

**Effective Tax Rates in the EU Commission
Study on Company Taxation:
Methodological Aspects, Main Results and Policy
Implications**

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Effective Tax Rates in the EU Commission Study on Company Taxation:

Methodological Aspects, Main Results and Policy Implications*

By Silvia Giannini and Carola Maggiulli

Contents

- I. Introduction
- II. Backward- and Forward-Looking Approaches to Computing Effective Tax Rates
- III. The Methodology Used to Compute Effective Tax Rates in the Commission Services Study
- IV. Pros and Cons of the EC Methodology
- V. The Usefulness of Effective Tax Rate Indicators for Policy Makers
- VI. Concluding Remarks

I. Introduction

The study on corporate taxation in the EU undertaken by the Commission services (EEC 2001a; b) provides a comprehensive assessment of the problems arising from the coexistence of 15 different company tax systems and of the major obstacles to companies' cross-border activities in the internal market. It also provides a detailed discussion of different (targeted and comprehensive) measures to remove these obstacles, and makes some important and very innovative suggestions for future tax coordination.

This study was conducted to comply with a mandate by the Council, and it is not by chance that it was requested at a time when the EU was undertaking a profound analysis of the (harmful) effects of the preferential regimes established by the Member States (see Council of the European Union 1999). With the phasing out of these regimes, the general features of the tax system will become more important for location decisions and therefore for the competitive behaviour of the different countries.

The mandate explicitly stated that the study should, among other things, "illuminate existing differences in effective corporate taxation in the Community" in

* The views expressed in this paper are those of the authors alone and should not be attributed to the European Commission or its services.

view of the “effects on the location of economic activity and investments” (EEC 2001a).

Differences in effective tax burdens between national jurisdictions within the EU and subsequent tax competition may give rise to two different corporate strategies. On the one hand, effective tax rate differentials may create incentives to locate new production or to relocate existing production in certain countries, thus impacting on resource allocation, employment and economic activity in general. On the other hand, tax differentials may induce tax optimisation processes involving changes in the location of the taxable base, with a subsequent loss of tax revenues for some jurisdictions, but without much incidence on the actual production location and economic activity.

The mandate given to the Commission clearly refers to the effects of effective corporate tax differentials on resource allocation. In broad terms it demands a quantitative assessment of how the general criteria of the efficiency of the company tax system is met at EU level, taking into account the existence – and therefore the features – of 15 different general tax regimes.

To comply with this part of the mandate, the study provides a wide range of computations in order to compare effective tax rates on domestic and international investment for the EC Member States and to evaluate the domestic and international efficiency of the corporate tax systems adopted by the EU Member States.

“Effective tax rates” are summary indicators that take into account the interaction of different aspects of tax legislation: e.g. national and local statutory rates, allowances from the tax base, tax credits, and, for international investments, methods to avoid or reduce double international taxation. Their computation involves a variety of complex conceptual and measurement problems. Notwithstanding certain limitations, these indicators provide useful insight into the principal tax distortions and can be used to evaluate the impact of tax reforms or policy coordination.

This paper briefly reviews this “quantitative” part of the Commission study, focusing on the methodology used and the policy implications of the empirical results obtained.

More precisely, the paper is organised as follows.

Section II recalls the important distinction between forward- and backward-looking indicators and explains why the former are better suited to identifying tax distortions on economic decisions. Section III illustrates the basic assumptions of the methodology used to compute forward-looking effective tax rates, emphasising in particular the importance of extending the analysis to effective average tax rates, along with the more traditional effective marginal tax rates usually presented in other comparative studies (OECD 1991; Ruding 1992; Baker and McKenzie 1999; 2001). Section IV illustrates other extensions of the study and the major remaining limitations of the approach used. Section V highlights the usefulness of these indicators for policy makers, suggesting the principal policy implications of the quantitative results presented in the Commission services study. In so doing we will sometimes go beyond the comments of the study, or

be more explicit in assessing the policy implications that might be derived from these quantitative results.

II. Backward- and Forward-Looking Approaches to Computing Effective Tax Rates

When policy makers or economic agents want to evaluate the impact of taxation on economic activity and understand the usefulness and likely effects of their decisions, they need to assess effective tax burdens. They therefore need to take into account the interplay of the statutory rates, the provisions defining the tax base and the subsequent reduction in tax debt made possible through the existence of tax credits.

In assessing effective corporate tax burdens, two types of framework can be distinguished. One approach measures effective tax rates on the basis of current data arising from aggregate macroeconomic accounts or from the accounts of existing firms. Because it is based on the observation of *ex-post* data, it is known as a “backward-looking” – macro or micro – approach. Effective tax rates based on macro backward-looking methodologies are often referred to as “implicit tax rates”. The second framework is based on *ex-ante* indicators involving the calculation of effective tax burdens, for a hypothetical prospective investment project or company, over the assumed life of the project. As they are based on future hypothetical behaviour, these indicators are defined as “forward-looking”.

The existence of different indicators is not, per se, a shortcoming of this kind of analysis, but simply reflects the fact that each indicator measures different things. Different indicators can be appropriate for different policy issues (see OECD 2001). Therefore, it is worth emphasising that it is impossible to compute the “universally valid” effective tax rate. Moreover, this measure not only depends on the chosen approach, but also on the particular way the approach is applied.

