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## Working Paper

The effective average tax burden in the European Union and the USA: a computer-based calculation and comparison with the model of the European tax analyzer

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## Non-technical Summary

Knowledge about the levels of comparative tax burdens of companies is important for political debate in many ways since the tax burden decides whether companies have competitive advantages or disadvantages in relation to their foreign competitors. Furthermore, structures and levels of taxation play an important role in the realisation of the European Union, as recent discussions about the Code of Conduct of the European Commission and similar steps of the OECD against harmful tax competition show.

During the past years, also in response to the growing demand by policy makers, various measures to compute and to compare tax burdens of companies have been developed. However, the accuracy of the results of tax burden comparisons differs depending on how detailed an analysis is and which provisions of the tax codes are included.

Therefore, in the *first part*, this paper reviews the most common approaches used to measure tax burdens of companies. In addition, we present a computer-based model (so-called European Tax Analyzer) for the international computation and comparison of company tax burdens. The methodology follows the forward-looking concepts for the measurement of effective average tax rates (EATR) on the basis of a model-firm. In contrast to the prevailing approaches for calculating EATR our model-firm approach allows to calculate EATR for more complex and realistic conditions that are relevant for the decision making. Due to its flexibility another important advantage of the model-firm approach is the possibility to include the most relevant and complex provisions of the tax codes (i.e. tax systems, taxes, tax rates, and tax bases).

A concrete comparison of the EATR of corporations and their shareholders in five different countries is carried out in the *second part* of this paper. This comparison as well as various sensitivity analysis for alternative assumptions of both economic and tax data reveal not only the areas of application of our European Tax Analyzer but also the wide spread between the EATR in the countries covered by this study. Based on the comparison of the EATR between Germany, France, the UK, the Netherlands, and the USA the following main conclusions are possible:

- If one can take a medium-sized manufacturing company as typical, the EATR both for corporations and shareholders is highest in France.
- This conclusion, however, cannot be generally applied to every situation as there are many options and planning opportunities which can increase or decrease the EATR in the countries. As examples, the effects of tax electives and the tax base as a whole, as well as the effects of alternative assumptions concerning relevant economic data like profitability, financing and dividend policy etc. have been shown.
- The differences between the national EATR are related to the individual characteristics of the national tax systems. The model of the European Tax Analyzer enables to show the user the impact of the corporate tax system, the various profit and non-profit taxes, the tax bases and the tax rates on the EATR. It could be worked out that the profit taxes, corporation tax systems and tax rates have the highest impact on these differences. Nevertheless, the impact of the tax bases on the EATR cannot be neglected.
- For the time series 1995-2000 it could be shown that the differences between the national EATR have declined a little. In spite of this convergence, however, tax distortions of competition did not become significantly less.

In summary, we believe that the European Tax Analyzer is a new important instrument for computing and analyzing the EATR for many complex economic situations taking into account the most relevant provisions of the national tax codes.



# **The Effective Average Tax Burden in the European Union and the USA**

## **A Computer-based Calculation and Comparison with the Model of the European Tax Analyzer**

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### **Abstract:**

In this paper we present a computer-based model (so-called European Tax Analyzer) for the international computation and comparison of company tax burdens. The methodology follows the forward-looking concepts for the measurement of effective average tax rates (EATR) on the basis of a model-firm. The EATR is computed for investments generating economic rents (i.e. pure profits above the market interest rate). In contrast to the prevailing approaches for calculating EATR based on separate and isolate investment projects the model-firm approach allows to calculate EATR for more complex and realistic conditions that are relevant for the decision making. Due to its flexibility another important advantage of the model-firm approach is the possibility to include the most relevant and complex provisions of the tax codes (i.e. tax systems, taxes, tax rates, and tax bases). A concrete computation and comparison of the EATR of corporations and their shareholders in five different countries reveals the wide spread between the national EATR. Moreover, for the time series 1995-2000 it could be shown that the differences between the EATR have declined a little. In spite of this convergence, however, tax distortions of competition did not become significantly less.

### **Keywords:**

Tax burden comparison, capital income taxation, tax competition, tax harmonization in Europe

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## 1 Introduction

With the formal establishment of the Single Market in 1992 and the third stage of the European Money Union in 1999 (EMU) many regulatory and economic barriers in the European Union (EU) have been removed. Yet, competition in the EU is still strongly distorted by the tax regimes of the Member States. Thus taxation has become an important remaining factor which prevents the full realization of the Common Market and its four fundamental freedoms. It is therefore not surprising that discussions on the economics of one business location as against another in Europe usually quickly turn to the comparative tax burdens.

In 1992, the Ruding Committee found out, that taxation differences between the Member States may distort competition in the EU. These differences result from the specific national tax systems, taxes, tax bases and rates.<sup>1</sup> In its 1992 Communication the European Commission rejected most of the Ruding Committee's recommendations as it could not clearly be shown to what extent the distortions were related to one of these four factors. Moreover, the Commission referred to the political problems to harmonize direct taxes in the EU (unanimity, Art. 93, 95 EU-Treaty). Instead the Commission,<sup>2</sup> in line with politicians,<sup>3</sup> quoted subsidiarity as the basic principle for the harmonization of direct taxes in Europe. As a result, the process of harmonization came to a standstill.

It took more than four years before the necessity of a co-ordinated tax policy, in order to promote the proper functioning of the Single Market, the run-up to the third stage of the EMU and Member States' competitiveness and employment, was recognized in official statements.<sup>4</sup> Another important and major step in the area of business taxation is one of the two components of the tax package agreed upon in December 1997: the code of conduct.<sup>5</sup> This code aims at fighting against unfair and harmful tax competition. Although there exists no clear definition of unfair tax competition (which is admittedly a difficult task), what is meant in principle is a reduction of the tax rates or tax bases in one country with the aim to attract more direct investment and other transactions from companies located in other countries. The fight against harmful tax competition calls for co-operation between the Member States and commentaries suggest the approval of a minimum standard framework (i.e. rates and bases) for the taxation of companies (and not an overall harmonization).<sup>6</sup>

Both for the assessment of the distorting effects of tax competition and the proper definition of minimum tax standards it is first of all necessary to have an idea about the level of the tax burden of companies in the EU, as well as of the structural and systematic distortions of competition related to tax differentials. In particular, it is necessary to show separately the effects of the tax systems, taxes, tax bases and rates on these differentials. In order to measure the effective tax burden and to assess the impact of taxation on managerial decisions such as location, investment, and financing, various methodological approaches have been developed. However, there is an ongoing discussion about the appropriate concept.

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<sup>1</sup> See COMMISSION OF THE EUROPEAN COMMUNITIES (1992a).

<sup>2</sup> COMMISSION OF THE EUROPEAN COMMUNITIES (1992b).

<sup>3</sup> See recently HENDRICKS (1999), p. 96.

<sup>4</sup> The main challenges to be solved by a more co-ordinated approach in taxation policy are (1) stabilization of Member States' tax revenues, (2) smooth functioning of the Single Market, and (3) promoting employment. See COMMISSION OF THE EUROPEAN COMMUNITIES (1996), p. 94-98; COMMISSION OF THE EUROPEAN COMMUNITIES (1997), p. 23-30; HINNEKENS (1996), p. 91-93.

<sup>5</sup> See Official Journal C2, 6 January 1998, p- 1-6. See also MONTI (1998), p. 2-3. The OECD also launched a debate on this issue. See OECD (1998). See PINTO (1998), p. 386-410, OSTERWEIL (1999), p. 198-202, for a comparison of the two approaches.

<sup>6</sup> See RUDING (1998), p. 72-73; VANISTENDAEL (1999), p. 2-3.

Referring to these aspects this paper has several aims. In a first step the most relevant methodical approaches for international tax burden comparisons are evaluated to which extent their results are good indicators for the effective tax burden and its impact on managerial decisions (chapter 2). Afterwards, we introduce our own approach for the calculation of effective average tax rates, based on the concept of a model-firm. In order to demonstrate the efficiency and the possibilities of this approach, with respect to the measuring and analyzing of effective tax burdens, the tax burdens in four EU-member states and the USA are also calculated and compared applying various sensitivity analysis (chapter 3). The last chapter is a summary of the conclusions (chapter 4).

## 2 Evaluation of existing approaches for international tax burden comparisons

### 2.1 Methodical requirements

If an international tax burden comparison is to have any meaning at all, it must at least heed to the following considerations:<sup>7</sup>

- *Relevant taxes*: In order to compute the effective tax burden the comparison must include all taxes that have an impact on the profitability of an investment and must take not only the tax rates, but also the characteristics of the national tax systems into account. Thus, the comparison must include all profit and non-profit taxes levied on the investment as well as the interrelation between these taxes.
- *Relevant tax bases*: The tax burden is calculated by multiplying the tax rate and the tax base. A comprehensive comparison therefore has to include the most relevant provisions for the bases of assessment affected by the investments whose tax burden are analysed. Thus, it is the scope of the considered investments that determines the relevant provisions for the tax bases to be covered. A valid comparison should include at least the provisions that are generally available for a single investment (e.g. depreciation, capital gains taxation), a group of related investments or a multi-period production (e.g. calculation of production costs, stock valuation) as well as for the whole company (e.g. provisions for bad debts).
- *Loss compensation*: If the periodical result of an investment is negative not all expenses and deductions in accounting result in an immediate tax saving in that period. In such a situation the amount of tax saving rather depends on the rules for loss compensation. As these rules influence the tax burden for different types of investment and also differ materially among countries they have to be included in a valid comparison.
- *Relevant taxpayers*: Structural differences between national tax systems are mainly caused by the corporation tax systems and the interaction of corporation and income tax respectively. Among the Member States we can find the classical system, double taxation mitigating (e.g. shareholder relief) and double taxation avoiding systems (e.g. imputation systems).<sup>8</sup> For this reason tax burdens not only for retained but also for distributed profits differ among nations. In order to consider these facts in international tax burden comparisons besides the taxation at the companies' level the taxation at the level of the shareholders has also to be examined. In this connection the taxation of distributed profits and of other income related to the company are of main interest (e.g. taxation of interest from shareholders' loans).
- *Calculation period*: Most of the differences between tax burdens related to the bases of assessment and various tax electives are only temporary (e.g. depreciation and accounting for provisions). A valid and useful determination of the resulting financial effects (interest and liquidity) is only possible over a multi-year-period.

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<sup>7</sup> For a more detailed discussion see SPENGL (1995), p. 5-18.

<sup>8</sup> See CNOSSEN (1993), JACOBS (1999), p. 265-268, for an overview of different types of corporation tax systems.

- *Model comparisons with identical pre-tax data*: Many factors such as the sources of finance, the types of business assets, the sales and the costs - in short, the entire business policy - will be dictated by circumstances and opportunities specific to the country or market. On the one hand, in reality, many of these factors are often influenced by taxation considerations.<sup>9</sup> However, on the other hand, considering real economic data does not allow to calculate and isolate tax related distortions of competition. Therefore effective tax burdens can only be computed on the basis of a model. This requires the assumption of an identical starting point and identical pre-tax data for the alternative projects that are compared.<sup>10</sup>
- *Financial consequences of taxation*: The measures for effective tax burdens should help to assess the impact of taxation on managerial decisions (e.g. location, investment, financing and distribution). This problem cannot be solved by referring the tax payments to figures such as taxable or accounting profits because they are defined legally and therefore not interrelated with economic decisions. Moreover, they are not defined uniformly in different countries which means that the tax burdens cannot be compared at all even if the computed tax payments were the same. Instead it is necessary to relate the tax burden to relevant financial pre-tax figures such as financial profit, cash flow, return on equity or net assets. In order to assess the incentive effects set by taxation, the calculations must be based on future and not on past financial data or profits.<sup>11</sup>

## 2.2 Statutory tax rate

Practitioners and industrial unions<sup>12</sup> often measure the tax burden by the statutory or nominal tax rate. Statutory tax rates are easy to calculate as they only take into account the cumulative marginal tax rates of the (profit and non-profit) taxes levied considering their interdependencies.<sup>13</sup> Although they have an important signal function and also may be relevant for the decision of where to locate international mobile activities<sup>14</sup> statutory tax rates are not at all useful estimates for the tax burden of real (productive) investment as the effects of the tax bases are omitted. Also tax rate reductions, loss compensation and other tax benefits are not considered. As a result, the tax burden thus determined is very inexact and considerably overestimates the amount of the effective tax burden.

## 2.3 Backward-looking concepts

A common approach to measure the effective tax burden in policy-making is aggregated tax rates of existing firms. As these tax measures refer to the capital stock, profits or other relevant data accumulated in the past they are called backward-looking approaches.<sup>15</sup> Within this framework one can distinguish between approaches based on firm-specific data or on aggregated economic data.

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<sup>9</sup> See BOND, DEVEREUX, GAMMIE (1996), p. 109-112.

<sup>10</sup> See AUERBACH (1990), p. 326; KING, FULLERTON (1984), p. 281; OECD (1991), p. 94-95.

<sup>11</sup> See KING, FULLERTON (1984), p. 7-12; OECD (1999), p. 4; SCHNEIDER (1994), p. 541; SCHREIBER, KÜNNE (1996), p. 47.

<sup>12</sup> So in Germany BUNDESVERBAND DER DEUTSCHEN INDUSTRIE/VERBAND DER CHEMISCHEN INDUSTRIE (1999), p. 6-7.

<sup>13</sup> For example, for German corporations the statutory tax rate for retained profits amounts to 52.35 p.c. which is composed of corporate income tax, solidarity levy and trade tax.

<sup>14</sup> E.g. financing structures, administration, coordination and distribution centres, European Headquarters. See DEVEREUX (1992), p. 105-117 for empirical evidence.

<sup>15</sup> We refer to the terminology of the OECD. See OECD (1999). In the earlier literature regardless of the forward-looking concepts to be discussed in section 2.4 only these backward-looking concepts were identified as measures for average effective tax rates. See FULLERTON (1984), p. 23-41.



*Firm-specific data:* Approaches based on firm-specific data express the effective tax burden as a percentage of the tax liabilities relative to the profits from annual accounts. Data can either be taken from individual financial statements or consolidated returns. Although such measures cover the most relevant aspects of the tax systems, taxes, tax bases and rates for current and past regulations, a reliable measurement of the effective tax burden is not possible. One reason is the complete omission of the taxation of shareholders. Other reasons refer to data problems in the case of foreign source income. If individual financial statements<sup>16</sup> are used and the country in which the corporation is located either exempts foreign source income from taxation (e.g. Germany, France, the Netherlands) or grants a tax credit for foreign taxes (e.g. Greece, Ireland, Spain, the UK), there is a mismatch between the numerator and the denominator as the companies profits include foreign source income while only domestic tax (after deducting foreign taxes in the case of a tax credit) is included in the numerator. Therefore, the measured tax burden tends to be too low. If instead the calculations are based on data from consolidated returns<sup>17</sup> there is no such mismatch between the numerator (world wide tax liability) and the denominator (world wide profits). However, one has to bear in mind that the tax burden which is measured in this case does not refer to the domestic taxes only but rather the world wide tax burden including foreign taxes on the world wide activities. Therefore, these tax ratios are very misleading if they are used to assess and compare the effective domestic tax burden in international studies. Altogether, tax ratios based on firm-specific data can be a robust indicator for the tax burden of corporations or groups of companies. But, referring to the above mentioned problems, an international comparison of domestic tax burdens is hardly possible.<sup>18</sup> Moreover, as the calculations are based on past data they merely say nothing about the investment incentives of the tax system or future tax reforms.

