T_2 &= t[p f(K_2) + p K_2]. \end{aligned} \quad (17)$$

Let us first employ the model to reproduce the conventional neutrality property of an origin-based general commodity tax in the absence of capital mobility. Maximizing the utility function (14) with respect to  $C_1$ ,  $C_2$ , and  $K_2$ , subject to the two budget constraints (15) and (16), and using (17) to eliminate  $T_1$  and  $T_2$  from the resulting first-order conditions<sup>11</sup>, one finds that the consumer's optimum conditions in the absence of capital mobility can be written as

$$\frac{\partial U / \partial C_1}{\partial U / \partial C_2} = 1 + f'(K_2), \quad (18)$$

$$C_1 = f(K_1) - (K_2 - K_1), \quad C_2 = f(K_2) + K_2. \quad (19)$$

Since the tax rate does not appear anywhere in these equations, it follows that the tax is completely neutral, having neither substitution nor income effects on resource allocation. Equation (18) reproduces the standard Pareto condition for a first best

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<sup>11</sup>Note that the transfer payments in each period are exogenous from the viewpoint of the representative consumer so that their values must be inserted only *after* the optimization problem has been solved.

optimum that the marginal rate of substitution between consumption in the two periods must equal the marginal rate of transformation, while equations (19) simply restate the economy's overall resource constraints for the two periods.

We turn now to the case where an international capital market exists. In the *presence* of international capital mobility, the consumer may use part of his cash inflow in period 1 to purchase an internationally traded financial asset  $S$  which pays the exogenous world interest rate  $r^*$  in period 2. Allowing for the resale of this asset at the end of period 2, the consumer then faces the constraints

$$\begin{aligned} p(1+t)C_1 + S &= [pf(K_1) - p(K_2 - K_1)] + T_1 \\ p(1+t)C_2 &= [pf(K_2) + pK_2] + T_2 + (1+r^*)S. \end{aligned}$$

Eliminating  $S$  yields

$$p(1+t) \left[ C_1 + \frac{C_2}{(1+r^*)} \right] = pf(K_1) - p(K_2 - K_1) + T_1 + \frac{[pf(K_2) + pK_2 + T_2]}{(1+r^*)}. \quad (20)$$

When he has access to an international capital market, the consumer may reallocate his consumption over time along the international capital market line, and his budget equations collapse into a single intertemporal constraint stating that the present value of his (tax-inclusive) consumption expenditure must equal the present value of the payments received from the firm and from the government.

The consumer now maximizes the utility function (14) with respect to  $C_1$ ,  $C_2$ , and  $K_2$ , subject to the intertemporal budget constraint (20), recalling from (13) that  $p(1+t) = 1$ . Again, we may use (17) to eliminate  $T_1$  and  $T_2$  from the first-order conditions, and we then find that the equilibrium of our market economy will be characterized by the optimum conditions

$$\frac{\partial U / \partial C_1}{\partial U / \partial C_2} = 1 + r^*, \quad f'(K_2) = r^*, \quad (21)$$

$$C_1 + \frac{C_2}{(1+r^*)} = f(K_1) - (K_2 - K_1) + \frac{[f(K_2) + K_2]}{(1+r^*)}. \quad (22)$$

Again we see that the tax rate has dropped out from the equilibrium conditions, implying complete neutrality of the origin principle under international capital mobility as well. According to (21) the consumer will reallocate consumption over time until his marginal rate of substitution between present and future consumption equals the (constant) marginal rate of transformation  $(1+r^*)$  offered by the international capital market, and the firm will carry physical investment to the point where the marginal product of capital equals the exogenous return on international financial assets.

We emphasize that the neutrality of the origin principle depends crucially on the assumption that the general commodity tax is of the consumption type. In contrast, if the commodity tax is of the *income* type, investment expenditure is not deductible from the tax base and the sale of investment goods is not included in the base. The price of capital goods is then given by the *consumer* price of output, and the consumer's budget constraints (15) and (16) change to

$$p(1+t)C_1 = [p f(K_1) - p(1+t)(K_2 - K_1)] + T_1 \quad (23)$$

$$p(1+t)C_2 = [p f(K_2) + p(1+t)K_2] + T_2 \quad (24)$$

Tax revenues are altered accordingly and (17) changes to

$$\begin{aligned} T_1 &= t p f(K_1), \\ T_2 &= t p f(K_2). \end{aligned} \quad (25)$$

In the absence of capital mobility, maximizing (14) subject to the budget constraints (23) and (24) yields the following first-order condition for  $K_2$ :

$$\frac{\partial U / \partial C_1}{\partial U / \partial C_2} = 1 + \frac{f'(K_2)}{(1+t)}. \quad (26)$$

In contrast to equation (18), the commodity tax rate enters the first-order condition (26), demonstrating that intertemporal resource allocation is distorted by a commodity tax of the income type. This result is familiar from the analysis of an income tax: since savings (investment) cannot be deducted from the tax base in period 1 while the return to savings (investment) is taxed in period 2, future consumption is discriminated by the tax and the marginal rate of substitution (of  $C_1$  for  $C_2$ ) will fall below the marginal rate of transformation. It is easy to show that this distortion is also present under an origin-based commodity tax of the income type when international capital mobility is introduced.