When policy makers are concerned with the effects of the increasing mobility of capital in terms of a gradual shifting of the tax burden from capital to labour or consumption, or when they are interested in knowing the actual tax burden on small versus large firms or the tax burden on different industries or types of economic activity located in their country, compared with others and over time, then the use of backward-looking indicators may be a useful policy tool. Generally, this approach is useful for addressing issues related to the distribution of the tax burden and the effects of tax legislation and possible changes of the tax code on corporate cash flow. It also permits better understanding of the sensitivity of tax revenues to the economic cycle. While backward-looking indicators may give an accurate picture of the tax position of a particular company, they cannot single out the incentives generated by a particular tax regime for a number of reasons. In particular, tax payments in any period may depend appreciably on the past history of the company and hence may vary between companies that are currently identical in all other respects. When the analysis of the impact of taxation on investment behaviour is the objective, and therefore the effects of tax legisla-

tion on future choices have to be pinpointed, then forward-looking indicators are preferable by far. They make it possible to isolate the structure of the incentives and disincentives offered by the elements of the tax systems for specific investments, and to take into account the interrelations of the different tax systems. Therefore, they allow a comparison of international tax regimes and identification of the most important tax drivers influencing effective tax rates.

Taking into account the scope of the analysis, the Commission services, supported by a panel of experts¹, agreed on the need to compute micro forward-looking indicators.

It is worth noting that these indicators do not assess the actual impact of tax differentials on investment flows or on the economic welfare of the Member States and the EU as a whole. However, because of the lack of empirical data, and the difficulties and uncertainties in devising a proper methodology², the Commission considered that none of the existing approaches designed to assess the actual impact of taxation could be usefully adopted without considerably extending the range of the work.

III. The Methodology Used to Compute Effective Tax Rates in the Commission Services Study

Traditional analysis of forward-looking effective tax rates on income from capital has focused on the impact of tax on marginal investment decisions in the framework of the model developed by King and Fullerton (K&F 1984). Their approach was originally conceived for the analysis of domestic investments. Subsequently it was extended to transnational investments (OECD 1991, Ruding 1992) and is increasingly being used to make comparisons over time and between countries. At international level, the K&F methodology is the most well known. This is a clear advantage when the purpose of the analysis is to provide summary indicators to policy makers.

However, the K&F methodology has a major limitation when used to summarise the impact of taxation on international location decisions. It focuses on the impact of taxation on a marginal investment, that is, an investment whose expected pre-tax return equals the cost of capital. By focusing on this minimum required return on investment, the K&F approach provides indicators – the effective marginal tax rates – useful in explaining the scale of the investment and the possible distortions introduced by the tax system for different assets and sources of finance. However, as demonstrated by a growing literature, particu-

¹ The experts who assisted the Commission in this work were Ms. *S. Giannini* and Messrs. *K. Andersson*, *M. Devereux*, *J. Le Cacheux*, *C. Spengel*, *J.M. Tirard* and *F. Vanistendael*.

² The empirical literature on the impact of taxation on the location of real capital is still largely inconclusive: there is some evidence that taxes are important, but there is still much uncertainty about the extent of this effect (*Devereux and Griffith 2002a*). Even more difficult is to provide estimates of the overall efficiency losses arising from particular incentive structures of the tax systems, vis-à-vis tax co-ordination, using a general equilibrium framework (*Sorensen 2000*).

larly based on Devereux and Griffith (1998a; 1998b)³, these summary indicators may be limited and even misleading when used to assess the impact of taxation on location decisions and on the competitive behaviour of the different jurisdictions. In fact, multinational companies usually face a choice between two or more exclusive projects (exporting or producing abroad, and in the latter case, the country of investment) expected to earn more than the minimum required rate of return. To take the decision, they will compare the expected post-tax economic rents of each alternative. Hence, they will be interested in seeing how large a share of the pre-tax value of a profitable investment project will be paid as corporate income tax. A measure of this share is an effective “average” tax rate, since it expresses the expected total tax burden in relation to total profits.

In summary, both effective marginal and average tax rates are important but they serve different purposes: the latter may be more appropriate for identifying the effect of taxation on the choice of location, while the former impact on the choice of how much to invest, once the choice of location has been made.

The Commission services study presents effective marginal and average tax rates for a large number of different hypothetical investment projects. It is the first comprehensive analysis of effective average tax rates ever undertaken for the EC countries, which represents its most important innovation with respect to previous studies, including the Ruding Report. The next section briefly describes the methodology used by the Commission, and illustrates that these two indicators – marginal and average tax rates – provide different pictures, and are therefore useful complementary tools for the purpose of the analysis.

1. The Devereux Griffith Approach

To compute the effective average tax rate the Commission study mainly relies on the methodology developed by Devereux and Griffith (D&G 1998a). This approach, which can be considered an extension of the K&F methodology, has the advantage of allowing the computation of both effective marginal and average tax rates within a single framework.

In practice, the D&G model computes what we may simply call an “effective tax rate” for alternative hypothetical investment projects with different rates of profitability, illustrating respectively:

- a) the effective marginal tax rate, if the real pre-tax return is the minimum rate required to undertake the investment, that is to say, is equal to the cost of capital;
- b) the whole range of effective average tax rates, if the project is not marginal, i.e. if it generates economic rents.

The effective tax rate (ETR) is measured as the ratio between the present value of taxes and the present value of pre-tax income a company expects to

³ See also *Bond (2000)*, *Bond and Chennels (2000)*, *Devereux, Lockwood, and Redo-ano (2001)*, *Devereux and Griffith (2002b)*.

earn from alternative new investment projects that can be either marginal (effective marginal tax rate) or infra-marginal (effective average tax rate) in their post-tax return. More precisely, the numerator is the difference between the present value of the rent of the investment before tax (R^*) and after tax (R), and the denominator by which these taxes are scaled down is the net present value of the pre-tax income stream, net of depreciation (Y^*):

$$(1) \quad ETR = \frac{R^* - R}{Y^*}.$$

We will not enter here into the details of the model, summarised in Annex A of the Commission study, but will briefly explain its major assumptions and provide a numerical example.