*Aggregate economic data:* Measures for the tax burden using aggregate economic data from national accounts include domestic corporate taxes (in general only corporate income taxes) in the numerator and in the denominator various income measures such as

- aggregate domestic corporate profits,
- corporate operating surplus (i.e. value added accruing to factor capital)<sup>19</sup> or
- gross domestic product.<sup>20</sup>

Although these formulas are mathematically correct, the use of aggregate economic data from national accounts is problematic and misleading for several reasons. Referring to *aggregate domestic corporate profits* one has to bear in mind that many countries do not report separately on corporate profits. In Germany, for example, the only available profit figures include data for the unincorporated sector such as revenues from sole traders and partnerships,<sup>21</sup> agriculture and forestry, and also revenues from tax exempt institutions such as the German Federal Reserve Bank. Moreover, referring to the *corporate operating surplus*, interest, rent and royalties paid by corporations enter in the denominator. However, taxes on these sources of income are paid by private savers which do not enter in the numerator at all. The use of such tax ratios is also questionable for other reasons: the aggregate tax ratio is a static concept, and the tax revenues considered in its calculation and the profits from corporate activities according to the national accounts do not stem from the same year. Instead, they are the cash tax receipts which have been reduced by loss

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<sup>16</sup> See JACOBS, SPENGL (1997b).

<sup>17</sup> See MAASTRICHT ACCOUNTING AND AUDITING RESEARCH AND EDUCATION CENTER (1999).

<sup>18</sup> These tax ratios might, however, be a reliable instrument for cross-sectoral comparisons and empirical studies.

<sup>19</sup> See MENDOZA, RAZIN, TESAR (1994).

<sup>20</sup> See OECD (1997).

<sup>21</sup> In Germany, for example, about 90 p.c. of all enterprises have the legal form of sole traders and partnerships. See the periodical publications of the German Federal Statistical Office.

carryforwards and carrybacks, whereas these loss treatments do not affect companies profits from national accounts.

In summary, comparably low tax revenues in the numerator might oppose a very substantial profit figure in the denominator which explains the downward bias derived by these measures for several countries including Germany.<sup>22</sup> Due to this mismatch between numerator and denominator, the use of aggregate economic data is a very unreliable concept for both measuring business tax burdens<sup>23</sup> and providing information about the incentives of a tax system to stimulate new investment. Even if these statistical problems of the proper assignment of taxes to profits did not exist, an international comparison of tax ratios thus determined would be problematic as the methods and definitions of the national accounting systems differ between the countries.

## 2.4 Forward-looking concepts

In contrast to the tax measures described above, forward looking approaches calculate the effective tax burden for a hypothetical future investment project or company over the assumed life of the project. We can therefore distinguish between effective marginal and effective average tax measures.

### 2.4.1 Effective marginal tax rates (EMTR)

The calculation of effective marginal tax rates (EMTR) closely follows the commonly used model of King and Fullerton.<sup>24</sup> As this approach was applied and fully described in many international studies<sup>25</sup> it will only be broadly outlined here. The EMTR measures the extra tax of a marginal investment project and is defined as the difference between the pre-tax and the post-tax return of this project divided by the pre-tax return. Marginal investments are new additional projects yielding a rate of return on the initially invested capital (equal to the last unit invested) that is just sufficient to that the project is from the investor's point of view worthwhile. Therefore, the calculations are based on the assumption of a capital market equilibrium and an optimal investment behaviour where the marginal benefits just equal the marginal costs (i.e. the project generates no rents above the market interest rate (= no economic rents or pure profits). The EMTR can be measured for the corporation alone or also taking into account the shareholder level.

In terms of the calculations, the most relevant tax provisions are to be considered such as all relevant profit and non-profit taxes and the statutory tax rates. However, only a few items of the tax base enter the calculations (especially rules for depreciation, valuation of inventories and investment incentives) as the structure of the investment is very simple. At the shareholder level the corporation and income tax systems as well as capital gains and property taxes are taken into account. As company taxation differs from the industry, the assets, the financing and the tax status of the saver, the EMTR depends upon the portion of the marginal investment in each type of asset and the portion of the company finance in each source of finance. The model can include as assets intangibles, buildings, machinery, inventories and financial assets. The considered sources of finance are new equity capital, profit retention and debt financing. Savers can be individual shareholders, parent companies, financial intermediaries or tax exempt institutions. The EMTR for a whole industry is a weighted average of separate EMTR characterized by a particular combination of assets, financing and savers.

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<sup>22</sup> See SPENGLER, ECKERLE (1999), p. 2, for an overview of results.

<sup>23</sup> See OECD (1999), p. 13; BUNDESMINISTERIUM DER FINANZEN (German Ministry of Finance) (1999), p. 13-14.

<sup>24</sup> See KING, FULLERTON (1984).

<sup>25</sup> See, for example, BOVENBERG ET. AL. (1990), CARON & STEVENS/ BAKER & MCKENZIE (1999); CHENNELLS, GRIFFITH (1997); CLAASSEN (1994); COMMISSION OF THE EUROPEAN COMMUNITIES (1992a); OECD (1991).

The EMTR approach fulfils the principal methodological requirements for international tax burden comparisons. Although the calculations of EMTR are based on a simple model of a firm with strict assumptions about the market, investment and financing conditions that are not representative (e.g. rates of return, interest rate, inflation) and omit various tax provisions concerning the tax base,<sup>26</sup> the approach is of high international acceptance and was also considered for a long time as the only forward-looking concept providing information of the tax driven investment incentives.<sup>27</sup>

### 2.4.2 Effective average tax rates (EATR)

In contrast to the EMTR, the effective average tax rate (EATR) measures the effective tax burden of projects that earn more than the capital costs (i.e. projects generating economic rents). In principle, the EATR for a future investment project is calculated as the ratio of the future tax liabilities divided by the pre-tax financial profit or some other parameter for the value of the firm over the estimated period of life of that project. The EATR can be expressed as the relation of the present value of the corporate tax payments and the pre-tax financial profits.<sup>28</sup> An equivalent expression of the EATR would be the difference between the pre-tax and the post-tax return of the project divided by the pre-tax return.<sup>29</sup> The EATR like the EMTR can account for the corporate taxes alone or also consider the taxation at the shareholder level.

To show the differences between the effective marginal and the effective average tax burden, the calculation of EATR must differ from the measurement of EMTR with respect to the conceptual framework of the model and the coverage of tax provisions.<sup>30</sup>

- *Conceptual framework of the model:* In contrast to the EMTR approach models for the calculation of EATR do not need to characterize optimal investment behaviour based on the restrictive assumptions of a general equilibrium of the market conditions, because the tax effects on infra-marginal investments (i.e. investments in imperfect market conditions) are in the centre of interest. Moreover, instead of only new investment the taxation of an already existing capital stock should be analyzed.
- *Coverage of tax provisions:* Effective average tax rate measures like the EMTR account for all relevant taxes (corporate, personal and non-profit taxes), statutory tax rates and the rules for profit computation. However, there are several tax provisions such as progressive tax rates, tax rates with income brackets, tax exempt amounts, minimum and maximum tax provisions, (investment) tax credit with upper ceiling, and limitations for loss compensation that can explain differences between the marginal and the average tax burden and therefore have to be included in a model for the calculation of EATR.

EATR can be calculated for separate investment projects based on the King-Fullerton-model<sup>31</sup> or for a complex model of a hypothetical firm using specified weights for the assets, sources of finance etc.<sup>32</sup>

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<sup>26</sup> See BRADFORD, STUART (1986), p. 308-311, for a critical review.

<sup>27</sup> See FULLERTON (1986), p. 291; SCHNEIDER (1992), p. 418.

<sup>28</sup> See OECD (1999), p. 8.

<sup>29</sup> See DEVEREUX, GRIFFITH (1999), p. 6.

<sup>30</sup> See also FULLERTON (1984), p. 28-29, for reasons why EMTR and EATR differ. Although FULLERTON only refers to backward-looking concepts for EATR many of the arguments also hold for forward-looking concepts.

<sup>31</sup> See DEVEREUX, GRIFFITH (1999), p. 5.

<sup>32</sup> The model described below is based on a model-firm approach for computing EATR. See section 3.1.

## 2.5 Summary and comparison

The comparison of the alternative approaches to measure corporate tax burdens has dealt with various concepts. However, the relevance of these approaches for the calculation of the effective tax burden and for the assessment of the impact of current (and in the case of a reform future) tax systems on investment behaviour is different. It has been worked out that the best indicators for analyzing the impact of taxation on investment behaviour are forward-looking concepts such as the effective marginal (EMTR) and the effective average tax rate (EATR). The question arises which one of the two approaches - EMTR or EATR - is an appropriate concept.

The EMTR is based on the assumption that all investment projects will be realized that earn the cost of capital. Therefore, EMTR indicate whether a tax system or a change in the tax laws sets incentives to make additional investments or not. As the EMTR are calculated for different assets and financing policies, they are used to measure intersectoral distortions exclusively attributable to taxation.<sup>33</sup>

In reality, however, for a number of circumstances, the impact of taxation on investment decisions cannot be measured by the King-Fullerton-approach alone. The reason for this is that in reality only investments with a rate of return above their capital costs are realized. As these projects generate an economic rent, investment pattern and managerial decisions respectively might be affected by the taxation of pure profits. Hence, what is relevant for the investment decision is the average (i.e. total) tax levied on the total return (including pure profits) of the project, or, in other words the post-tax profits. Therefore, if the investor has the choice between two or more mutually exclusive projects all of them expecting to generate economic rents, the EATR is the relevant tax burden. Examples for such investment choices given in the literature are alternative (international) production location, production technologies, production types and qualities, and investments in the case of financial constraints.<sup>34</sup>

In summary, there exists no general forward-looking effective tax rate concept for the purpose of tax competition. It rather depends on the kind of investment choice or the objective of the measurement whether the EMTR or the EATR is the more suitable concept.<sup>35</sup> On the one hand, if one aims to assess the allocation efficiency of a tax system, the EMTR is the approach to use. On the other hand, if the aim of the tax burden comparison is to measure the impact of taxation on managerial decisions (i.e. for imperfect market conditions) the EATR is the relevant approach. These findings might be relevant for practical policy questions. If we refer to the location of new production plants and the incentives for additional investments as examples, one has to distinguish:<sup>36</sup> Whereas the choice of the location or production plant and, thus, the attractiveness of a country for foreign investors rather depends on the EATR, it depends on the EMTR whether there are incentives for additional investments after choosing the place of location.

However, as the results both for the EMTR and the EATR are derived from models, the measured impact of taxation is only valid under the assumptions of these models. As assumptions of a model can never be fully representative, the impact of taxation on investment cannot be measured by these models alone. In addition, survey based information or empirical data has to be used.

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<sup>33</sup> See, for example, FULLERTON (1984), p. 24, 30.

<sup>34</sup> See DEVEREUX (1995), p. 183-184; DEVEREUX, GRIFFITH (1998); DEVEREUX, GRIFFITH (1999), p. 10-13.

<sup>35</sup> See SPENGEL (1996), p. 48-52.

<sup>36</sup> See RICHTER, SEITZ, WIEGARD (1996), p. 19.

### 3 Tax burden of companies in Germany, France, the UK, the Netherlands, and the USA

#### 3.1 Methodological concept of the European Tax Analyzer

##### 3.1.1 Conceptual framework

In contrast to the King-Fullerton-approach for the computation of EMTR there is no generally accepted approach for the computation of the EATR. So far, only very few models seem to exist. Referring to the market conditions and investment choices mentioned above for which the EATR turns out to be the relevant concept, we think that a suitable approach should model the circumstances that are relevant for the decision making in the most realistic way. Therefore, we believe that a model-firm approach turns out to be better than tax considerations for single investments that are aggregated for the total firm afterwards. If the latter approach is based on the methodology of King / Fullerton,<sup>37</sup> then the EATR for a company is calculated as the weighted average of a particular combinations of assets, financing, and savers. The conceptual framework of a model-firm approach is, however, completely different.<sup>38</sup> The calculations are already based on a industry-specific mix of assets and liabilities. Based on this (in general existing) capital stock, the future pre-tax profits are derived on the basis of estimates for the future cash receipts and cash expenses associated with the initial capital stock. In order to determine the post-tax profits the tax liabilities are derived by taking into account the tax bases according to the national rules and then applying the national tax rates. As such model-firms, if computer based, can easily be run under alternative sets of assumptions on key variables such as pre-tax receipts and expenses, types and age of assets, sources of finance etc., they may provide reliable results (i.e. EATR) for different circumstances and even different industries.

Model-firms are of high practical relevance as the calculations are based on the firms' total cash receipts and expenses (i.e. cash flows), assets and liabilities. As far as we know, in the process of managers' decision making the overall returns, cash-flows and other ratios for profitability and liquidity are more relevant than the figures that are related to separate investments.<sup>39</sup> Besides the correct calculation of tax payments and effective tax burdens the use of cash flows, therefore, makes it possible to demonstrate simultaneously the impact of taxation on the pre-tax return and other relevant figures for managerial decisions such as the cash flow, the value of the firm, the total equity, the retained earnings etc. From the results of empirical studies it is evident that in particular the cash flows and the equity capital of a firm (due to financial constraints) may serve as good indicators for explaining the impact of tax systems and changes in tax laws on investment behaviour.<sup>40</sup>

Besides this more suitable framework for the modelling of imperfect market conditions and, hence, the conditions for yielding economic rents, one of the main advantages of a model-firm approach is that this concept can cover all relevant tax provisions. In contrast to the model-firm concept, the aggregation of separate independent investment projects in other methodological approaches requires an algebraic expression of the tax code for the tax computations.<sup>41</sup> This algebraic expression, however, cannot be designed to account for many relevant tax provisions and their complexities that affect the total or average tax burden.

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<sup>37</sup> See DEVEREUX, GRIFFITH (1999).

<sup>38</sup> See JACOBS, SMITH (1991), p. 148-149.

<sup>39</sup> In reality, as there is only a firm-specific structure of assets and liabilities, it is impossible to allocate one source of finance to one single asset or investment. This might be relevant for modelling financial constraints.

<sup>40</sup> See CUMMINS, HASSETT, HUBBARD (1996).

<sup>41</sup> See, for example, the EATR model of DEVEREUX, GRIFFITH (1999).

Referring to literature,<sup>42</sup> the critical disadvantage of the model-firm approach is that the results are heavily dependent on the particular characteristics of the company. To increase the relevance of the study, however, such models are able to take into account different economic situations or planning options as profitability, capitalization or dividend policies, to take but three examples. If the options are chosen carefully, „what-if“ analysis methods can then be used to quantify their impact on the tax burden. The technique of sensitivity analysis is used in all important studies on international tax burden comparisons regardless of the methodical approach and the underlying model.<sup>43</sup> Therefore, the use of firm data is no specific disadvantage of the model-firm approach.

The concept described in this section follows this model-firm approach. The so-called *European Tax Analyzer*,<sup>44</sup> which was developed in a joint research project by the Centre for European Economic Research (ZEW) and the University of Mannheim, is a computer program for calculating and comparing effective average tax burdens for companies located in different countries.<sup>45</sup> The current version covers Germany, France, the United Kingdom, the Netherlands, and the United States of America. As the model firm is designed as a corporation, the tax burden can be calculated for the level of the corporation as well as for the level of the shareholders.

### 3.1.2 Input data

#### 3.1.2.1 Non-tax data

The effective average tax burden is derived by simulating the development of a corporation over a ten year period. For the computation of the tax burden the model uses as inputs economic data of the corporation and the shareholders as well as tax data.

The development of the corporation is based on the initial capital stock and the data of the corporate plans that contain variable estimates for the future development of the capital stock.

- *Initial capital stock*: The capital stock in the first period includes the firm’s total assets and liabilities that either can be new or already existing. The *assets* consist of ground and both office and production buildings, plant and machinery, office furnishing, fixtures, intangibles (patents and royalties), financial assets, participations in other corporations (both domestic and foreign), inventories, trade debtors, cash funds, and deposits. The *liabilities* include new equity capital, long-term and short term debt, and trade creditors.
- *Development of capital stock*: The *corporate planning* supplies data about the expected development of the capital stock over the simulation period of ten years. The estimates are based on periodical assumptions for production and sales, acquisition of goods, staff expenditure (e.g. number of employees, wage per employee and pension costs), other receipts and expenses (e.g. R&D-expenses), investment, distribution, and costs of financing. It is assumed that in each period the corporation produces goods which are either inventoried or sold on the market. Therefore, multi-period production is possi-

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<sup>42</sup> See, for example, OECD (1999), p. 6.