Of course, our model can also be utilized to investigate the effects of a destination-based general consumption tax. In that case, goods arbitrage will imply that

$$p(1+t) = E p^*(1+t) \implies p = E p^* \equiv 1, \quad (27)$$

where we may now set the foreign producer price at unity. Both the temporal budget constraints (15)–(16) and the intertemporal constraint (20) will remain unaffected by the switch from an origin-based to a destination-based consumption tax, but tax revenues and hence transfer payments will be given by

$$T_1 = t C_1, \quad T_2 = t C_2. \quad (28)$$

Following an optimization procedure similar to the one indicated above, the reader may easily convince herself that a destination-based general consumption tax likewise implies complete neutrality, whether capital is mobile or not.

### 3.2 Discussion of the Neutrality Result

Although a mechanical analysis of the equation for current account balance (12) might suggest non-neutrality, it is not really surprising that the neutrality of an origin-based consumption tax survives the introduction of capital mobility. International capital mobility simply allows an intertemporal reallocation of consumption, but when the general consumption tax rate is constant over time, it will not affect the relative price of present versus future consumption and hence will not influence the economy's saving-investment balance. To put it differently, consumption in different periods may be seen as separate commodities which are taxed at a uniform rate when the commodity tax rate is time-invariant, and the consumer's intertemporal budget constraint is then equivalent to a static budget constraint linking the consumption of the two commodities 'present consumption' and 'future consumption'. With this translation of the consumer's intertemporal problem, it should be intuitively clear that the neutrality of the origin principle derived in a static many-commodity setting without capital mobility will carry over to the intertemporal setting with international borrowing and lending.

Notice that the validity of our neutrality result does not hinge on our small-economy assumption. In a general equilibrium model of two large, interdependent open economies, the optimum conditions derived above would still characterize the equilibrium of each individual country, and one would only have to add the overall resource constraint for the world economy as a whole (which would obviously not include any taxes) to close such a model. Notice also that our aggregation of all goods into a single commodity is quite innocent, as long as trade in all categories of goods (including intermediates and capital goods) enforces the general arbitrage condition (3). In that case all producer prices of inputs and outputs will adjust proportionally to a change in the general commodity tax rate. As we have seen, fulfilment of (3) for all types of goods requires that a multi-stage tax like the value-added tax be administered according to either the notional credit method or the international subtraction method.

In the single-period framework underlying the current account equation (12), the proportional adjustment of the prices of all goods is still the key to the neutrality of the origin principle<sup>12</sup>. In particular, the general adjustment of all prices (including the prices of capital goods) explains why the deflated net foreign asset term in equation (12) will be unaffected – so that the current account will remain

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<sup>12</sup>The neutrality of the origin principle in a model with international trade in capital goods, but without savings and capital accumulation, is also discussed in Krause-Junk (1992, pp. 149–151).

in equilibrium – even though producer prices adjust to the imposition of an origin tax. To illustrate, consider a net debtor country where foreign investors own a fraction  $\alpha$  of the domestic capital stock  $K$ . In long run equilibrium, the market value of the physical capital stock must equal its replacement value. With  $p_k$  denoting the producer price of domestic capital goods, foreigners will therefore have to inject a capital inflow of  $\alpha p_k (1 + t)K$  into the domestic economy in order to acquire a fraction  $\alpha$  of the domestic capital stock<sup>13</sup>. In the current account equation (12) we then have  $V = -\alpha p_k (1 + t) K$ , and the equation may therefore be written as

$$\frac{p(1+t)}{Ep^*(1+t^*)} X \left( \frac{p(1+t)}{Ep^*(1+t^*)} \right) - M \left( \frac{p(1+t)}{Ep^*(1+t^*)} \right) - r^* \alpha \frac{p_k(1+t)}{Ep^*(1+t^*)} K = 0, \quad (29)$$

where  $p^*$  should now be interpreted as the foreign price of consumer goods. This equation makes clear that if domestic producer prices of capital goods ( $p_k$ ) as well as the producer prices of consumer goods ( $p$ ) adjust by the factor  $1/(1+t)$ , or if the exchange rate  $E$  adjusts by the factor  $(1+t)$ , there is no need for trade and capital flows to adjust to a change in the tax rate, and the current account will remain in balance.