The D&G analytical framework is fairly simple as it is based on a one-period perturbation of the capital stock: a hypothetical investment undertaken in period t , and providing a real return equal to p , is reversed in period $t + 1$. The financial policy of the company strictly follows this one-period perturbation of the capital stock: the company issues equity or debt in period t and repurchases equity or repays the principal, along with interest, in period $t + 1$. The value of the firm is derived from a standard capital market equilibrium condition, according to which a representative shareholder (a domestic resident) will hold equity shares only up to the point where their net return is equal to the net return from selling the company and investing the assets in the best alternative investment available (Treasury bonds, for example).

If the value of the firm does not change as a consequence of this one-period perturbation of the capital stock, the pre-tax return of the investment undertaken in period t is equal to the cost of capital and the investment is marginal. If, on the contrary, the one-period change in capital stock increases the value of the company, then the investment project is earning economic rents.

Given the real market interest rate r and the real return on investment p , the net present value of the pre-tax economic rent (R^*) is simply:

$$(2) \quad R^* = \frac{p - r}{(1 + r)}$$

and the present value of the pre-tax net income Y^* is:

$$(3) \quad Y^* = \frac{p}{(1 + r)}.$$

The post-tax economic rent, R in equation (1), is a much more complex expression containing all tax parameters, the economic depreciation rate (δ), the rate of return on investment (p), the rate of inflation (π), and the rate of interest (r). Moreover, it is defined in different terms depending on the company's financing choices and on whether the investment is located domestically or in a foreign country.

For the sake of simplicity we only replicate here the value for R in the domestic case, and assuming that the investment is financed by retained earnings and there are no personal taxes:

$$(4) \quad R^{RE} = -(1 - A) + \frac{(1 - \delta)(1 + \pi)(1 - A) + (\rho + \delta)(1 + \pi)(1 - \tau)}{(1 + i)}$$

where:

A is the present value of the tax saving due to depreciation allowances;

τ is the overall statutory tax rate on profits;

$i = r(1 + \pi) + \pi$ is the nominal interest rate.

The effective marginal tax rate is computed by making this post-tax economic rent (R) equal to zero and solving for the rate of return ρ . The latter, denoted by $\tilde{\rho}$, is the minimum return the company must earn, net of depreciation, in order to cover the costs of the investment, including the cost of finance, and given the real market interest rate r . For example, in the case of an investment in machinery financed by retained earnings in the UK, and assuming $r = 5\%$, $\pi = 2\%$, $\tau = 30\%$, $\delta = 17.5\%$, $A = 0.2502^4$, the cost of capital $\tilde{\rho} = 6.6\%$, and the effective marginal tax rate is 24.2%.⁵

The effective average tax rate is computed taking the same real market interest rate (r), and different hypothetical pre-tax rates of return on investment (ρ) greater than the cost of capital ($\tilde{\rho}$). Hence, for each particular investment project defined as the acquisition of a specific asset financed with debt, new equity or retained earnings, it is possible to compute the effective marginal tax rate and the whole range of effective average tax rates for all possible values of the real return greater than the cost of capital. Taking again the example of an investment in machinery financed by retained earnings in the UK, and assuming a pre-tax return on the investment of 20%, the value of post tax rent R is 0.08933 and the corresponding EATR is 28.1%.⁶

The D&G model is also extended to international direct investment, using an approach similar to that used by the OECD (1991). It considers a parent company resident in country j which undertakes an investment in country i through a wholly-owned subsidiary. The parent company, in turn, is owned by shareholders located in country j , so that the equilibrium condition defining the value of the firm does not change with respect to the domestic case. The subsidiary finances the increase in investment through retained earnings, new shares issued to the parent company and borrowing from the parent. All the various methods implemented in the tax legislation of the various countries for reducing or avoiding international double taxation on repatriated dividends and interests (exemption, credit, deduction) are considered.

⁴ The fiscal coefficient (ϕ) is 25% and the method of depreciation is declining balance; therefore: $A = \tau\phi(1 + i)/(\phi + i) = 0.30 \cdot 0.25 \cdot 1.071 / (0.25 + 0.071) = 0.2502$.

⁵ These results are shown in Table 1 for the UK case in Annex C of the study.

⁶ See again Annex C, Table 1 for the UK.

The assumptions of the D&G model differ somewhat from those of the traditional K&F and OECD models, but the effect of these differences on results is of minor importance and the two approaches are highly consistent in the effective marginal tax rate they generate.

2. Do Effective Marginal Tax Rates and Effective Average Tax Rates Provide Different Pictures of Tax Distortions?

To illustrate the different picture that can result when looking at average rather than marginal tax rates it may be useful to refer directly to some of the general results of the Commission study. Table 1 compares effective marginal tax rates in the EU in 1999⁷ with effective average tax rates computed for two different rates of profitability, 20% and 40%. The results refer to the base case of a domestic investment without personal taxes. However, similar observations could be made using the case of an international investment.

Table 1

Effective Marginal Tax Rates (EMTR) and Effective Average Tax Rates (EATR) in the EU (1999)^{*} (domestic investment – corporate taxes only)

Source of finance	EMTR	EATR (20%)	EATR (40%)
Retained earnings	32.6	33.5	33.5
New equity	31.6	33.1	33.3
Debt	- 24.6	22.3	28
Mean	20.2	29.5	31.6
<p>* The effective tax rates for each source of finance are the unweighted averages for the 5 assets considered – intangibles, machinery, industrial buildings, financial assets and inventories – and for the 15 EU countries. The last row is a weighted average for the three forms of finance, with weights of 55% for retained earnings, 10% for new equity and 35% for debt.</p>			

Source: EEC (2001a, Tables 1, 2, 14).