<sup>43</sup> For the calculation of EMTR see KING, FULLERTON (1984), p. 268; CLAASSEN (1994), p. 145. For the calculation of EATR see DEVEREUX, GRIFFITH (1999), p. 30-37.

<sup>44</sup> For detailed descriptions of the model and the computer-software see SPENGEL (1995); JACOBS, SPENGEL (1996); MEYER (1996). The model also covers the following aspects not mentioned in this paper: Social security contributions (see SPENGEL (1997)), green taxes (see JACOBS, SPENGEL, WÜNSCHE (1999), p. 7-22), and concepts of neutral profit taxes (see JACOBS, SCHMIDT (1997)).

<sup>45</sup> The OECD classifies the European Tax Analyzer as a backward-looking (and not a forward-looking) concept for the calculation of EATR (See OECD (1999), p. 6). This subsumption under the above mentioned concepts is wrong.

ble. Additional variable assumptions are made with regard to the production costs for material and labour. It is assumed further that depreciable assets (i.e. buildings, plant and machinery, office furnishing, fixtures, and intangibles) are worn out at the end of their expected economic life. On option, fixed assets can also be sold for their market value before the end of expected economic life. In any of the two cases, reinvestments in new assets are made at that time based on the historical costs of the assets adjusted for inflation. With regard to investment the assumptions ensure that the initial capital stock at least remains constant. The assumption allow, however, additional new investment resulting in an increasing capital stock during the simulation period. In addition to differing rates of price increases, other macro-economic data considered are credit and debit interest rates, exchange rates for the given countries and costs for energy and electricity.

- *Financing of the corporation:* The initial capital stock contains new equity as well as both long and short term debt capital. As the corporate plans, inter alia, make assumptions about the distribution policy, in addition to new equity and debt financing the company can be financed by retained earnings (e.g. the distribution rate is below 100 p.c.).

Due to differences between the corporation tax systems as well as the taxation of capital income (e.g. dividends, interest, and capital gains) in the hands of the *shareholders* a valid comparison of the tax burdens has to include the shareholders. The model allows to include up to 10 groups of shareholders with different shareholding (e.g. participation rate) and personal status. The latter distinguishes between natural and legal persons, domestic or foreign shareholders, taxable or tax-exempt entities, and other aspects (e.g. family status, number of children). According to the financing of the corporation the shareholders receive dividends from new equity, interest from loans in the corporation or capital gains upon the disposal of shares in the case of profit retention. In addition to this income, the underlying assets (e.g. shares and loans) are considered for non-profit taxes.

### 3.1.2.2 Tax data

The tax liabilities in the different countries are derived from assessment over the period of ten years under the rule of each country. This assessment takes into account all relevant *taxes* that may be influenced by the investments and financing both at the level of the corporation and the level of the shareholders (see table 1).

Table 1: Considered taxes

	Company	Shareholder
GER	Grundsteuer ( <i>real property tax</i> ) Gewerbeertragsteuer ( <i>trade tax on profits</i> ) Körperschaftsteuer ( <i>corporation tax</i> ) Solidaritätszuschlag ( <i>solidarity levy</i> )	Einkommensteuer ( <i>income tax</i> ) Solidaritätszuschlag ( <i>solidarity levy</i> ) Kirchensteuer ( <i>church tax</i> )
FRA	Taxe foncière ( <i>real property tax</i> ) Taxe professionnelle ( <i>trade tax</i> ) Taxes assises sur les salaires ( <i>employer's contributions</i> ) Impôt sur les sociétés ( <i>corporation tax</i> )	Impôt sur le revenu ( <i>income tax</i> ) Prélèvements fiscaux ( <i>surcharges on income tax</i> ) Impôt de solidarité sur la fortune ( <i>property tax</i> )
UK	Rates Corporation tax	Income tax
NL	Vennootschapsbelasting ( <i>corporation tax</i> ) Onroerendbelasting ( <i>real property tax</i> )	Inkomstenbelasting ( <i>income tax</i> ) Vermogensbelasting ( <i>property tax</i> )
USA	Property tax Franchise tax on corporate income Accumulated earnings tax Corporate income tax	Income tax Property tax

Referring to the *tax bases*, the most relevant items with regard to the assets and liabilities included in the capital stock and the effects of the corporate planning are considered. Furthermore, the tax module of the model allows to choose several accounting options (tax electives) enabling a company to influence its taxable profits. The *rules for profit computation* cover

- depreciation (methods and tax periods for all considered assets, extraordinary depreciation),
- inventory (stock) valuation (production costs, LIFO, FIFO and weighted average, inflation reserves),
- development costs (immediate expensing or capitalization),
- taxation capital gains (roll-over relief, inflation adjustment, special tax rates),
- employee pension schemes (deductibility of pension costs, contributions to pension funds, book reserves),
- provisions for bad debts,
- elimination and mitigation of double taxation on foreign source income (exemption, foreign tax credit, deduction of foreign taxes),
- and loss relief.

Finally, in addition to generally available provisions the model can also consider special incentives schemes granted by the national authorities for the stimulation of new investment as well as research and development (special capital allowances, investment and R&D-tax credits, and grants).

Referring to the *tax rates*, the calculations consider statutory linear as well as progressive tax rate structures. In the case of progressive rates or income brackets the tax rates enter in the model as functions of the relevant income or net assets (non-profit taxes) as provided by the tax laws.

### 3.1.3 Calculation of the effective average tax rate

For the sake of comparability and in order to isolate the effects of taxation it has to be assumed that the model-firm in each country shows identical data before any taxation.<sup>46</sup> Due to this necessary assumption any differences between pre- and post-tax data in the model can be solely attributed to taxation in the different countries.

The tax burden is expressed in two ways: The *absolute effective average tax burden* in currency units is the difference between the pre-tax and the post tax value of the firm at the end of the simulation period (i.e. period 10). An equivalent expression of the effective average tax burden is the *effective average tax rate* (EATR). The EATR is the difference between the pre-tax and the post-tax return of the equity capital invested in the corporation divided by the pre-tax return. These returns are derived from the value of the firm. The effective average tax burden is calculated separately for level of the corporation and the level of the shareholders (if their taxation is included). The computation of total tax burdens and the EATR takes four steps.

In a *first step* the pre-tax value of the firm at the end of the simulation period is calculated. The pre-tax value of the firm is derived on the basis of the estimated cash flows and the value of the net assets at the end of the simulation period. The cash flows are derived on the basis of estimates in the corporate planning for the cash receipts (sales and other receipts, gains upon the disposal of assets, interest and dividend income) and expenses (wages and pension payments, expenses for material, energy consumption and other expenses, new investment, interest expenses and distributed profits). The cash flow (= liquidity) is calculated in each period. Thereby it is assumed that any given amount of surplus cash flow at the end of a single period can be invested at a given interest rate and any given deficit can be covered by borrowing money at

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<sup>46</sup> See section 2.1 above.



a given debit rate (balancing investment or credit). The interest receipts or expenses plus the amount of the underlying balancing investments or credits are considered for the calculation of the cash flow in the following period. The value of the net assets at the end of the simulation period is computed by deducting the liabilities of the corporation (and, if relevant, of the shareholders) from the assets. Both the assets and the liabilities are valued at calibrated parameters that are the same in each country. For the assets we take their replacement prices and for the liabilities their nominal values.

	pre-tax cash flow at the end of the simulation period (companies' or overall level)
+	value of the net assets at the end of the simulation period (companies' or overall level) (= assets in the capital stock at replacement prices - liabilities in the capital stock at nominal values)
=	pre-tax value of the firm at the end of the simulation period (companies' or overall level)

In a *second step* the post-tax value of the firm at the end of the simulation period is calculated. The determination of the post-tax value of the firm has only cash flow effects and no impact on the value of the net assets. The post-tax cash flow is derived in each period by deducting the tax liabilities from the pre-tax cash flow. The tax liabilities are derived by transforming the receipts and expenses into items of the tax bases (i.e. on the one hand assets and liabilities and on the other hand profits and losses/charges) respect given to depreciation allowances according to the relevant national rules and then applying the (functions of the) tax rates and, if necessary, other relevant provisions (e.g. loss carryover and tax credits). As the tax payments (liabilities) reduce the cash flow this also has an impact on the balancing investment or credit and the connected interest receipts or credits. By taking these tax induced effects on interest income or expense of each period into account the deferral of tax payments can be integrated easily into the model.

	pre-tax cash flow at the end of the simulation period (companies' or overall level)
-	tax liabilities in each period
=	post-tax cash flow at the end of the simulation period (companies' or overall level)
+	value of the net assets at the end of the simulation period (companies' or overall level) (= assets in the capital stock at replacement prices - liabilities in the capital stock at nominal values)
=	post-tax value of the firm at the end of the simulation period (companies' or overall level)

	pre-tax value of the firm at the end of the simulation period (companies' or overall level)
-	post-tax value of the firm at the end of the simulation period (companies' or overall level)
=	total average tax burden in currency units (companies' or overall level)

In contrast to models which compute tax burdens solely based on pre-tax returns (yields),<sup>47</sup> calculations based on cash receipts and cash expenses considering balancing investments allows the entire computation of all tax bases at any time during the period of simulation (as all relevant income and assets enter into the tax base). As a consequence, the model can include complicated tax provisions such as progressive tax rates, (investment) tax credit with upper ceiling, and loss carryovers without any difficulty.

In a *third step* both the pre-tax and the post-tax value of the firm at the end of the simulation period are transformed into the pre-tax and post-tax return respectively:

$$r = [V_f(T) / V_i(0)]^{1/T} - 1 \quad \text{and} \quad r_s = [V_{fs}(T) / V_i(0)]^{1/T} - 1$$

$r$  = pre-tax return

$r_s$  = post-tax return

$V_i$  = value of the firm at beginning of the simulation period

$V_f$  = pre-tax value of the firm at the end of the simulation period

$V_{fs}$  = post-tax value of the firm at the end of the simulation period

$T$  = simulation period

<sup>47</sup> E.g. the King-Fullerton-model. See KING, FULLERTON (1984).

The return  $r$  ( $r_s$ ) represents the internal rate of growth of the value of the firm during the simulation period before taxes (after taxes).<sup>48</sup> In contrast to other models for calculating marginal or average effective tax rates (e.g. calculation of net present values) in this model the return is not an exogenous but an endogenous variable taking into account all the assumptions about the investment, financing and distribution policy at the beginning of the simulation.

In a *fourth step* the effective average tax rate (EATR) is computed by deducting the post-tax return from the pre-tax return and dividing this difference by the pre-tax return.

$$\frac{r - r_s}{r} = \text{EATR}$$

### 3.2 Comparison of the tax burden in the five countries over a ten year period

The comparison is made in two stages. The first stage is to determine and compare the effective average tax burden taking as a base data typical for a German manufacturing company of medium size. The second stage (section 3.3) is to see how the results will be affected by alternative assumptions as regards the various tax electives and the pre-tax data of the company. The paper uses information about the tax systems in operation as of 1 January 1999.

#### 3.2.1 Economic structure of the model firm

The model firm's structure of the balance sheet and profit and loss account at the end of year six (the mid-point of the ten year comparison) based on the assumption of German taxation is shown in table 2 and 3.<sup>49</sup>

Table 2: Model firm's structure of the balance sheet (period 6)

ASSETS	DM	LIABILITIES	DM
<b>A. Fixed assets</b>		<b>A. Shareholders' equity</b>	
I. <i>Intangible assets</i>	1.267.178	I. <i>Share capital</i>	6.000.000
II. <i>Tangible assets</i>		II. <i>Profit brought forward</i>	10.065.241
1. Real estate	7.858.400	III. <i>Net income</i>	2.673.965
2. Machinery	5.131.402	<b>B. Provisions for Pensions</b>	6.395.399
3. Office furniture and fixtures	2.614.992	<b>C. Creditors</b>	
III. <i>Financial assets</i>		I. <i>Loans from third parties</i>	16.000.000
1. Investments	10.000.000	II. <i>Loans from shareholders</i>	3.000.000
2. Long-term loans	1.500.000	III. <i>Trade creditors</i>	4.552.914
<b>B. Current assets</b>		IV. <i>Short-term debt</i>	19.600.000
I. <i>Stock</i>	14.715.174		
II. <i>Trade debtors</i>	13.788.351		
III. <i>Fund's assets</i>	6.395.399		
IV. <i>Deposits</i>	5.016.623		
Total	68.287.519	Total	68.287.519
Balance sheet total: DM 68.3 m, Net income: DM 2.7 m, Tangible fixed assets to total balance sheet-ratio: 22.9 p.c., Equity capital to total balance sheet-ratio: 27.4 p.c., Return on equity capital (after taxes): 16.6 p.c., Return on total capital (after taxes): 5.9 p.c.			

Table 3: Model firm's structure of the profit and loss account (period 6)

	DM
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<sup>48</sup> See SCHNEIDER, SIEGEL (1988), p. 19.

<sup>49</sup> The data was taken from official German statistics. See DEUTSCHE BUNDESBANK (1997a); DEUTSCHE BUNDESBANK (1997b); INDUSTRIEKREDITBANK (1997); STATISTISCHES BUNDESAMT (1997), p. 193-195, 206-207, 228-230, 464.

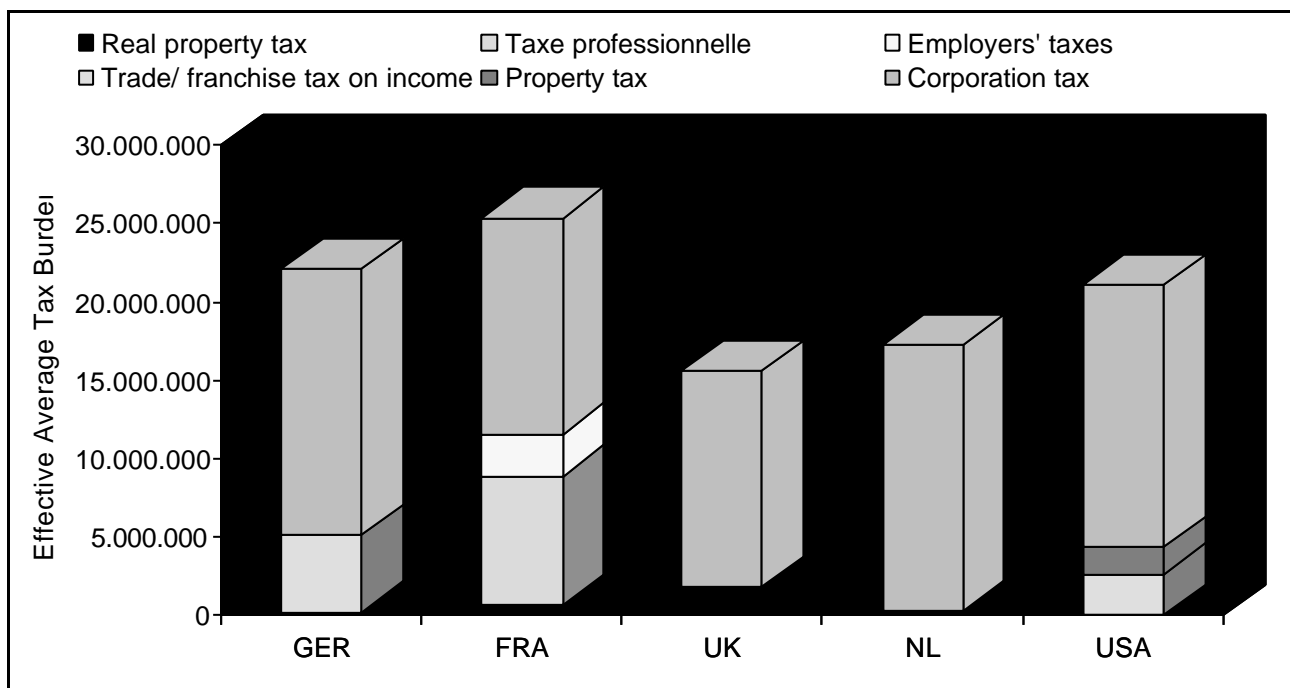
	Net sales or revenues	86.177.196
-	Cost of goods sold	68.515.546
=	Gross profit	17.661.650
-	Selling expenses	2.717.460
-	General and administrative expenses	7.763.206
+	Other revenues	5.099.511
-	Other expenses	7.644.755
+	Investment earnings (dividends)	1.128.571
+	Interest income	441.274
-	Interest expenses	1.140.000
=	Operating income	5.065.585
-	Income tax expenses (if deductible)	784.588
-	Other taxes	5.315
=	Taxable income (income before corporation tax)	4.275.682
Turnover: DM 86.2 m, Net profit ratio (after taxes): 3.1 p.c., Personal expenditure: DM 19.9 m, Personal expenditure to turnover-ratio: 24.6 p.c., Taxable income: DM 4.3 m		

### 3.2.2 Effective average tax burden at the level of the corporation

The effective average tax burden (EATR in per cent) for corporations under these assumptions over a ten year period is (see figure 2 and table):

- Germany: DM 22.1 m (32.8 p.c.)
- France: DM 25.3 m (39.9 p.c.)
- UK: DM 15.5 m (21.0 p.c.)
- Netherlands: DM 17.2 m (23.6 p.c.)
- United States: DM 21.1 m (30.7 p.c.)