Alternatively, we may say that even though a higher origin-based domestic commodity tax rate implies a higher tax burden on output produced by means of domestically located capital, there is no incentive to shift part of this capital abroad, because investors attempting to liquidate domestic capital goods for the purpose of capital exports would end up with a correspondingly lower after-tax revenue from the liquidation and hence would face a higher relative price of foreign (physical) assets which would eliminate the incentive for additional capital exports.

Thus, under the origin principle, cross-country tax differentials are capitalized in the after-tax prices of physical assets and give rise to asset-price differentials which are proportional to the differentials in net-of-tax output prices. Hence, with the ratio of input (asset) to output prices being unaffected by the tax differentials, there is no tax incentive to shift production and investment from one country to another.

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<sup>13</sup>Note that even though a business investor may deduct the VAT paid on his purchase of investment goods from his total VAT liability and will therefore base his calculations of profitability on the net-of-tax price of capital goods  $p_k$ , the amount of foreign exchange injected into the domestic economy by a foreign investor will of course still be equal to the tax-inclusive price  $p_k (1 + t)$  at which capital goods are traded in the domestic market.

### 3.3 Sources of Non-Neutrality

As already suggested, the neutrality of the origin base derived above should be interpreted as a long run equilibrium phenomenon. In the short run and perhaps also in the medium term, the capitalization effects and the price adjustments just described can be expected to work imperfectly, due to the existence of nominal rigidities, including contracts fixed in nominal terms. In particular, if nominal exchange rates are fixed, so that the neutralization of a domestic tax increase requires a downward adjustment of nominal wages and prices, there may be considerable real effects of the tax increase for quite a long time.

Furthermore, even though neither a general origin-based consumption tax nor a general destination-based tax will distort relative prices in the long run, both types of taxes may have permanent effects on the level of aggregate consumption and saving because they will generally tend to affect the distribution of income, including the distribution across different generations and the distribution between domestic and foreign citizens. These distributional effects – which have recently been thoroughly analyzed by Bovenberg (1993) – are in the nature of income effects, and via their impact on savings, they will tend to affect the long run equilibrium magnitude of the net foreign asset term as well as the trade flows in equation (12). Thus, in so far as intergenerational and international distribution effects are of quantitative importance, the general commodity taxes analyzed here will have real effects and hence will be neutral only in the sense that they will not interfere with international efficiency.

## 4 Administrative and Political Aspects

The above discussion has focused on the allocative neutrality of a general consumption tax levied under the origin principle in a simple macroeconomic model. On the other hand, administrative and political arguments have always figured prominently in the discussion of alternative tax principles and, in view of the immediate policy relevance of the topic, a brief review of the most relevant arguments will be included here.

Our discussion in section 2.2 has shown that a *notional* tax credit for imports is compatible in principle with the tax credit scheme that is currently implemented for domestic transactions in all EC member states [cf. equation (6)]. If the foreign tax rate is lower (higher) than the domestic one, this implies that imports are subsidized

(taxed) in the destination country in anticipation of the recouping effect which occurs at subsequent production stages (cf. Krause-Junk, 1990, pp. 262–264).

Alternatively, the subtraction method could be used to exclude intermediate goods from the commodity tax base. Two variants of this tax scheme can be distinguished: one option would be to apply the subtraction method exclusively to international transactions while domestic transactions would still be taxed according to the tax credit method (cf. Sinn, 1990, p. 496, fn. 13). The problem with this solution is that it would be necessary to distinguish between imported and domestic value added throughout the further chain of processing if the origin taxation of imported goods is to be preserved. The substantial practical difficulties of this procedure have been stressed by Andel (1986). The second option would be the consistent use of the subtraction method for international as well as domestic purchases. The drawback is here that the tax laws of the Community and each of its member states would have to be changed in order to reverse the decision in favour of the tax credit method, which has been made by EC member states in the Second VAT Directive of 1967. Given the difficulties of applying either the one or the other variant of the subtraction method, the notional tax credit seems to be the preferred choice of implementing the origin principle.