Table 1 shows, first of all, that the effective tax rate increases with profitability. Considering the overall mean (last row), the effective tax rate is 20.2% for a marginal investment and grows to 29.5% and to 31.6% if the investment project generates a real return equal to 20% and 40%, respectively. The average

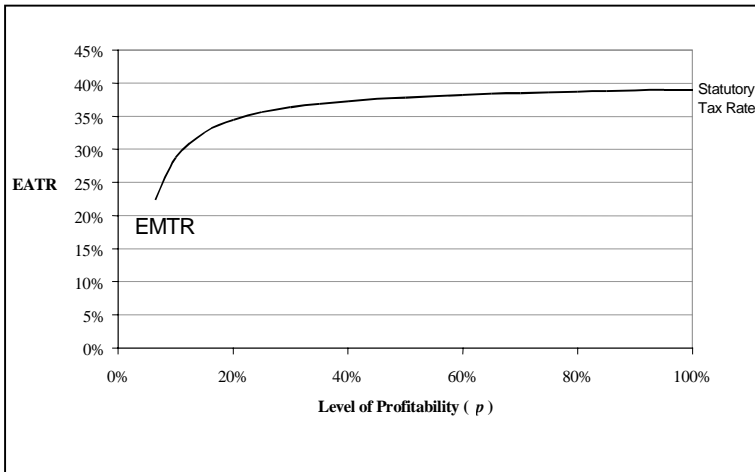
⁷ In the Commission study, the reference date for the computation of effective tax rates is 1999. However for Germany all calculations are repeated to take into account the wide tax reform enforced in 2001. In addition, a specific section of the study (Part II, section 10) updates effective tax rates for a domestic investment in 2001.

statutory rate (including surcharges and local taxes) in the EU is 34.7%.⁸ Hence, for the EU as a whole, the effective marginal tax rate is less than the effective average tax rate and the latter increases as profit rises, gradually approaching the nominal rate.

In the absence of personal and capital taxes, the typical relation between the effective marginal tax rate and the whole range of effective average tax rates for different rates of profitability is illustrated by the graph in figure 1, which refers to the case of Belgium.

Figure 1

Effective Average Tax Rate and Profitability in Belgium
(corporate taxes only – average for all forms of investments)



Source: EEC (2001a, Figure 1).

The effective marginal tax rate is usually lower than the effective average tax rate because of the benefits of tax allowances from the tax base, for depreciation and interest payments, which are more powerful in reducing the tax burden on marginal investments. As profits increase above the minimum required rate, these allowances become relatively less important and the effective tax burden is increasingly affected by the statutory rate. This also explains the different behaviour of the effective tax rate with respect to the different sources of finance

⁸ In 1999, Germany had different rates on distributed and retained earnings. To compute the average statutory rate for the EU, we used the rate on retained earnings.

considered. As table 1 illustrates, there is not much difference between the effective marginal tax rate and the effective average tax rate when the source of finance is equity, whereas in the case of debt the effective tax rate rapidly switches from a negative value (-24.6) to a positive value. For a 20% rate of profitability the effective average tax rate is 22.3%, rising to 28% if the rate of return doubles to 40%. At the margin, the effective tax rate is negative, because in addition to depreciation allowances (which in the EU are slightly higher on average than the assumed economic depreciation rate), the company has the advantage of deducting nominal interest payments from the tax base. It is a well-known conclusion of the economic literature that when depreciation allowances are greater than true economic depreciation and are associated with deductible interest payments, corporate tax is transformed into a subsidy at the margin. However, with an increase in profits above the minimum rate required to make interest payments, the subsidy at the margin rapidly disappears. The statutory rate on profits increasingly affects the effective average tax rate, which becomes positive and moves closer to the statutory rate as profits rise.

To summarise, three elements emerge as particularly important in explaining the observed differences between the effective marginal tax rate and the effective average tax rates, and their relation with the statutory rate. Briefly put, these are:

- a) the amount of the deductions allowed from the tax base, notably for interest payments and depreciation;
- b) the source used to finance investment (equity or debt);;
- c) the rate of profitability assumed to compute the effective average tax rate.

Table 1 and figure 1 also show that starting from the minimum required rate of return, the effective tax rate increases rapidly with profitability up to the 20% rate, whereas the increase is less important thereafter. Although there are differences from one country to the next (see Annex D of the study), the assumption of a 20% rate of profitability underlying the basic calculations of the Commission study is on the whole suitable for identifying most of the changes of effective tax rates from the effective marginal tax rate to the statutory rate, that is to say, from the marginal case to the most profitable investment project.

3. A More Detailed Analysis for the EU Member States

The aggregate picture outlined in the previous section masks noticeable differences between countries. To bring these to light, figures 2, 3 and 4 disaggregate the data of table 1 for each Member State.⁹ The figures show, along with the effective marginal tax rates, the effective average tax rates computed, as-

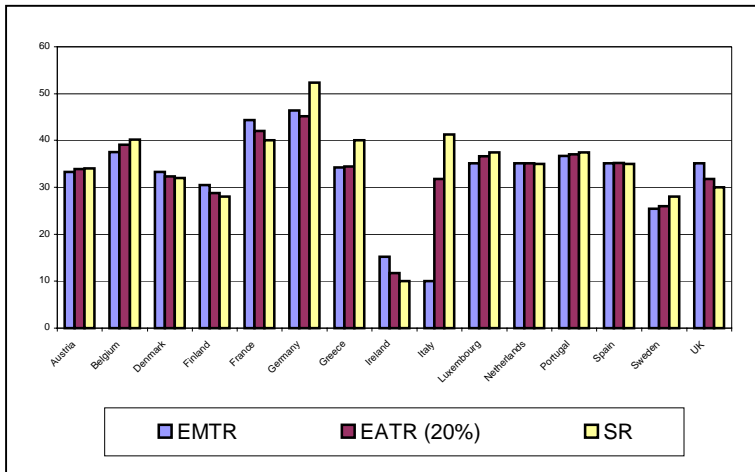
⁹ Equity finance makes no distinction here between new equity and retained earnings, in so far as in the absence of personal taxes the two are equal for all countries but Germany, where in 1999 a two-rate system was in force. In this case the rate shown in the figure is an average using relative weights as used in the study for these two sources of finance.

suming a 20% rate of profitability, and the statutory rates, towards which effective average tax rates tend to rise.