Figure 2: Tax burden of corporations in Germany, France, the UK, the Netherlands and the USA



The German tax burden is lower (DM 3.2 m, 12.6 p.c.) than the French but higher than the British (DM 6.6 m, 42.6 p.c.), the Dutch (DM 4.9 m, 28.5 p.c.) and the American (DM 1.0 m, 4.7 p.c.). The differences between the EATR are always the result of the given input data. Therefore they cannot be generalized. Moreover, these differences are caused by the national tax systems, taxes, tax bases and tariffs. These elements are explained below.

*Germany:* Since property tax (1997) and trade tax on capital (1998) were abolished in Germany only one non-profit tax remains: real property tax. The significance of the real property tax is almost not relevant compared to the profit taxes (corporation tax, solidarity levy, trade tax on income). Considering the deductibility of the real property tax for the purpose of profit computation its portion in the total tax burden amounts to only 0.7 p.c. Consequently profit taxes with a portion of 99.3 p.c. are more important.

	Germany	France	UK	Netherlands	USA
EATR - corporation absolute in DM	22.082.229	25.335.887	15.550.937	17.198.468	21.076.815
effective in p.c.	32.8	39.9	21.0	23.6	30.7
corporation tax and surcharges	16.996.152	13.764.899	13.763.084	16.936.049	16.749.927
trade/ franchise tax on income	4.924.057	-	-	-	2.658.256
trade tax on capital/ taxe professionnelle	-	8.214.074	-	-	-
employer's contribution	-	2.710.659	-	-	-
property tax	-	-	-	-	1.668.632
real property tax	162.020	646.255	1.787.853	262.419	-

*France:* The structure of the French tax system differs significantly from the German. There are three non-profit taxes: real property tax, trade tax (taxe professionnelle) and employers' taxes - taxe d'apprentissage, participation des employeurs à la formation professionnelle continue and participation des employeurs à l'effort de construction. Their portion in the total tax burden is 45.7 p.c. considering that they are deductible for tax purposes.

- The burden of the real property tax is about three times higher than in Germany. This is not due to the tax base (rental value compared to standard tax value) but to the tariff (24 p.c. compared to 1.5 p.c.).
- The taxe professionnelle and the employers' taxes burden capital- and labour-intensive companies in particular: The tax base of the taxe professionnelle comprises 16 p.c. of the acquisition costs of tangible fixed assets and 18 p.c. of the payroll. Besides a general deduction of 16 p.c. there is no allowance for other deductions (e.g. debts). The average tariff is 23 p.c. Moreover, the total payroll is charged by the employers' taxes. Their nominal burden amounts to 2.45 p.c. of the payroll. Consequently the total burden of the payroll due to taxe professionnelle and employers' taxes is around 5.8 p.c.
- Summing up, the burden of non-profit taxes is about 70 times higher than in Germany.

Compared to Germany the portion of the corporation tax is significantly smaller (23.5 p.c. less). This derives from a lower base - in particular more favourable depreciation rules - and a lower tax rate (40.0 p.c. compared to 42.2 p.c. including solidarity levy). Adding trade tax on income in Germany, the difference between the burden of profit taxes rises to 59.2 p.c. In the case of France it has to be considered that the statutory rate of corporation tax is 33.33 p.c. only. Since 1995 there is a common surcharge of 10 p.c. In 1997 another surcharge of 15 p.c. was implemented for corporations with a turnover of more than FF 50 m. This latter surcharge was reduced in 1999 to 10 p.c. thus the actual tax rate is 40 p.c.

*United Kingdom:* In the UK at the company's level, there are only corporation tax and real property tax (rates). Due to the average tax rate (47.3 p.c.) the burden of real property tax is significantly higher than in Germany and France. Nevertheless the influence of the rates is low in comparison to the corporation tax. The share in the total tax burden amounts to 11.5 p.c. and is therefore higher than in Germany but much lower than in France. The level of the total tax burden in the UK is determined by the corporation tax which is lower than in Germany (-23.5 p.c.) but approximately the same as in France. This result is not due to the tax base - the rules concerning profit computation are more favourable in Germany and France- but to the lower tax rate (30 p.c.).

*Netherlands:* Like in the UK the total tax burden in the Netherlands is above all influenced by the corporation tax whereby its share is 98.5 p.c. In addition to corporation tax only a real property tax is levied which is lower than in France (-54.8 p.c.) and the UK (-85.3 p.c.) but higher than in Germany (+62.0 p.c.). The burden of the Dutch corporation tax is almost the same as in Germany (although the Dutch corporation tax rate is lower (35 p.c.)) but higher than in France (+23.0 p.c. due to less favourable rules for profit determination) and the UK (+23.0 p.c. due to less favourable rules for profit determination and a higher tax rate).

*United States:* For the USA it is assumed that the company is located in California. Thus one non-profit tax at the state's level (property tax) has to be considered whose share in the total tax burden is 7.9 p.c. As California levies a franchise tax on income in addition to federal corporation tax, there are two profit taxes in the USA. Their portion in the total tax burden amounts to 92.1 p.c.

- Like the German trade tax on income the franchise tax on income in California is an additional tax on profits. The basis of assessment is similar to that for US-federal corporation tax but with fewer modifications than in Germany. In particular, interest expenses are fully deductible and therefore the basis of assessment tends to be lower than for trade tax on income in Germany (where 50 p.c. of the interest expenses have to be added back). Moreover, the German net effective rate is higher than in the United States (17.6 compared to 8.8 p.c.) so that the total local tax income burden in Germany exceeds the corresponding US burden by about 85.3 p.c.
- Compared to Germany the portion of the corporation tax is somewhat lower (1.5 p.c. less). This derives from a lower tax rate (39 p.c. compared to 42.2 p.c. including solidarity levy). However, adding German trade tax and US franchise tax on income respectively, the difference between the burden of profit taxes rises to 12.9 p.c. in favour of the USA. In comparison to the other three countries, the US burden of corporation tax is little lower than in the Netherlands but higher than in France and the UK which - as corporation tax rate is higher (less) in France (the UK) - all in all proves that the rules for profit computation are more (less) favourable in France (the UK).

### **3.2.2 Effective average tax burden at the overall level (corporation and shareholder)**

In our base case example for a medium-sized company the model includes 10 shareholders (natural persons) who are located in the same country as the corporation. In each country a uniform profit distribution of DM 1.0 m (16 p.c. of share capital) including tax credit plus an uniform income of each shareholder from other sources is considered. Under these assumptions the overall effective average tax burden (EATR in per cent) of corporations and shareholders over a ten year period is (see figure 3 and table):

- |                                  |  |
|----------------------------------|--|
| - Germany: DM 30.1 m (37.0 p.c.) | - Netherlands: DM 26.9 m (31.8 p.c.)   |
| - France: DM 36.4 m (48.6 p.c.)  | - United States: DM 28.1 m (33.8 p.c.) |
| - UK: DM 22.7 m (25.8 p.c.)      |  |

Compared with the tax burden at the level of the corporation the overall burden at the shareholders' level is higher. From the German perspective, on the one hand, there is an advantage compared to France which is rising (DM 6.4 m compared to DM 3.2 m) and a disadvantage compared to the Netherlands (DM 3.2 m compared to DM 4.9 m) which is declining. On the other hand the advantages of the UK (DM 7.0 m compared to DM 6.6 m) and the United States (DM 1.9 m compared to DM 1.0 m) which compared to Germany are rising.

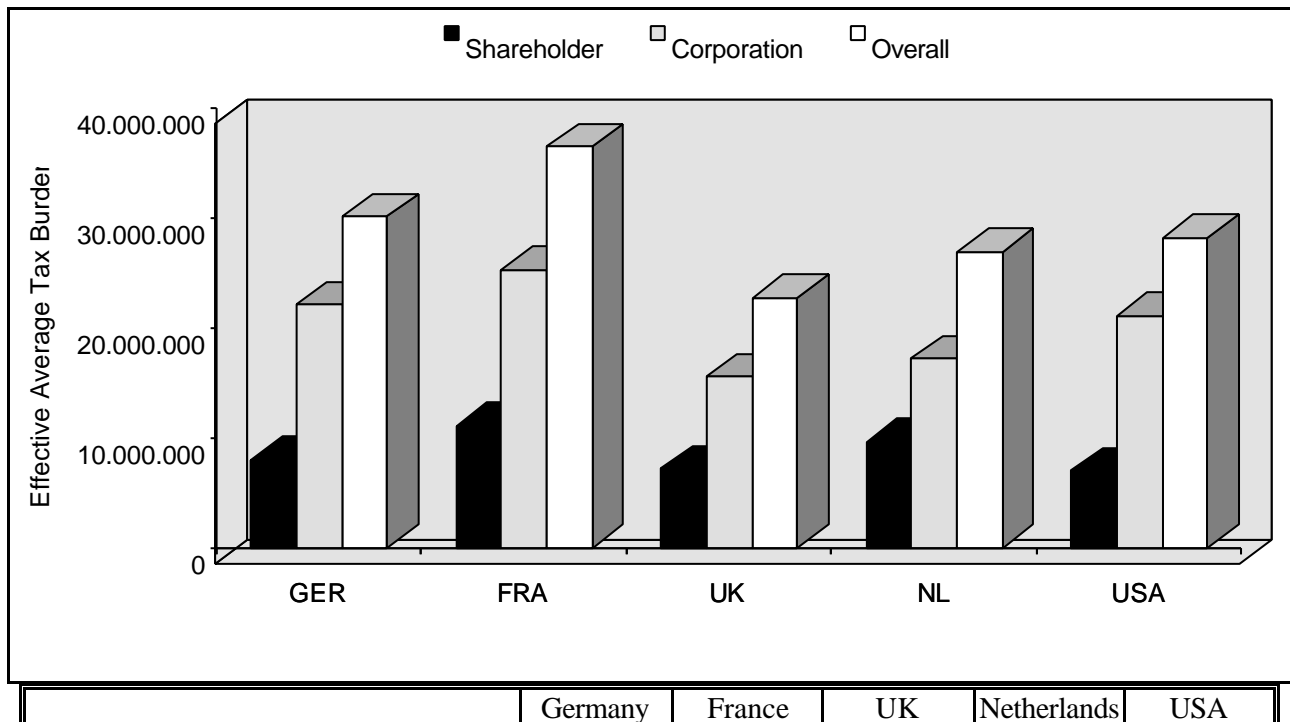
Consequently, shareholders in France and the Netherlands are subject to a higher tax burden than in Germany, the UK, and the United States, where we find the lowest tax burden. The total average effective tax burdens and the differences compared to Germany are (see figure 3 and table):

- Germany: DM 8.0 m
- France: DM 11.1 m (38.7 p.c. more)
- UK: DM 7.2 m (10.0 p.c. less)
- Netherlands: DM 9.6 m (20.0 p.c. more)
- United States: DM 7.0 m (12.5 p.c. less)

Ultimately, these differences come from the domestic corporation tax systems, the individual income tax rates including supplementary levies, and capital taxes at the shareholder's level:

*Corporation tax systems:* Germany totally avoids double taxation of domestic dividends by crediting the corporation tax borne by the company in full against the ultimate income tax liability of the shareholder.<sup>50</sup> Although the French corporation tax system, like the German system, is an imputation system, economic double taxation of dividends is not entirely eliminated. Due to the surcharges on the corporation tax rate and the limitation of the tax credit (avoir fiscal) to one half of the distributed dividend, only 75 p.c. of the underlying corporation tax are credited against personal income tax. Although there is no imputation system, the situation in the Netherlands is quite similar. Instead of a tax credit, qualified shareholders (participation of at least 5 p.c. as considered in our base case) are entitled to a so-called shareholder relief, granting a lower income tax rate on dividends (25 p.c.) instead of the statutory income tax rate (marginal rate of 60 p.c.). Since 1999, Great Britain also applies a shareholder relief system. On the one hand, dividends carry a tax credit of 10 p.c. which is, however, not refunded. On the other hand the top income tax rate for dividends is now lower (32.5 p.c.) than the ordinary top income tax rate (40 p.c.). Altogether, for top rate shareholders the tax credit and the reduced income tax rate provide that about 58 p.c. of the underlying corporation tax are credited against personal income tax. In the USA there is no tax credit or relief at all (classical system). To the extent that the tax credit or relief is denied or restricted, the corporation tax represents a final burden, which tends to make dividend distributions less attractive than they would be in Germany.

Figure 3: Tax burden of corporations and shareholders in Germany, France, the UK, the Netherlands and the USA



<sup>50</sup> However, trade tax on corporate income is not credited against personal income tax in Germany.

EATR - corporation absolute in DM	22.082.229	25.335.887	15.550.937	17.198.468	21.076.815
effective in p.c.	32.8	39.9	21.0	23.6	30.7
EATR - shareholder	7.975.409	11.078.515	7.192.880	9.663.370	7.026.890
- income tax	7.975.409	10.873.402	7.192.880	8.847.690	6.935.820
- property tax	-	205.113	-	815.680	91.070
EATR - overall level absolute in DM	30.057.638	36.414.402	22.743.817	26.861.838	28.103.705
effective in p.c.	37.0	48.6	25.8	31.8	33.8

*Income tax rates:* The apparent advantage for the full imputation system in Germany is significantly reduced or overcompensated by the higher income tax rate (including supplementary levies such as church tax and solidarity levy) compared with the UK and the USA. This is not the case, however, compared with the Netherlands. In the Netherlands, relief is granted exclusively for dividend income whereas income from other sources is fully taxed at a rate of 60 p.c. (e.g. interest income). Of the five countries that are under review, France has the highest maximum rate (including several surcharges on income tax (prélèvements fiscaux)). This results in the highest income tax burden.

*Capital taxes:* France and the Netherlands charge the total assets including the value of shares in companies to annual property taxes. The USA (e.g. the State of California) also levies a property tax but exempts the value of shares from the tax base. Germany (since 1997) and the UK do not levy any net assets or similar form of capital tax. As a result, the initial disadvantages to French and Dutch shareholders from the restricted tax credit and shareholder relief respectively are further increased in comparison to the other three countries.

### 3.3 Influence of tax electives and altering business data on the tax burden

#### 3.3.1 Primary remarks

Since the effective average tax burden depends on the concrete economic data of a corporation, differences between the structures of the national tax systems can

- on the one hand distort competition in the European Union (EU) and
- on the other hand influence decisions of companies such as location, investment, financing, dividend policies etc.

Table 4: Sets of variations

Rules for profit computation	Business data
Tax electives	Investment (tangible fixed assets to total balance sheet ratio)
Uniform tax base	Financing (equity to total capital ratio)
	Profitability (pre tax return)
	Personal intensity (personal expenditure to turnover ratio)
	Industry (specific company data for different industries)
	Dividend policies (rate of distribution)

In order to work out the dimension of these distortions the effects of alternative assumptions about the input data on the EATR is analyzed by using „what-if“ analyses. Therefore we differ between on the one hand alternative rules for profit computation and on the other hand different business data (see table 4).