It should also be stressed that no additional administrative complications arise for the taxation of trade with non-member states if the version of the restricted origin principle suggested by Lockwood, de Meza and Myles (1993) is adopted. Trade flows from the rest of the world to the Community would be tax-exempt in the origin country but EC members still grant a notional tax credit based on their domestic tax rates in order to neutralize the recouping effect which occurs at later stages of production. In contrast, EC exports to the rest of the world would leave the origin country at their tax-inclusive prices but no tax credit would be granted in the country of destination, which simply adds the domestic tax rate on the (tax-inclusive) price of imported goods.

Nevertheless, a number of problems remain under each of the alternatives of implementing the origin principle in the European Community. One argument put forward by Cnossen and Shoup (1987, p. 73) is that both the notional tax credit and the subtraction method give rise to transfer-pricing when tax rates differ between EC members. Since tax credits or deductions from the tax base are based on the *value of imports* there is an incentive for internationally integrated firms to overstate (understate) the import value if the tax rate in the destination country is higher (lower) than the rate of the origin country. Given the increasing importance of multinational firms operating in the Community, this form of commodity tax evasion

must be considered as a serious practical disadvantage of the origin principle<sup>14</sup>.

Another point which has long been emphasized in the discussion of alternative tax principles is that the neutrality of the origin principle must also be *perceived* by economic agents. It is often argued that producers in high-tax member states are unlikely to be convinced by the analysis of exchange rate adjustments that they are *not* put at a disadvantage in comparison to producers in low-tax countries (e.g. Cnossen and Shoup, 1987, p. 71). This argument becomes even stronger if the Community's exports to the rest of the world are subject to double taxation whereas trade in the other direction remains untaxed. This will most likely be perceived as non-neutral by producers throughout the Community and even if this tax scheme were adopted by policymakers, it may be challenged before the European Court of Justice on the grounds that it violates fundamental rules of reciprocity.

## 5 Conclusions

The purpose of this paper was to provide an overview of the main arguments for destination- versus origin-based commodity taxation in the European Internal Market. One option is to maintain the destination principle for trade between VAT-registered traders while allowing final consumer purchases to be taxed in the country of origin. This 'restricted destination principle' inevitably distorts intra-Community trade although the distortion need not weigh heavily from a macroeconomic perspective when the volumes of tax-induced cross-border shopping are low. Alternatively, a tax scheme can be implemented where EC members adopt the origin principle for their internal *and* external trade whereas non-members consistently use the destination principle. In a setting with commodity trade only, the latter tax scheme is neutral if the commodity tax is completely general. With a split VAT structure, however, the origin principle violates production efficiency unless indirect tax structures are harmonized between countries.

The paper has further shown that the introduction of international capital mobility does not affect the neutrality of a general consumption tax levied under the origin principle. The intuition for this result is that a general consumption tax affects neither aggregate savings nor – through the deductibility of investment expenditures from the tax base – the real return to domestic investment. Therefore,

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<sup>14</sup>Note that with non-uniform VAT rates within individual EC countries, the same transfer pricing argument applies equally to *domestic* transactions if a consistent subtraction method were to be implemented in the Community.



no international capital movements are induced by tax rate changes and commodity trade will thus be undistorted. Finally, it has been argued that a notional tax credit scheme allows to switch to the origin principle while maintaining the convenient tax credit method for domestic transactions in the Community. Implementation problems remain, however, because this method may lead to tax evasion through transfer-pricing, and it is likely to stir political opposition because its neutrality is not perceived by EC producers.

A switch to the origin principle also requires that either prices or exchange rates are flexible. Because of the serious short-run difficulties involved in a process of domestic wage and price deflation, the only practicable way for the EC countries to switch to the origin principle would be to adjust exchange rate parities. Thus, each member country would have to adjust its exchange rate in proportion to the level of its indirect tax rates (cf., e.g., Siebert, 1990, pp. 60–62). Since the planned transition to a common currency offers an opportunity to undertake a final exchange rate realignment, it might seem natural to consider a switch to the origin principle at that time. This timing could also be motivated by the fact that the transition to a monetary union will reduce the transaction costs of direct consumer purchases across intra-European borders, thereby exacerbating the distortions associated with the current 'restricted destination principle'. On the other hand, the anticipation of an exchange rate realignment prior to the transition to monetary union could induce speculative capital flows which might create some short run instability in financial markets.

Summing up these arguments, no clear-cut choice emerges between the different commodity tax regimes which are feasible and desirable under the conditions of the European Community's internal market. Given the present fairly limited amount of distortionary direct cross-border consumer trade, the present restricted destination principle may be preferable on practical and political grounds, but if direct consumer trade assumes increasing importance as economic integration proceeds, the option of switching to the origin principle and the notional tax credit scheme seems to deserve serious attention by policy makers.

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