In the case of equity finance (figure 2), the effective marginal tax rate is positive in all countries. In most countries it is lower than the statutory rate and the gap between the statutory rate and the effective tax rate closes as profitability rises. However, for some Member States (Ireland, France, Denmark, Finland, and the UK) the effective tax rate for an equity-financed investment is slightly higher than the statutory rate and decreases as profitability rises. This is due to the presence of relatively high real property taxes, like real estates taxes in Ireland and the UK, which impose a greater effective tax burden on marginal investments than on most profitable ones. This effect more than offsets, at the margin, the benefits of the allowances from the tax base.

Figure 2

Effective Marginal Tax Rates, Effective Average Tax Rates (20% Profitability) and Statutory Rate in the Case of Equity Finance (1999)
(domestic investment – corporate taxes only)



Source: EEC(2001a, Tables 7 and 8).

Owing to these differences in tax laws and the considerable differences in statutory rates, when comparing countries like Belgium and the UK, for example, the difference can be wider when looking at the effective average tax rate rather than at the effective marginal tax rate.

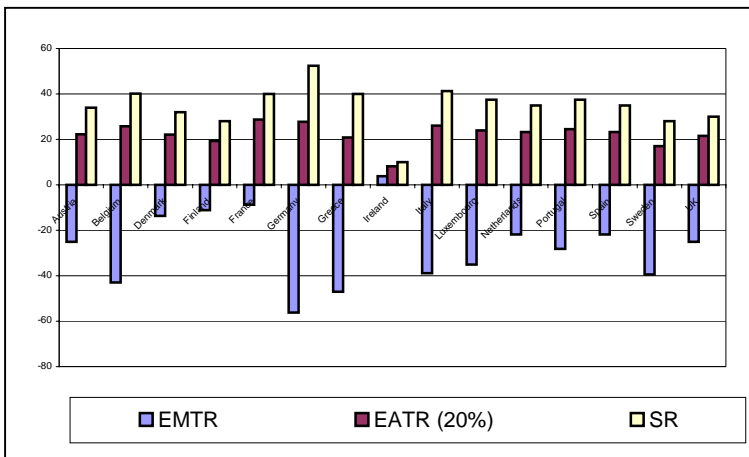
Figure 2 also shows that there are countries, like Spain or the Netherlands, where the three indicators provide substantially the same picture, whereas in other cases, notably in Italy, the picture is very different.

The peculiarity of the Italian case, a very low effective marginal tax rate (10%) compared to the statutory rate (41.25%), is explained by the presence of accelerated depreciation allowances and of a new equity allowance introduced in 1997. Under the latter, an imputed component of profits, representing the opportunity cost of equity capital (new equity and retained earnings), is taxed at a preferential rate (19%) rather than at the statutory corporate tax rate (37% when the reform was introduced). This allowance has a powerful effect at the margin. So, if we compare effective marginal tax rates, Italy appears to have even lower taxes than Ireland, notwithstanding a much higher statutory rate: 41.25% in Italy, compared to 10% in Ireland (used in this calculation). But the picture is very different if one compares the effective average tax rate, which more closely reflects the statutory rate.

The analysis disaggregated by countries clearly confirms that the discrepancy between the effective marginal tax rate and the effective average tax rate is wider when the source of finance is debt (figure 3).

Figure 3

Effective Marginal Tax Rate, Effective Average Tax Rate (20% Profitability) and Statutory Rate in the Case of Debt Finance (1999).
(domestic investment – corporate taxes only)



Source: EEC (2001a, Tables 7 and 8).

In all countries except Ireland, which has a corporate tax rate of 10%, the effective marginal tax rate is negative when the investment is debt financed. As mentioned above, this depends on the interaction between the deductibility of interest payments and tax allowances for depreciation in excess of economic

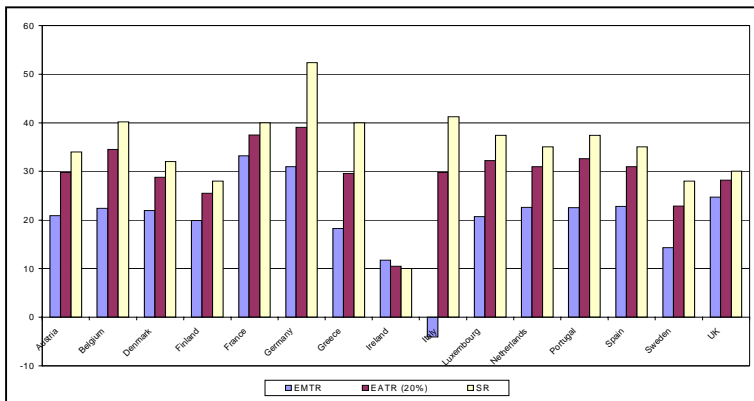
depreciation. The more depreciation allowances are accelerated with respect to economic depreciation, and the higher the statutory tax rate, the greater the subsidy. Sometimes, countries with a relatively low statutory rate also show a high subsidy (e.g. Sweden). As underlined in the Commission study, the existence of an inverse relationship between the level of statutory tax rates and the width of the tax base cannot be generalised.