#### 3.3.2 Profit computation

##### 3.3.2.1 Tax electives

The countries under consideration offer several choices for computing the fiscal profit. In order to measure the impact of these tax electives on the tax burden we consider a situation in which the relevant expenses are deducted nearer the time they are actually incurred (case A) and a situation in which they are deducted as soon as possible (case B). The tax electives that were taken into account for the calculations - depreciation rules, accounting for production costs, and stock valuation - are shown in table 5. In addition, in order to find out to what extent the differences between the effective tax burdens for case A and B are related to the tax systems, taxes and tariffs, the effective average tax burden is computed with respect to three distinct rules for taxation (situations I-III):

- *Situation I*: The first set of calculations takes into account the current tax rules in each country.
- *Situation II*: For the second set of calculations it is assumed that all non-profit taxes and profit taxes other than corporation tax will be abolished. Corporation tax still is levied at current rates. With this assumption it is possible to work out the effects of the non-profit taxes and the local profit taxes on the effective average tax burden.
- *Situation III*: For the third set of calculations a uniform corporation tax rate of 35 p.c. for each country is considered. This assumption allows on the one hand to work out the effects of the corporation tax rate on the effective average tax burden (by comparing EATR for situation II and III). On the other hand the remaining differences can solely be attributed to the national rules for profit computation. Thus their impact on the EATR can be worked out.

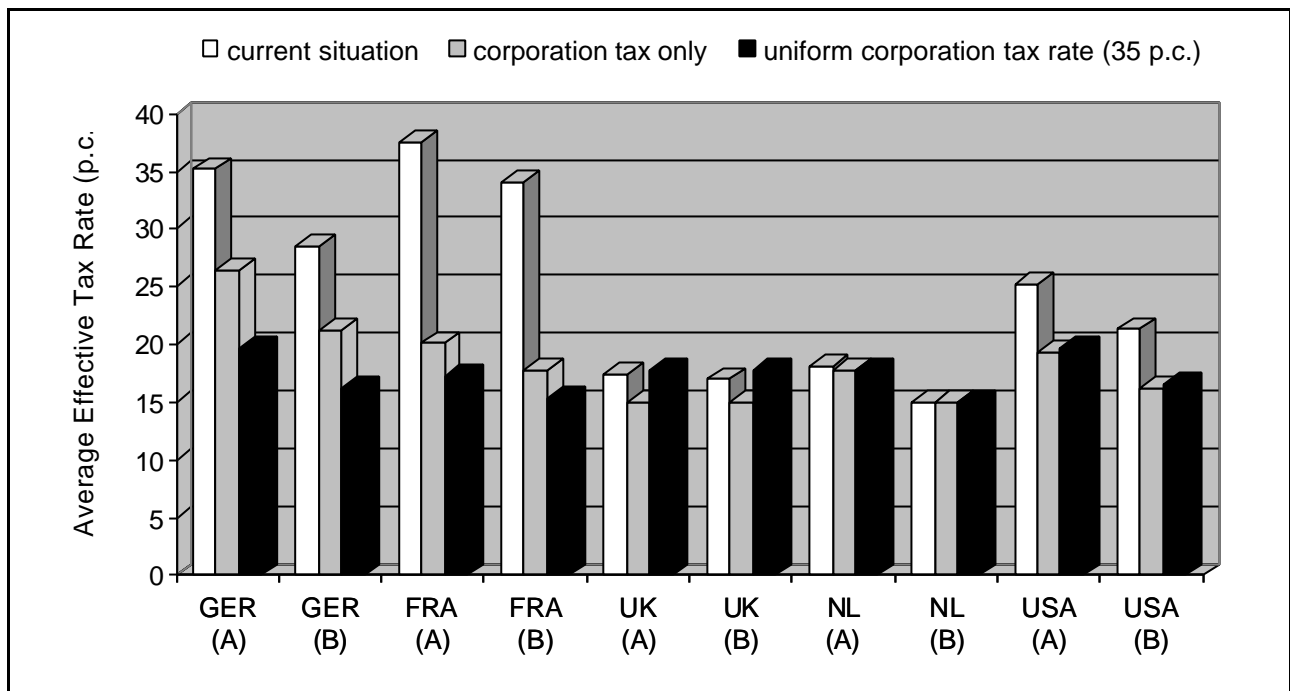
Table 5: Tax electives considered for the variation

country	Germany	France	UK	Netherlands	USA
depreciation plant and machinery - case A - case B	straight line declining balance	straight line declining balance	pooling pooling	straight line declining balance	straight line declining balance
production costs - case A - case B	full costs partial costs	full costs partial costs	full costs full costs	full costs partial costs	full costs full costs
stock valuation - case A - case B	weighted average lifo	fifo weighted average	fifo weighted average	weighted average lifo	fifo lifo

- (1) The results for *situation I* show the impact of the differences between the national tax electives for the determination of taxable profits on the effective average tax rate. Considering the current tax regulations and the economic data for the typical model firm the spread between case A and case B and, hence, the impact of the tax electives on the EATR is highest in Germany and lowest in the UK.
- The reason for the low impact in the UK is that there is no formal linkage between financial and tax accounting wherefore the various choices for financial accounting have no effect on the taxable profit.
  - Although in the Netherlands and in the USA there also exist distinct rules for the determination of taxable profits, there is an obvious influence of tax electives on the EATR. These independent electives that are granted in the range of depreciation and stock valuation cause a variation in the EATR between case A and B of 21.0 p.c. (Netherlands) and 18.6 p.c. (USA) respectively.
  - In Germany and France there is a strong linkage between financial and tax accounting resulting in a spread between the highest and the lowest EATR of 23.6 p.c. (Germany) and 10.5 p.c. (France) respectively.

Figure 4: Effects of depreciation methods, calculation of production costs and stock valuation





(2) While comparing the results for situation I and II we can draw two conclusions:

- The impact of the national tax electives on the EATR would become less when all non-profit contributions were abolished (e.g. the difference between the EATR in case A and case B is smaller). Thus the effects of the rules for the computation of taxable profits are also influenced by non-profit contributions due to the interrelations of the taxes (e.g. a fraction of the non-profit taxes is part of the production costs).
- Moreover, it is evident that the EATR in France above all is influenced by non-profit contributions. In Germany, in contrast, the EATR above all is the consequence of the high corporation tax rate.

(3) The results for situation III show that the rules for the determination of the corporation tax base are most favourable in France and the Netherlands as the EATR are lowest in case B (about 15 p.c.). Thereafter follow Germany (16.2 p.c.), the USA (16.6 p.c.), and the UK (17.7 p.c.).

Altogether we can conclude that the different rules for profit computation and the existing electives have an impact on the EATR. Depending on the particular choices for the accounting strategy the order of the countries in the ranking between the highest and the lowest EATR can even change. If we take Germany and France as examples we see that EATR in France can be higher (case A in France) or lower than in Germany (case B in France and case A in Germany). Thus harmonizing tax bases as suggested by the „Ruding Committee“<sup>51</sup> is besides the harmonization of taxes and tax systems another important condition for harmonizing company taxation in Europe.

### 3.3.2.2 Uniform tax base (International Accounting Standards)

If we are aware that differences between the tax bases have an impact on the EATR we still do not know how important this impact is compared to other elements constituting the tax burden (e.g. corporation tax system, taxes, and tariffs). In order to get some clue about this impact we considered a situation with an uniform tax base in all five countries. In doing so we assumed that the provisions according to the „Interna-

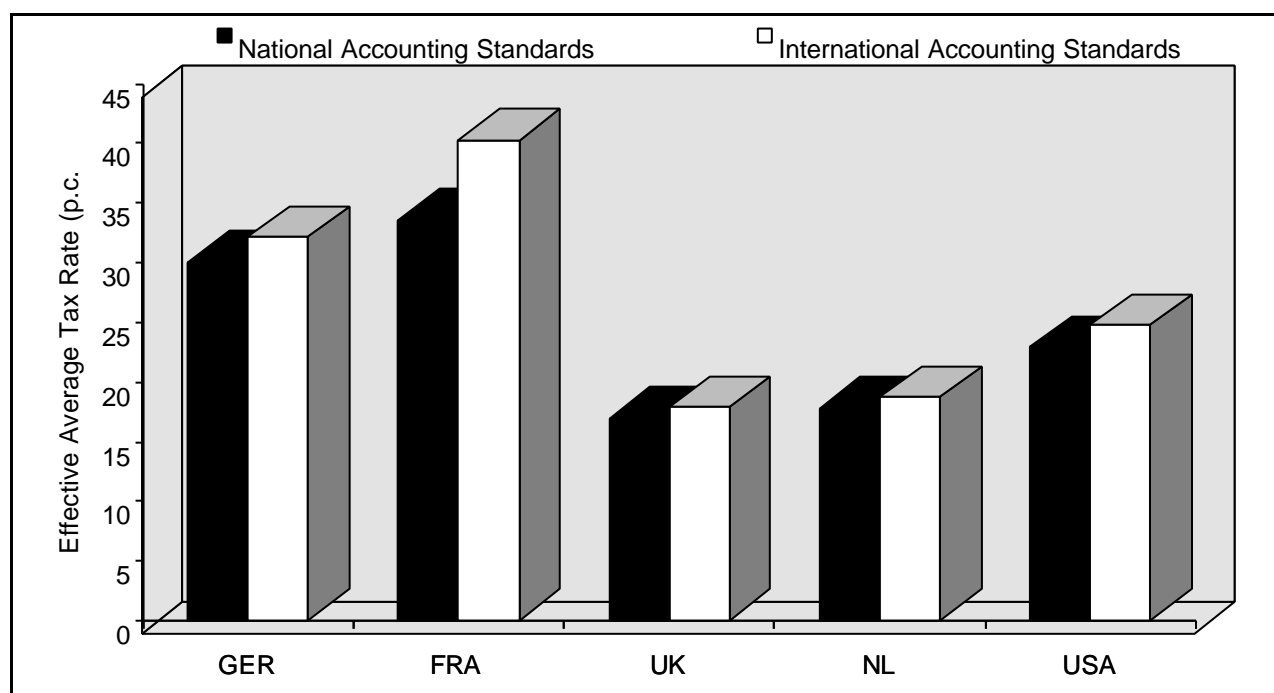
<sup>51</sup> See COMMISSION OF THE EUROPEAN COMMUNITIES (1992a), p. 211-218.

tional Accounting Standards“ (IAS) are forming without exception the basis for the determination of taxable profits in all the countries.<sup>52</sup> In particular, we considered the following provisions (IAS benchmark treatments):

Provision	IAS benchmark treatment
depreciation method	only straight-line
depreciation period	true economic lifetime
production costs	full costs
stock valuation	first in first out
pension costs	outside funding (pension fund), projected method, market interest rate
development costs	capitalization and straight-line depreciation over 10 years

Figure 5 compares the EATR in the case of national accounting standards (current situation) and in the case of the application of the IAS (uniform tax base).<sup>53</sup> What we see from the results is first that the EATR would rise in all five countries if the IAS were relevant for the computation of taxable profits. Thus, taking the IAS as a benchmark we can conclude that the national accounting provisions are more generous. However, compared to the UK and the Netherlands, the rise of the EATR would be higher in Germany, France, and the USA. This can be attributed to the fact that the accounting provisions in the Anglo-Saxon states are already corresponding with the IAS to a greater extent than the provision in the European continental states (e.g. Germany and France) exception made for the USA.

Figure 5: National tax bases, uniform tax base, and EATR



However, we have to admit that a uniform corporation tax base (e.g. tax accounting according to the IAS in all countries) would not eliminate the differences between the national EATR to a great extent. The remaining differences according to the national corporation tax systems, other taxes, and tariffs are still high

<sup>52</sup> It is quite likely that the IAS form the basis for a reform of the European Accounting Directive. See MONTI (1998), p. 1763-1764; SCHREIBER (1999), p. 906.

<sup>53</sup> See OESTREICHER, SPENGLER (1999), for a detailed analysis.

and vary between 17.9 p.c. (UK) and 40.2 p.c. (France). Thus, to sum up, a vital reform and harmonization of company taxation in Europe should not just concentrate on one element of the tax system. From our calculation we draw the conclusion that the differing (corporation) tax rates have a higher impact on the EATR than the differences between the tax bases.<sup>54</sup>

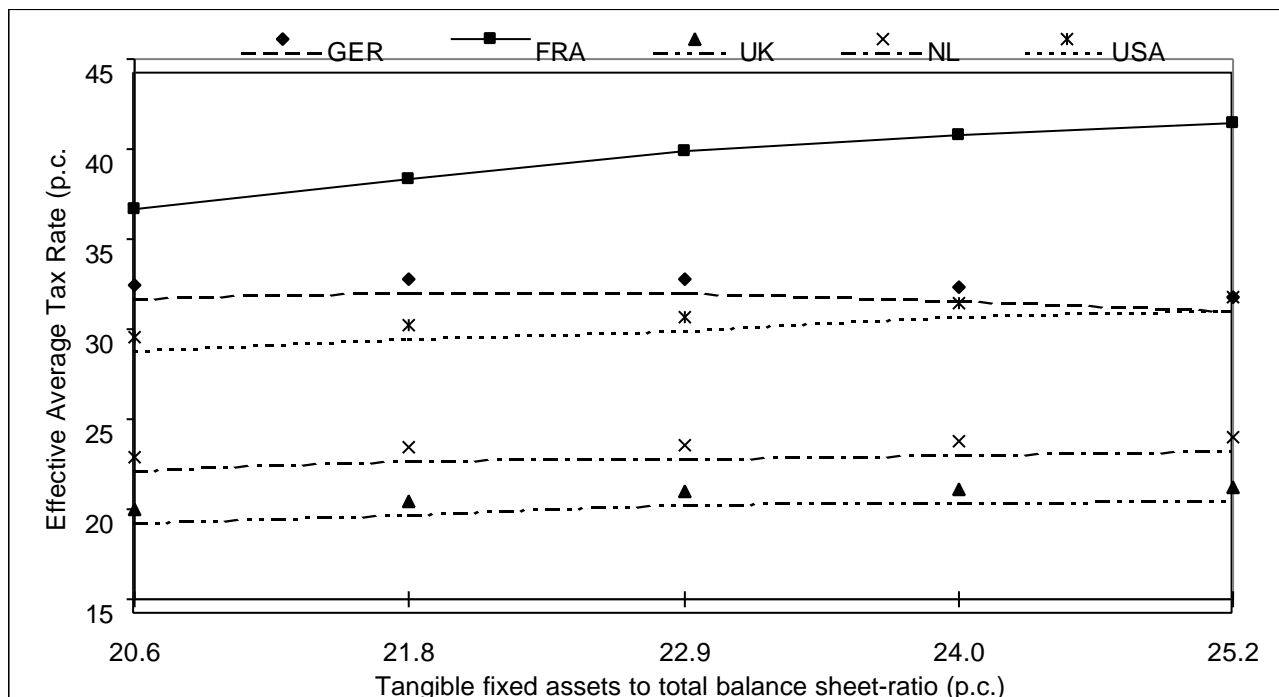
### 3.3.3 Business data of the model firm

#### 3.3.3.1 Investment policy

To make the impact of the structure of the types of assets on the EATR clear we vary the tangible fixed assets to total balance sheet ratio of the model firm. In doing so the portion of the tangible fixed assets in the total assets (i.e. balance sheet total) compared with the base case data is raised or reduced by 5 and 10 p.c. respectively. In other words, this variation takes into account a change in the model firm's capital intensity. In order to keep the total balance sheet constant the value for the financial assets was reduced or raised accordingly. Moreover, so that the effect of the modified investment policy can be isolated both the turnover and the interest receipts remain unchanged.

The results in figure 6 show that, with the exception of Germany, the EATR is increasing with the capital intensity. Thus, only the situation in Germany shows the expected result: Due to a shift from less generous rules for non depreciable assets (i.e. financial assets) to more generous capital allowance practice for depreciable assets (i.e. tangible fixed assets) the EATR is decreasing with the capital intensity. The increasing EATR in the other countries is due to the levy of non-profit taxes.

Figure 6: Tangible fixed assets to total balance sheet ratio and EATR



- In the case of the UK and the Netherlands, it is above all the higher portion of the real property tax in the overall tax burden that is overcompensating the effects of the capital allowances and therefore decisive for the increase. However, the increase of the EATR is only minor.

<sup>54</sup> This is also a major finding of other studies on the effective (marginal) tax burden in Europe. See, for example, CARON & STEVENS/ BAKER & MCKENZIE (1999).

- In contrast to the situation in the UK and the Netherlands the increase of the EATR in France and in the USA are noticeable. This can be explained by the structure of the French „taxe professionnelle“ and the US property tax. The bases of both taxes include tangible fixed assets but exempt intangibles and financial assets. Therefore, while the capital intensity is rising, the higher portion of tangible fixed assets in the tax bases is not compensated by a lower portion of financial assets as these assets are exempt from non-profit taxation.

It seems reasonable to conclude from the results that capital intensive production is discriminated in all countries except Germany. The reason of this distortion of investment decisions is the levy of non-profit taxes or more precisely the absence of tax bases that include all relevant types of assets and of uniform rules for the evaluation of the assets. However, the changes in the EATR-ranking of the countries are only minor. With the exception of Germany and the USA there are no other countries that change their positions.

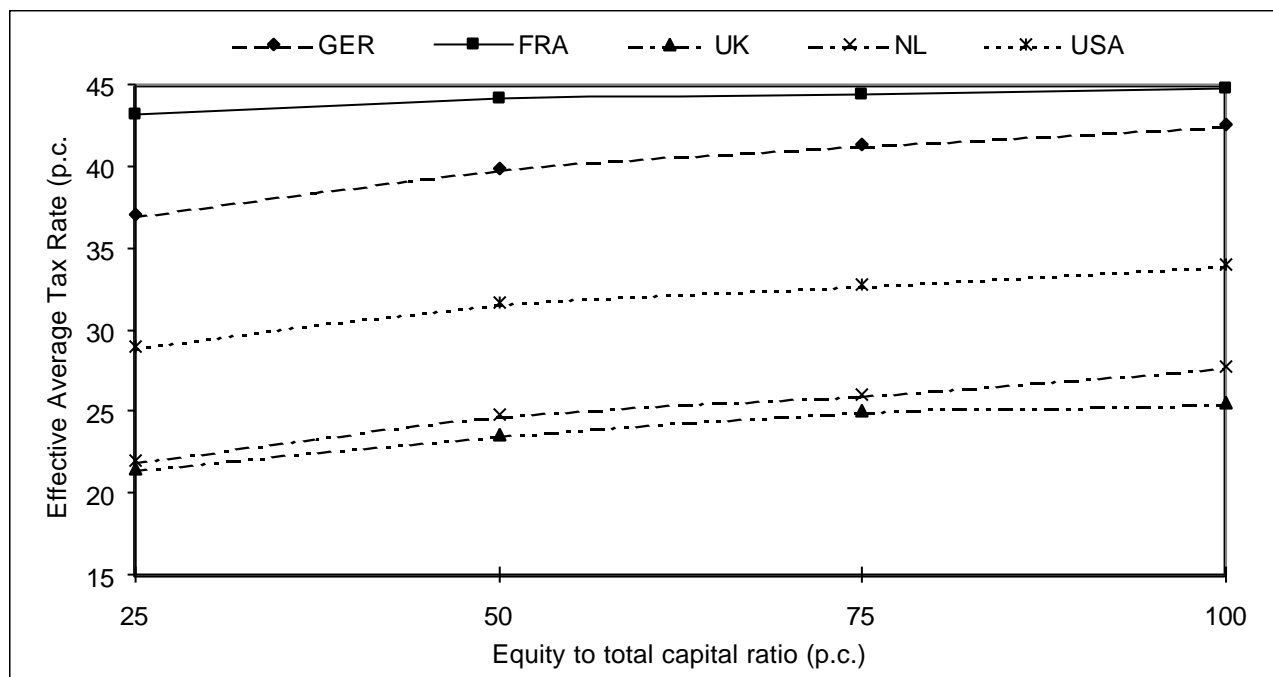
### 3.3.3.2 Structure of finance

The aim of this section is to investigate the impact on the EATR of changing assumptions for the financing of the corporation. Therefore, the weights for the sources of financing are gradually changed by increasing the equity to total capital ratio from 25 p.c. to 100 p.c. This increase of the equity to total capital ratio is accompanied by a reduction of the interest expenses for long term debts. The other data does not change.

From the results shown in figure 7 we can see that the EATR is increasing with the equity to total capital ratio. Therefore, the national tax systems are not neutral towards the source of company finance. The most important reason for this result is the effect of the corporation tax. While interest expenses are deductible from the taxable profits dividends must be paid out of taxed profits. Thus, the corporation tax burden is rising the more a company is financed by equity capital.

The discrimination of equity financing at the level of the corporation is most evident in Germany and the USA. Besides the high level of the corporation tax rate this results from the levy of other taxes in both countries that do not treat the payments for debt and equity capital equally. On the one hand, in Germany interest expenses for long term debt can be deducted to an extend of 50 p.c. from the base of the trade tax on income, in the USA interest expenses are even fully deductible from the base of the franchise tax on income levied by the states. On the other hand there are no reductions of the relevant tax bases for dividends paid to the shareholders. Therefore, in both countries the EATR are increasing disproportionately to the equity to total capital ratio.

Figure 7: Equity to total capital ratio and EATR (level of corporation)



Altogether the results show that the national EATR both rise and converge with an increasing equity to total capital ratio but they do not cross and thus do not change the ranking of our base case model firm. Whether the increasing EATR definitely proof a tax driven discrimination of equity financing cannot be stated ultimately. For that purpose it is necessary to consider the taxation of the relevant payments (i.e. dividends and interests) in the hands of the shareholders (see section 3.3.5.2 below).

### 3.3.3.3 Profitability

The EATR also depends on the assumed value for the pre-tax return of the company. There are at least two reasons for this dependence:

- (1) The relative weight of the non-profit taxes in the effective tax burden depends on the pre-tax return.
- (2) The ultimate value of depreciation allowance (i.e. the amount of the interest gain) depends on the cash flows of each period. If, for example, the total amount of depreciation in one period exceeds the cash flow (and the other pre-tax earnings) in the same period there is no full tax saving due to depreciation. If there is no possibility of a loss carry back the tax saving rather becomes effective in subsequent periods through the mechanism of a loss carry forward.

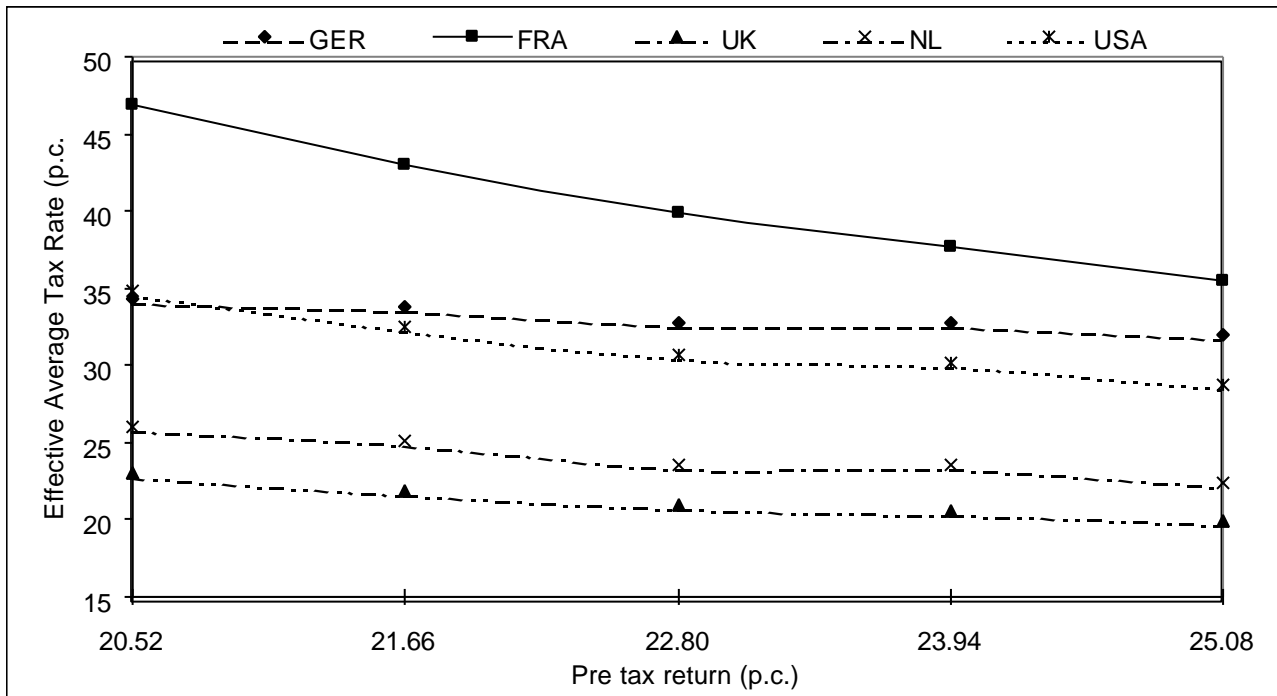
In order to find out whether the estimates for the EATR made so far are robust for the assumptions made for the pre-tax return or not, the EATR are recalculated by gradually increasing or decreasing the value for the pre-tax return in sequences of 5 p.c. compared with the base case data.

The curves in figure 8 show that the EATR is decreasing with the value for the pre-tax return in all five countries. The reason is that the impact of non-profit taxes and of comparatively disadvantageous depreciation allowances on the EATR become less important. In the countries that levy high real estate taxes (UK) or additional non-profit taxes for corporation (France and the USA), the reduction of the EATR is most evident. On the other hand it is obvious that the EMTR, in particular in France, and also in the USA are rising as the pre-tax return is falling, because non-profit taxes then constitute a relatively high fraction of a smaller pre-tax return.

The most important aspect of these results is that the EATR converge but do not cross as the pre-tax return is rising. The EATR seem to converge to a value below the statutory rates for the national profit taxes

as the tax savings due to depreciation allowances are still effective. From another perspective, the EATR for Germany and the USA can cross if the profitability of the company is low. Therefore it cannot be concluded that the German EATR is always higher than the EATR in the USA.

Figure 8: Pre-tax return and EATR



To sum up, the value of the EATR in one country as well as the differences between the national EATR are highly sensitive to the assumption made for the value of the pre-tax return. Above all this becomes relevant for smaller pre-tax returns.

### 3.3.3.4 Personal intensity

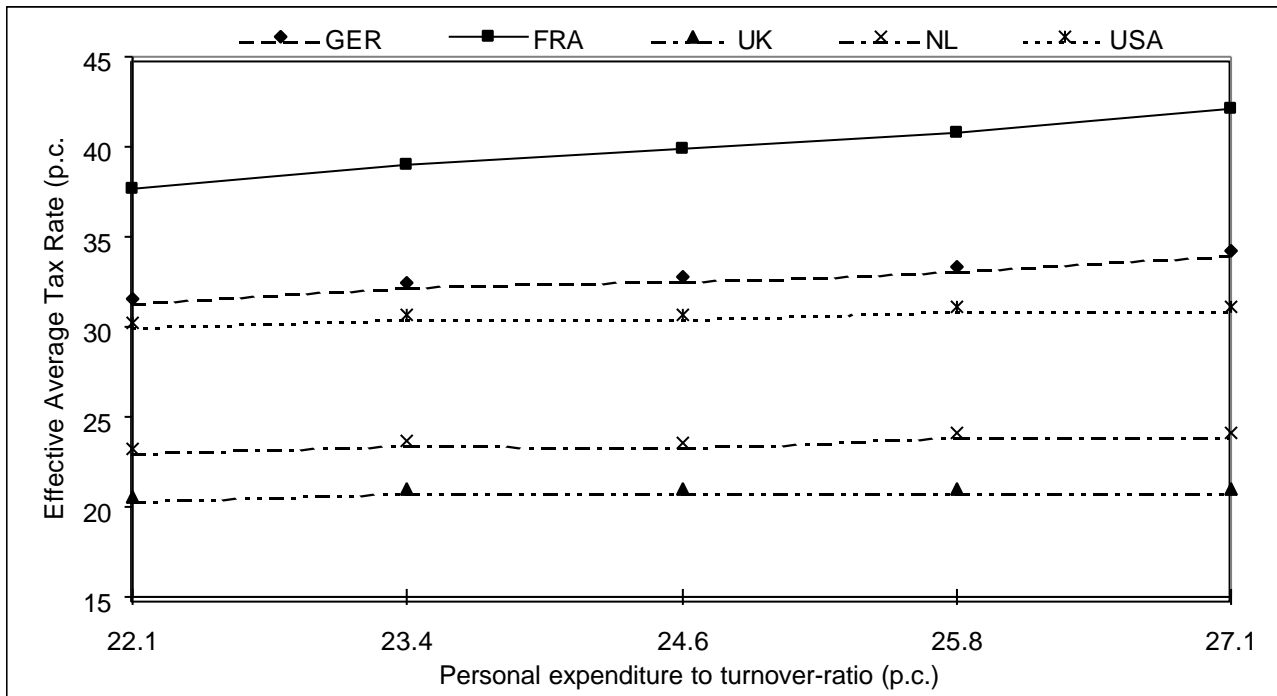
Labour costs are not considered explicitly for the calculations. As these costs are fully tax deductible they receive in principle a tax saving similar to interest expenses. Therefore, as a general rule, a company's net labour costs will decrease with the statutory tax rate on profits. Assuming equal gross wages in all countries, net labour costs will be lowest in countries with the highest statutory tax rates on profits (e.g. Germany). There are, however, two exceptions from the immediate and full deductibility of labour costs: (1) their inclusion in the production costs and hence the postponement of their deductibility to the period in which the underlying products are sold and (2) the levy of payroll taxes.

For the assessment of the impact of the personal intensity on the effective tax burden the EATR were calculated by gradually increasing or decreasing the value for the personal expenditure to turnover ratio in sequences of 5 p.c. compared with the base case data. Moreover, so that the total expenses remain unchanged, the other expenses were modified accordingly.

Referring to the results shown in figure 9 it is obvious that the EATR is increasing with the personal intensity in all countries. Therefore the assumptions about the personal intensity of a company have an impact on the EATR. However, the EATR neither cross or converge (exception for France). The reason for the observed increase of the EATR in all countries is the inclusion of personal expenditure in the production costs which lower the value of the tax saving due to the deductibility from the tax base to some extent as previ-

ously shown.<sup>55</sup> Although the EATR is increasing with the personal intensity the inclusion of personal expenditure in the production costs cannot be interpreted as a discrimination of labour against capital-intensive industries because capital allowances (depreciation) are also part of the production costs.

Figure 9: Personal expenditure to turnover ratio and EATR



The personal intensity has the highest impact on the EATR in France because France is the only country covered by this study that levies taxes on the payroll of a company other than wage taxes or social security contributions. As already pointed out the „taxe professionnelle“ and the three employer taxes burden the total payroll by around 5.8 p.c. At present the French tax rules are far from ideal from an economic point of view. With regard to „taxe professionnelle“ and employer taxes we can state that both capital- and labour-intensive industries are bearing high EATR in France.

### 3.3.4 Effective average tax burden of different industries

The effective tax burden always depends on concrete individual cases which provide the economic data for the calculation. The results of the calculations and the sensitivity analysis in the above sections made clear that there exist various values for the EATR in one country. Neither, therefore is it possible to make universally valid statements regarding the differences of the EATR across the countries. The EATR depends for example on the types of assets (investment), the sources of finance, the productivity or the personal intensity of a company. According to the character of these factors influencing the tax burden, the result will be different in international comparison.