The effective average tax rate is positive in all Member States. The difference with the marginal tax rate is particularly high for high tax rate-narrow base countries like Germany (in 1999), Greece, Belgium and Italy.

The overall mean results are illustrated in figure 4. Given the weights attributed to the sources of finance, the effective marginal tax rate always turns out to be lower than the effective average tax rate, with the exception of Ireland, because of the relatively high real estate tax accompanied by the low profit tax rate. It is also positive in all cases but Italy. As we saw in the comments concerning figures 2 and 3, this result is due to the tax laws in force in Italy in 1999, which give equity finance preferential tax treatment similar to that usually reserved to debt finance. As far as debt finance is concerned, Italy is not very different from the other countries.

Figure 4

Effective Marginal Tax Rate, Effective Average Tax Rate (20% Profitability) and Statutory Rate. Overall Mean (1999)
(domestic investment – corporate taxes only)



Source: EEC(2001a, Tables 7 and 8).

Though to a lesser extent than in Italy, other countries also show remarkable differences between the three indicators considered in figure 4. For these countries, mostly characterised by narrow tax bases and relatively high statutory rates, the information provided by the traditional effective marginal tax rate indi-

cator may be misleading when it comes to explaining location decisions. When looking at the effective marginal tax rate, countries like Italy and Greece appear very attractive, more than say the UK and Sweden or even Ireland, compared to Italy. But the picture changes considerably when looking at the effective average tax rate or at the statutory rate.

IV. Pros and Cons of the EC Methodology

Approaches based on the computation of forward-looking indicators are subject to specific methodological shortcomings that were carefully examined by the panel of experts and the Commission services.

First of all, the quantitative results (the effective tax rates) depend to a large extent upon certain exogenously fixed economic parameters, like the interest rate, the inflation rate and “true” economic depreciation. Moreover, in order to consider the tax treatment of different types of capital goods, different sources of finance and countries of location, effective tax rates must be computed on a series of alternative hypothetical investments. The calculations made by the Commission consider five different capital goods (machinery, buildings, inventories, R&D and financial assets), three sources of finance for the parent companies (debt, new equity and retained earnings) and three for the subsidiary (retained earnings and debt or new equity subscribed by the parent), plus the possibility of investing in each of the EC Member States, in the US or in Canada. This amounts to a total of 10,800 investment projects on which effective tax rates are computed. To provide manageable information, useful to policy makers, these rates must be aggregated using proper weights. However, these are difficult to obtain and again, different assumptions alter the quantitative results.

It is therefore essential, with this kind of indicator, to perform a sensitivity analysis in order to test the robustness of the results to different assumptions.

The wide sensitivity analysis undertaken in the Commission study (Part II, section 5) demonstrates, as expected, that the exact value of the effective tax burden is rather sensitive to changes in the value of economic parameters, notably the interest rate. However, in most cases the parameters used tend to have little effect on the overall EU values of the effective tax burden, and the analysis also shows that there is considerable stability in the rankings of countries for the different elements of the sensitivity analysis. The base case gives a reasonable indication of the relative position of Member States.

The quantitative results also depend on the assumption of capital market integration and therefore capital market equilibrium conditions in the observed countries and zone. This assumption is particularly relevant when assessing the role and weight of personal taxation – the taxation of shareholders and bondholders – on effective corporate tax rates.

The original K&F approach refers to a closed economy and includes corporate and personal taxation in computing the overall tax wedge between the pre-tax and post-tax rate of return. As is well known from the economic literature, in open economies with internationally mobile capital, the role of personal taxation

on investment decisions raises far more complex issues than in a closed economy. First of all, one should consider the possibility that the saver holds domestic as well as international portfolio assets and that the bulk of domestic and international allocation of savings occurs through an intermediary, rather than by direct holding. Moreover, certain assumptions should be made concerning the arbitrage conditions on international capital markets, the identity of the "marginal" shareholder and its tax status. All these important topics were discussed in the panel and, even allowing for different points of view, the case in which personal taxation is absent was considered as the more relevant. In short, this is coherent with the assumption that the tax rate of the marginal investor is zero (e.g. a tax-exempt intermediary) or, alternatively, that the amount of domestic savings does not affect the world interest rate and that personal taxes are residence based. In both situations, the taxation of the shareholder or, more generally, of the supplier of finance, will not affect the international allocation of capital, since companies will be able to obtain finance at the prevailing world interest rate. For these companies, usually the largest ones, personal taxation is likely to have no effects on the cost of capital.

The forward-looking effective tax rates presented in the Commission services study have other limitations in common with the traditional K&F approach. They are based on the assumption that the company is not "tax exhausted" and can take full advantage of the benefits of tax legislation, and they do not consider a number of important provisions concerning corporate taxation, including the carry-over of losses (backward or forward). Moreover, they do not consider the existence of additional burdens on companies, other than profit and capital taxes.

The quantitative analysis could in principle be extended and made more realistic in many respects, so as to take into account certain tax complexities, but this would have hugely complicated the model and the number of computations without adding a great deal to the main messages the results provide for policy makers, and may even have distracted attention from them.

The University of Mannheim and ZEW (Spengel 1999; Jacobs and Spengel 2002) has designed a quantitative approach – the "European Tax Analyser" – aimed at computing the forward-looking average effective tax rate by taking into account a large majority of the relevant tax provisions and, in particular, the carry-over of losses. This model differs substantially from the D&G approach. The calculations are based on an industry-specific mix of assets and liabilities, taking as a base case a typical medium-sized manufacturing company. Based on this existing capital stock, the future pre-tax profits are derived on the basis of hypothetical developments of future cash receipts and cash expenses associated with this initial capital stock. The tax liabilities are then derived by taking into account the tax bases according to national rules and then applying the national tax rates. The different concepts used in both models therefore imply different weights for the types of assets and the sources of finance, as well as different levels of profitability and interest rates. The "Tax Analyser" model – which is limited to six countries (Germany, France, the Netherlands, the UK, Ireland and the USA) – was used to test whether a substantially different forward-looking approach, capable of taking more detailed tax provisions into account, provides a different picture.

The approach used, like that of the original K&F model, focuses on investment decisions, and therefore on corporate and capital taxation. Companies' economic and location decisions, however, may also be affected by taxes on other inputs, like labour or energy. A number of experts in the panel agreed that the relation between other types of taxes and location decisions is an important one and should be carefully considered in the future. This issue is highly dependent on the assumption made in terms of the incidence of these non-profit taxes¹⁰, but it should be borne in mind that such incidence might change over time, given the apparently increasing importance of these non-profit taxes in the EU.

The mandate by the Council, however, clearly stated that the study should focus on corporate taxation only.

V. The Usefulness of Effective Tax Rate Indicators for Policy Makers

The extensive calculations presented in the Commission services study provide a detailed and fairly clear picture of the potential distortions introduced by the 15 different tax systems in the allocation of capital within the EU and highlight the most important elements of the tax laws accounting for these distortions.

The study shows that, notwithstanding increased economic and monetary integration, there are still sizeable differences between effective tax rates in the different countries, for domestic and international investments alike. The effective average tax rates computed using the European Tax Analyser model provide comparable results, notwithstanding the different approach adopted, as outlined above.

The range of differences is as wide as 37 points for a marginal domestic investment and 30 points in the case of a more profitable investment. For transnational investments, the difference between the effective tax burdens of subsidiaries located abroad can rise to more than 30 points.

The 15 tax systems in the EU are a long way from the benchmark of neutrality under many different dimensions of this concept: types of investment, sources of finance and specific location and therefore they may potentially bring about significant obstacles to full integration and losses in welfare.

Two types of distortions deserve particular attention.

In most countries there is still a large measure of discrimination between debt and equity financing. The issue, which is widely discussed in the economic literature¹¹, should be given more attention in the future policy debate on EU tax policy for several reasons. On the one hand, it is well known that in increasingly sophisticated financial markets, differences in the tax treatment of debt and equity finance open extensive arbitrage opportunities to decrease the tax burden. On the other, the existence of considerable distortion in favour of debt finance

¹⁰ See the discussion in *McKenzie, Mintz and Scharf* (1997). As far as the incidence of capital taxes is concerned, the assumption of a fixed net of corporate taxes world rate of return, implies that corporate taxation is fully borne by the demander of capital.

¹¹ With reference to policy options in the EU, see *Crossen* (1998), for example.

conflicts with the Commission's goal of promoting equity capital to boost growth and job creation (EEC 1998) and exacerbates the Commission's concern about the risk of EU enterprises being over-dependent on debt finance (EEC 1999).

Concerning international distortions on investment location, which is the focus of the study, the results show that neither Capital Export Neutrality (CEN) nor Capital Import Neutrality (CIN) is respected. CEN requires the parent company to bear the same effective tax burden whether investing domestically or abroad; CIN requires the tax burden to be equivalent, in each jurisdiction, on imported and domestic capital.

In general, tax systems tend to be closer to CEN if the subsidiary is debt financed and to CIN if it is equity financed. The main reasons are that interest payments from the subsidiary to the parent are primarily taxed in the home country (according to the residence principle), whereas profits are primarily taxed in the host country (source principle) either because of deferral or because of the exemption of dividends in the home country of the parent company.

Usually, for countries with a higher cost of capital and particularly with high statutory rates, outbound investment is taxed less than domestic investment, whereas the opposite is true for countries with a lower cost of capital and particularly lower statutory rates.¹² All countries show a higher effective tax rate on inbound investment than on domestic investment, except Germany, before the 2000 tax reform.¹³

The calculations presented in the study show that the most important tax driver influencing effective tax burdens and their differences across countries is the overall nominal or statutory tax rate, i.e. the corporate tax rate including surcharges and local rates. Tax rate differentials more than compensate for differences in the tax base, and the relative weight of rates in determining the effective tax burden of companies rises along with growth in profitability.

The extension of the study to effective tax rates on infra-marginal investment allows a clearer interpretation of the impact of taxation on location decisions. The international results confirm to a large extent the basic results commented on in section 3 for the domestic case. Effective average tax rates are more highly dependent upon the statutory rate of the host country than effective marginal tax rates. Focusing on the effective average tax rate could explain why tax competition between the EU countries appears to have taken the form of a reduction in the level of the statutory rate¹⁴, and why countries with lower statutory rates (like Ireland) rather than a lower cost of capital (like Italy) are likely to attract the bulk of foreign investment, particularly from outside the EU.

¹² These differences may be exacerbated, or reduced and even reversed, if one considers the possibility that the parent has insufficient retained profits and has to pay dividends out of income from a foreign source earned by the subsidiary.

¹³ When the effects of this reform are considered Germany's position is closer to that of the other countries. However, on the whole, the changes to effective tax rates brought about by the German tax reform are not large enough to alter significantly the relative tax position of this country within the EU.

¹⁴ *Devereux, Lockwood and Redoano (2001)* found evidence that countries compete over the statutory rate and the effective average tax rate, but not over the cost of capital.

The tax differences that emerged in the analysis of cross-border investments indicate that there can be considerable incentives for companies to alter their behaviour in order to minimise their overall tax burden. The study explores this issue in two directions (part II, section 6.3.3 and 8): on the one hand, by assuming that the parent company in all countries can make use of the most efficient means of financing the subsidiary, on the other, by introducing examples of more sophisticated financial arrangements, which make use of a financial intermediary (a Belgian co-ordination centre and a Dutch holding company). Under both assumptions the effective tax rate on transnational investment drops remarkably. If the parent company is fully flexible in choosing the most favoured source of finance for the subsidiary, inbound and outbound investments turn out to be taxed less than domestic investment. However, the dispersion of effective tax rates between countries remains very high. Similar considerations emerge when more complex financial arrangements are examined.