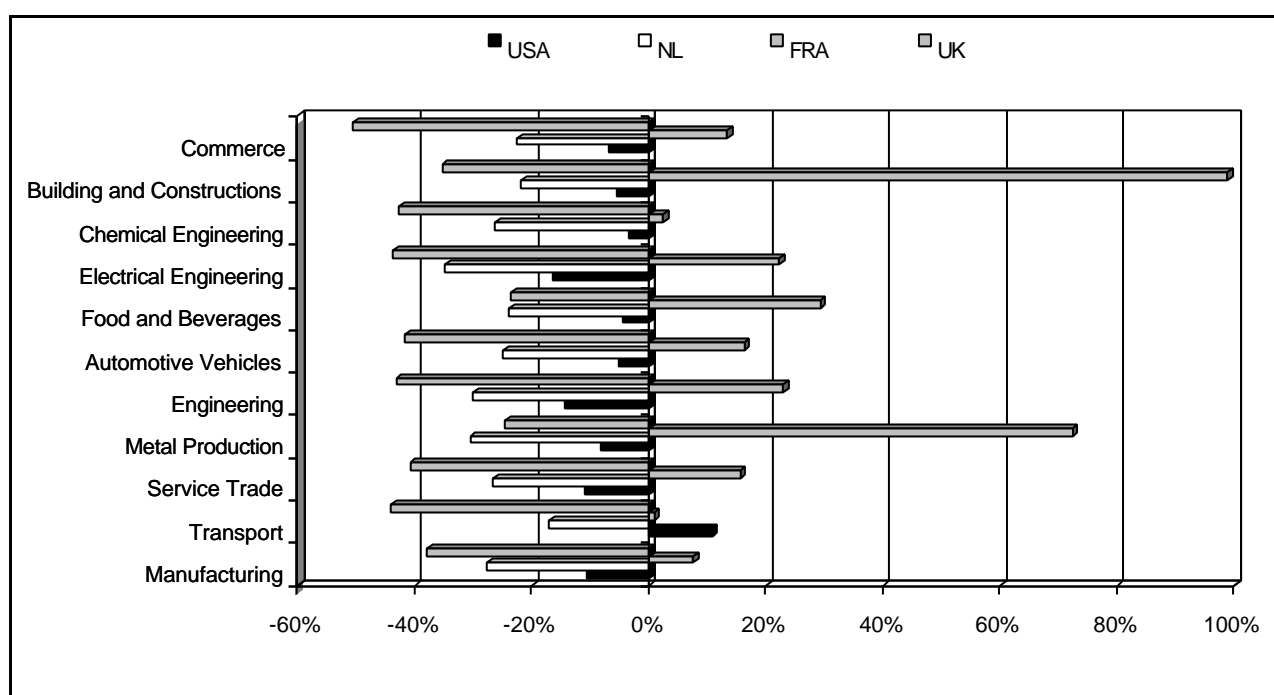
In order to investigate the impact of alternative weights for assets, sources of finance etc. this section calculates and compares the EATR of 10 other industries in addition to the base case which referred to data from the manufacturing sector. Figure 10 shows the effective average tax burdens as they were computed by the European Tax Analyzer for corporations from the different industries (Germany is the zero line).

<sup>55</sup> See FULLERTON (1986), p. 290, for a criticism that the effects of wage deductibility are not considered in effective marginal tax rate models.

The comparison of the tax burden is based on company data which is regarded as typical for the selected industries.<sup>56</sup>

In Germany, a comparably high level of profit taxes and only negligible non-profit taxes can be found. From the point of view of German company, this means that the lower the profitability the higher the advantage in the tax position compared to other countries and vice versa. This becomes very clear if we look at the relative position of a company from the *Building and Construction* Sector. In contrast to the base case manufacturing company this company has a very low profitability. Thus, as the EATR of this company above all is influenced by non-profit taxes, Germany can improve its relative position in the country ranking. A low profitability in comparison to the base case manufacturing company is also decisive for the more favourable German position of the sectors *Metal Production, Food and Beverages, Commerce, and Automotive Vehicles*.

Figure 10: Comparison of the EATR for selected industries



Although the profitability in the sectors *Engineering* and *Electrical Engineering* is also low in comparison to the base case manufacturing company, the relative position of Germany towards the UK, the Netherlands and the USA is deteriorating. The reason is that in both sectors the advantages of the low profitability are overcompensated by the effects of the low capital intensity. Thus, the impact of the comparably favourable German depreciation regulations on the EATR is only minor. The reason for the improvement of Germany in comparison with France is the high personal intensity of both industries.

The *Transport industry* has very favourable tax conditions in Germany. The reasons are the comparably high capital intensity and the comparably low debt-to-equity ratio.

Compared to the base case the relative positions for *Chemical Engineering* and *Service Trade* are worse in Germany. The reason in the case of *Chemical Engineering* is the high equity ratio whereby the discrimina-

<sup>56</sup> The data was taken from official German statistics. See DEUTSCHE BUNDESBANK (1997).



tion of equity financing in Germany due to the trade tax on income is noticeable. In the case of *Service Trade* it is the high profitability that causes the deterioration of Germany.

To sum up, the comparison reveals that different corporate economic data can effect variations in the tax burden differences between the countries. However, the industry comparison also arrives at the result that the ranking of the countries remains (almost) the same. According to this ranking, the German tax burden is below the French one and close to the one of the USA, but conversely, the low level of taxation in the UK and the Netherlands is not achieved by any of the cases examined.

### 3.3.5 Sensitivity of the overall effective average tax burden

Just as for the level of the corporation the tax burden for the overall level (i.e. including the taxation of the shareholders) is influenced by the assumptions about the economic data. Referring to the variables that have a large impact on the overall EATR we consider as relevant the distribution policy of the company and the sources of company finance provided by the shareholders.

#### 3.3.5.1 Dividend policy

In order to work out the impact on the overall EATR of changing assumptions for the distribution policy the rate of distribution of the corporation was gradually increased from zero (i.e. full retention of profits) to 100 p.c. (i.e. full distribution of profits). The assumptions about the number and the tax status of the shareholders are the same as in the base case (i.e. 10 non tax-exempt individual domestic shareholders). Figure 11 shows the results.<sup>57</sup>

If the *profits are fully retained* in the corporation (i.e. zero distribution) the overall EATR above all is influenced by the taxes of the corporations. Due to the differences between the tax burden of the corporations already explained above, the overall EATR is highest in France and lowest in the UK.

In the case of *profit distribution*, however, the overall EATR is increasing with the rate of distribution in all five countries. From the results it is obvious that Germany can improve its relative position in the country ranking while the positions of France and the USA are deteriorating. The USA even lose two places in the country ranking. This result can be attributed to the different corporation tax systems and the progression of the income tax rates.<sup>58</sup>

- *Corporation tax systems*: Due to the full imputation system in Germany the underlying corporation tax on distributed profits is merely replaced by the income tax of the individual shareholders. However, in our example, as the (average) income tax rate for a small number of shareholders is higher than the corporation tax rate the overall EATR is increasing with the rate of distribution. In the other four countries the corporation tax systems do not avoid double taxation of dividends with corporation tax and personal income tax. Either part of the underlying corporation tax (e.g. partial imputation system in France,

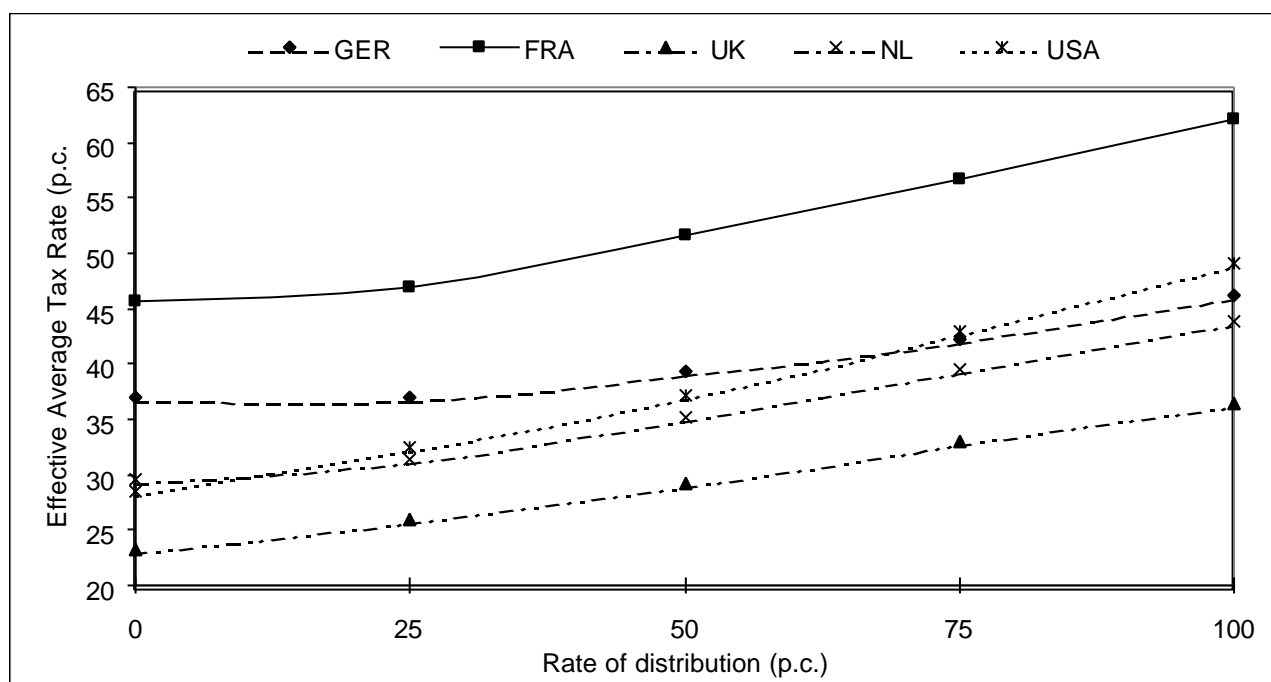
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<sup>57</sup> Here it is assumed that the corporation basically has only domestic sources of income which excludes cross-border economic activities. In these circumstances the assessment of the corporation tax systems is completely different from the domestic case. For an analysis of cross-border EATR using the European Tax Analyzer model see JACOBS, SPENGL (1997a).

<sup>58</sup> It has to be noted that there are additional reasons in the grounds of taxation that explain the differences between the national EATR (but not the increasing EATR in the case of profit distribution). First there are company taxes that can never be credited against personal income tax (e.g. real estate tax in all countries, trade or franchise taxes on income in Germany and the USA, and non-profit taxes in France and the USA). Moreover there are property taxes (e.g. personal net wealth taxes in France, the Netherlands, and the USA) at the level of the shareholders.

shareholder relief system in the UK and the Netherlands) or the total amount of corporation tax (e.g. classical system in the USA) becomes a definite burden.

Figure 11: Dividend policy and EATR (level of corporation and shareholder)



- *Progression of income tax rates:* From the point of view of Germany, however, the advantages resulting from the full imputation system are compensated by lower (average) income tax rates in the UK, the Netherlands, and the USA. This explains why the British and the Dutch overall EATR, although they do converge to the German, are always lower than the German. Only France has a higher (average) income tax rate compared to Germany which above all is caused by the levy of several surcharges. This is an additional disadvantage in the case of profit distribution in France.

To sum up, the EATR at the overall level and the differences between the countries in an international comparison are depending on the assumptions about the dividend policy of the corporation. All of the countries considered in this study favour profit retention compared with profit distribution. Moreover, depending on the rate of distribution the EATR of the countries do cross (e.g. the US EATR with the Dutch and the German). For these reasons it is impossible to make universally valid statements about the EATR at the overall level.<sup>59</sup>

### 3.3.5.2 Equity to total capital ratio

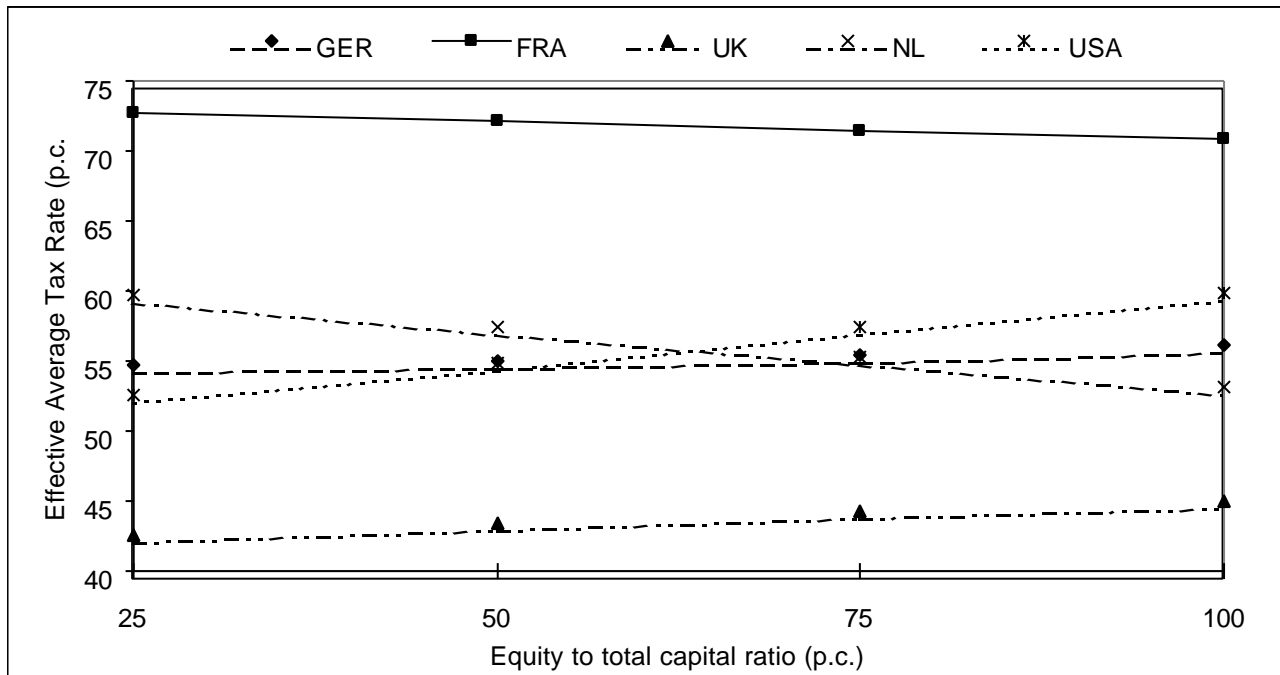
The corporation tax systems of France, the UK, the Netherlands and the USA do not completely avoid double taxation of dividends. In consequence of this (mitigated) double taxation, distributed profits of a corporation are taxed with personal income tax and that part of the corporation tax that cannot be credited against the personal income tax, whereas other sources of capital income (e.g. interest) are only taxed once

<sup>59</sup> Moreover, the situation in the case of a great number of shareholders earning only small amounts of dividends, tax exempt or foreign shareholders can be completely different. See JACOBS ET. AL. (1999).

with personal income tax. This unequal taxation of capital income can distort, *inter alia*, the decision of a shareholder whether to finance a corporation with equity or with debt capital.<sup>60</sup>

This section investigates the impact on the EATR at the shareholders' level of changing assumptions about the financing of the corporation. Therefore, it is assumed that the corporation is entirely financed by its shareholders with debt or equity capital. In the case of debt-financing the shareholders receive interest income for the loan granted to the corporation at a fixed rate, in the case of equity financing the profits are fully distributed to the shareholders. The weights for the sources of finance are gradually changed by increasing the equity to total capital ratio from 25 p.c. to 100 p.c. Figure 12 shows the results:

Figure 12: Equity to total capital ratio and EATR (level of corporation and shareholder)



- In Germany, as can be expected from the full imputation corporation tax system, the source of finance of the corporation has almost no impact on the EATR at the overall level. Therefore, a full imputation system is neutral towards financing decisions (in a domestic context as analysed here). The reason for the slight increase of the EATR with the equity to total capital ratio is the preferential treatment of debt financing within the scope of the trade tax on income as half of the interest expenses are deductible (and no allowance at all is given for equity).
- As expected, EATR in the UK and the USA are increasing with the equity to total capital ratio, because the corporation tax systems in both countries do not eliminate the double taxation of dividends and hence discriminate equity against debt financing.
- Referring to the effects solely attributable to the corporation tax system one would also expect a discrimination of equity financing in France and in the Netherlands. However, the trend of the EATR show the opposite, i.e. a discrimination of debt financing. There are of course different reasons for these results in both countries. In the Netherlands it is the combination of the corporation and personal income tax rate that results in a lower (combined) tax rate on dividends: Whereas interest income is taxed at a

<sup>60</sup> The impact of different corporation tax systems on the financing of corporations by their shareholders is analysed by JACOBS (1989); JACOBS, SPENGL (1993).

marginal income tax rate of 60 p.c., dividend income is taxed at a rate of 51.25 p.c. only (i.e. corporation tax 35 p.c. plus reduced tax rate for dividends of 25 p.c. on a dividend of 65 p.c. (= 16.25 p.c.)). In France, the discrimination of equity financing caused by the partial imputation system is overcompensated by a lower property tax burden on equity financing (i.e. the taxable value of shares is lower than the taxable value of loans according to the valuation rules of the French tax code).