These results suggest two important conclusions for policy makers.

First of all, they show that the possibility of using financial arrangements to reduce the effective tax burden "cannot remove all tax obstacles for cross-border investment caused by different tax rates and different tax bases" (p. 256-7 of the study), on the assumption that there are no other profit shifting possibilities.

Secondly, they provide a quantitative indication of how useful these arrangements may be in reducing the effective tax burden for those companies that can implement these tax-saving devices relatively easily and at little additional cost. Since such companies are usually the largest ones, it follows that the optimisation of tax strategies, while reducing some real distortions on factor allocation, is likely contextually to introduce new discriminations between companies based on size.

This observation is confirmed by the section of the study comparing the tax treatment, in the UK, Germany and Italy, of SMEs and partnerships with that of large corporations (part II, section 9). "The results of this section show that the specific tax rates applied to SMEs in the countries analysed have the effect of lowering the effective tax burden. ... But, when comparing the results of this section with those ... which examined the tax minimisation approach, it is worth noting that small and medium-sized enterprises in Germany, Italy and the UK bear a higher tax burden than multinationals investing abroad" (p. 264).

The effective tax rate indicators allow also the assessment of the efficiency content of alternative tax policy changes. This is done in the Commission study by computing the level and dispersion of effective tax rates under alternative hypothetical tax policy scenarios (part II, section 11.4 and Annex F). The simulations are designed to allow separate evaluation of the contribution towards neutrality of each tax policy alternative.

These simulations confirm the importance of the statutory rate in determining observed differences in effective tax rates from one country to the next. Tax rate harmonisation would be very powerful in reducing dispersions of effective tax rates, above all effective average tax rates, whereas harmonisation of tax bases would not provide comparable efficiency gains. Things get even worse, in the

latter case, above all when looking at the effective average tax rate for outbound investment; CEN is even further removed.

The Commission services study repeatedly warns that a great deal of caution is necessary in deriving policy implications from the results of these simulations. They provide an important guide on how to move towards increased neutrality, but in evaluating alternative policy scenarios other important factors must also be taken into consideration. First of all, there is the need to reduce the compliance costs, for both companies and tax administrations, of having to deal with up to 15 different systems of tax rules and regulations. Secondly, there is the need to preserve the highest level of Member State fiscal autonomy compatible with the functioning of the internal market and respect for the four fundamental freedoms of the EC Treaty. Third, there is the need to find a solution ensuring that some progress is made within a reasonable period of time, where "reasonable" should mean the time dictated by the necessities of an increasingly integrated market. How to trade off these often conflicting needs is the subject of the proposals made in the other parts of the Commission study, and will not be discussed here. However, in discussing the different options it will be important to keep in mind that the quantitative simulations warn of the distortion that might derive by coordinating the tax base without introducing limits on Member States' freedom to set their national tax rates.

VI. Concluding Remarks

The Commission's primary aim was to satisfy the Council's request to illuminate existing differences in effective corporate taxation in the Community in view of their effects on the location of economic activity and investments. For this purpose, the Commission services study applies a model conceived to analyse the incentives (or disincentives) offered by taxation systems for corporate investment choices. However, the analysis attempts to manage some of the methodological shortcomings linked to the traditional King and Fullerton forward-looking methodology. First, by applying a revised and extended methodology set out by Devereux and Griffith, and second by complementing the base case analysis with a set of computations aimed at adding further realism to the analysis.

It is consequently the first comprehensive study analysing such a broad range of indicators of the effective company tax burden, both marginal and average, for the Member States of the European Union. One of the most striking features of the quantitative analysis in the study is that, across the range of different situations, the relevant conclusions and interpretations remain relatively constant. Nevertheless, the comparative analysis of effective marginal tax rates and effective average tax rates for individual countries shows that, even if in most cases the two indicators do not tell a very different story, in some cases the picture is quite different.

The general results of the quantitative analysis seem to confirm that the potential distortions resulting from the 15 different general tax systems in the allocation of capital within the EU are not negligible and that the differences in nominal tax rates are the most important factor accounting for these potential

distortions. Moreover, the existence of wide tax discrimination in favour of debt financing may conflict with the EU objectives of promoting equity capital to boost the economy and growth and exacerbates the risk of EU enterprises becoming over-dependent on debt finance.

All in all, the quantitative results show that the internal market is a long way from ensuring a levelled playing field for both domestic and international firms and that the significant lack of domestic and international tax neutrality may conflict with the objectives set at the Lisbon European Council.

Therefore, the overall picture resulting from the quantitative analysis suggests that the balance to be struck between economic efficiency and the other goals of taxation policy has to be considered not only at Member State level but also at EU level. The Commission has declared its intention of carefully monitoring the trend of effective levels of corporate taxation in the EU (see EEC 2001b, p. 9). Furthermore, the full implications of an approach implying a co-ordination of tax bases could be that present differences between nominal tax rates are unsustainable.

Summary

This paper has three aims. First, it presents the methodology used in the quantitative analysis undertaken in the Commission services study. Second, it compares the results obtained by two different indicators, the traditional effective marginal tax rate and the effective average tax rate. Third, it summarises the overall results of the Commission study and their policy implications. All in all, these results show that tax systems in the EU are a long way from ensuring a levelled playing field for both domestic and international firms and that the observed disparities between effective tax rates are mainly due to differences in statutory tax rates.

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