Altogether the results show that in none of the countries covered by this study the taxation is entirely neutral towards the financing of a corporation. Moreover, there exists no common pattern as to a preferential taxation of debt or equity financing. As there are countries that either favour debt financing (e.g. Germany and, in particular, the UK and the USA) or equity financing (e.g. France and the Netherlands), both the amount of the national EATR and the ranking of the countries from the lowest to the highest EATR rather depend on the assumptions about the equity to total capital ratio.

### 3.3.6 Changes in the effective average tax rates over the period 1995-2000

The last section summarises the main tax reforms and their consequences for the EATR both for the level of the corporations and the shareholders. We refer to the period 1995-99 and give an outlook to tax reform proposals in Germany<sup>61</sup> and France<sup>62</sup> already announced for the near future (denoted as year 2000). The aspects to the tax systems referred to and entered in the calculations of the EATR are those that apply to the manufacturing sector and that are generally available. This excludes, above all, special investment incentive schemes.

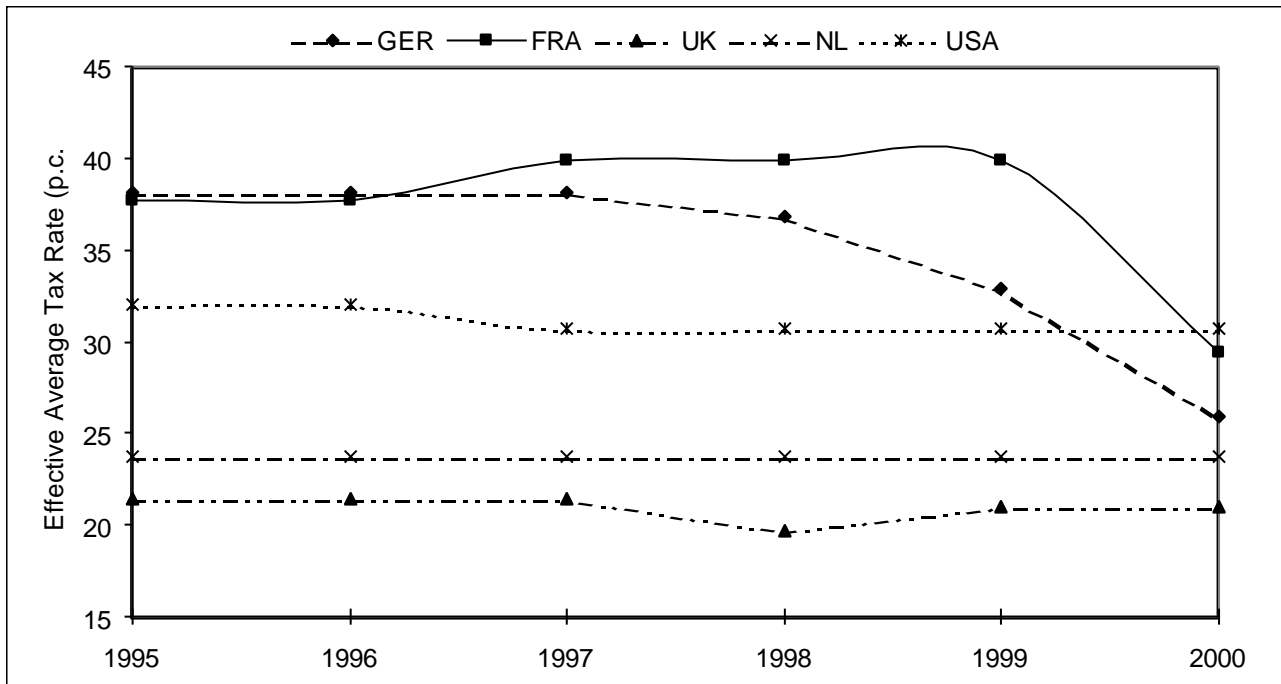
The results for the *level of the corporations* in figure 13 show that in the period 1995-99 the EATR has declined in Germany, the UK, and the USA, has risen in France, and has not changed in the Netherlands. As a consequence, the average EATR has reduced from 30.6 p.c. (1995) to 29.6 p.c. (1999). The announced tax reforms in Germany and France could cause a further reduction of the average EATR to 26.1 p.c. (2000).

Figure 13: EATR over the period 1995-2000 (level of corporation)

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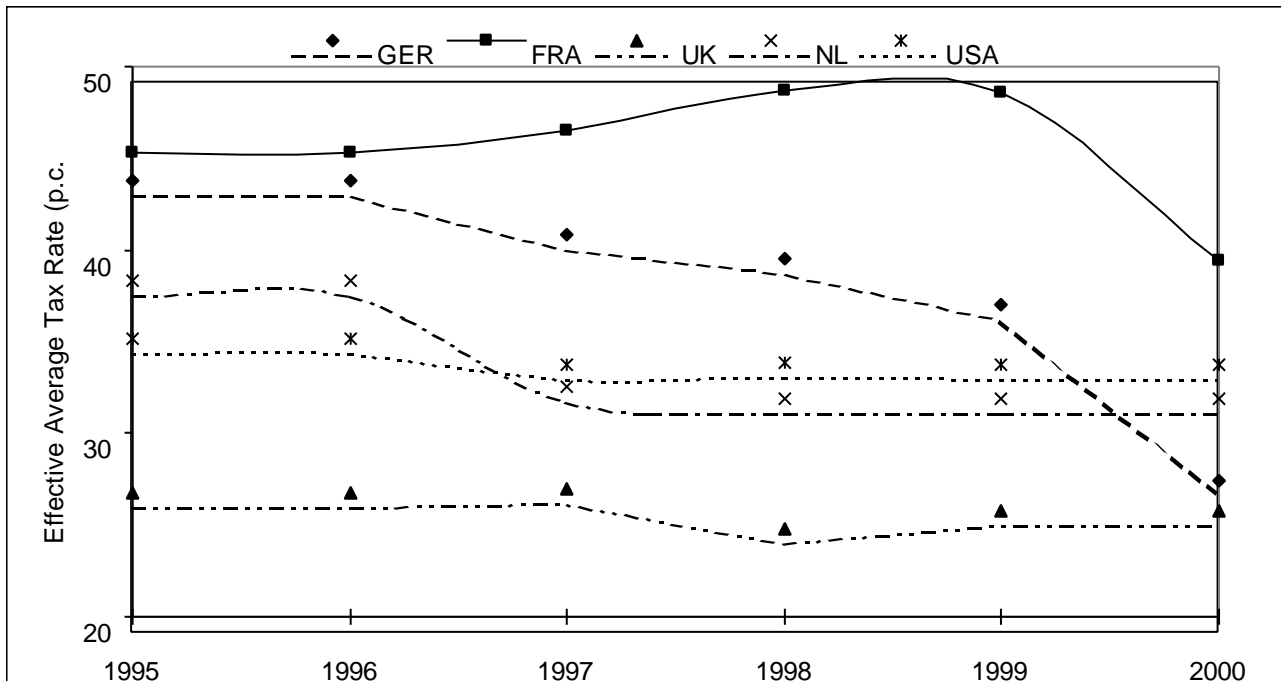
<sup>61</sup> See BRÜHLER EMPFEHLUNGEN ZUR REFORM DER UNTERNEHMENSBESTEUERUNG (1999).

<sup>62</sup> See Art. 44 de la Loi de Finances 1999.



The trend of the EATR for the *level of the shareholders* shown in figure 14 is similar: For the period 1995-99 EATR has declined in four countries (Germany, the UK, the Netherlands, and the USA) and risen in France, the average EATR has reduced from 37.8 p.c. (1995) to 35.4 p.c. (1999). A further reduction to 31.6 p.c. (2000) could occur if the announced tax reforms in Germany and France came into force.

Figure 14: EATR over the period 1995-2000 (level of corporation and shareholder)



The dominant trend in the tax reforms has been the *lowering of the statutory tax rates on profits*. This has been seen in three out of five countries:

- *Germany*:<sup>63</sup> The statutory corporation tax rate on retained earnings was reduced from 45 p.c. to 40 p.c. (1999). The solidarity levy on the corporation and personal income tax has fallen from 7.5 p.c. to 5.5 p.c. (1998). The proposed reform for the year 2000 aims to introduce a uniform and linear tax rate of not more than 35 p.c. regardless of the distribution policy (and the legal form of the corporation). This „business tax“ should cover both corporation income tax (including solidarity levy) and trade tax.
- *United Kingdom*: The statutory corporation tax rate has fallen from 33 p.c. to 31 p.c. (1998) and then to 30 p.c. (1999).<sup>64</sup>
- *United States*: The rate of the alternative minimum tax (AMT) fell from 28 p.c. to 20 p.c. (1997).

In contrast to earlier periods not covered by this study the lowering of the tax rates was not combined with important extensions of the *tax base*.<sup>65</sup> An exception has to be made for the present reforms in Germany. The tax rate reductions in 1999 were largely financed by cut backs of tax incentives, a long list of disallowing certain expenses altogether from deduction, and changes in tax accounting that lead to a deferral of the tax deductibility of much expenditure until nearer the time it is actually incurred.<sup>66</sup> The reform proposal for the year 2000 intends a further broadening of the tax base by cutting back the depreciation rules both for machinery (declining balance only 20 instead of 30 p.c.) and buildings (straight-line depreciation over 33 instead of 25 years). The proposed extensions of the tax base have been considered in the above calculations.

However, the lowering of the tax rate has not been the only type of reform. During the period 1995-98 France has raised the statutory corporation tax rate by surcharges of 10 p.c. (1995) and 15 p.c. (1997) from 33.33 p.c. to 41.67 p.c. In addition, the various surcharges on private investment income (including interest and dividend income) have risen from 4.9 p.c. to 10 p.c. in the same period of time. In 1999 the corporation tax rate was reduced to 40 p.c. and a further reduction to the former level of 33.33 p.c. is intended.

	EATR level of corporation						EATR level of corporation and shareholder					
	1995	1996	1997	1998	1999	2000	1995	1996	1997	1998	1999	2000
Germany	38,16	38,16	38,16	36,84	32,89	25,88	43,83	43,83	40,86	39,52	36,97	27,40
France	37,72	37,72	39,91	39,91	39,91	29,39	45,27	45,27	46,49	48,65	48,63	39,42
UK	21,49	21,49	21,49	19,74	21,05	21,05	26,81	26,81	27,01	24,82	25,81	25,81
Netherlands	23,68	23,68	23,68	23,68	23,68	23,68	38,33	38,33	32,59	31,91	31,85	31,85
USA	32,02	32,02	30,70	30,70	30,70	30,70	35,17	35,17	33,80	33,85	33,79	33,79
Average	30,61	30,61	30,79	30,17	29,64	26,14	37,88	37,88	36,15	35,75	35,41	31,65
Spread	16,67	16,67	18,42	20,17	18,86	9,65	18,46	18,46	19,48	23,83	19,14	13,61

Referring to the *structure of the national tax systems* two trends have to be emphasized that are important for the competitive effects of taxation:

<sup>63</sup> It has to be considered, however, that the average tax rate (Hebesatz) of the trade tax on income levied by the German municipalities has risen over the period 1995-99. Therefore, the calculated decline of the EATR is less than expected.

<sup>64</sup> However, the tax rate reduction in 1999 did not effectuate an increase of the EATR at the level of the corporation as the imputation system was abolished at the same time (see below).

<sup>65</sup> For an overview of the tax reforms in earlier years see, for example, CHENNELLS, GRIFFITH (1997), p. 26-30; RIMBAUX, (1996). Both studies, however, omit non-profit taxes.

<sup>66</sup> See ENDRES, DITSCH (1999), p. 89-99, for an overview and comments.

- *Non-profit taxes*: Germany has abolished property tax (1997) both for companies and individuals as well as trade tax on capital (1998). The Netherlands have reduced their property tax rate for individuals (1998). France has announced to exempt the payroll gradually from the base of the „taxe professionnelle“ till the year 2003.
- *Corporation tax systems*: Since 1997, for qualified shareholders (participation of at least 5 p.c.)<sup>67</sup> the Netherlands apply a shareholder relief system instead of the classical system that is still in force for non-qualified shareholders. The Dutch shareholder relief provides a reduced income tax rate on dividends of 25 p.c. instead of 60 p.c. on other items of income. Great Britain has abolished its imputation system in 1999 and also introduced a kind of shareholder relief system. Companies no longer have to pay the so-called advance corporation tax (ACT) which was equal to the tax credit of 20 p.c. From 1999 the tax credit is reduced to 10 p.c. without giving regard to the corporation tax paid by the company. At the same time a special upper income tax rate on dividends of 32.5 p.c. (instead of 40 p.c. for ordinary income) was introduced. This reduction together with the reduced tax credit ensures, however, that individual shareholders are facing the same post-tax dividend income as before the tax reform.<sup>68</sup> Germany has announced together with the reduction of the corporation tax rate mentioned above to abolish the full imputation system and introduce a shareholder relief that provides that 50 p.c. of the dividends received are exempt from personal income tax.

Altogether, over a period of the last five years including tax reform proposals already announced, in particular those countries covered by this study which had or still have a high EATR show trends to reduce their effective tax burdens significantly (e.g. Germany and France). Germany, for example, could improve its position in the country ranking by one (level of corporation) or two places (overall level). On the other hand there are only minor reductions of the burdens in those countries where the EATR is already low (e.g. the UK). From a systematic point of view, the gradual abolition of non-profit taxes and the trend towards an implementation of shareholder relief corporation tax systems have to be emphasized. As a result of the reforms the average EATR and the difference between the highest and the lowest EATR both for the level of the corporation and the overall level have declined (see above table for the data). In spite of the gradual convergence of the national EATR one cannot conclude, however, that tax distortions of competition became significantly less or even disappeared. Instead, the differences between the national EATR are still high and the results of the above sensitivity analysis obviously prove the opposite.

#### 4 Summary of conclusions

In the *first part* of this paper we developed and presented a computer-based model (so-called European Tax Analyzer) for the international computation and comparison of company tax burdens. The methodology follows the forward-looking concepts for the measurement of effective average tax rates (EATR) on the basis of a model-firm. The EATR is computed for investments generating economic rents (i.e. pure profits above the market interest rate). In this regard, in contrast to the prevailing approaches for calculating EATR based on separate and isolate investment projects the model-firm approach offers several advantages:

- *Conceptual framework of the model*: The model-firm approach allows to consider the relevant market conditions in which an investment is generating economic rents (e.g. imperfect market conditions with different yields inside and outside the company and for different kinds of investments). Moreover,

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<sup>67</sup> As our model firm in the base case considers ten shareholders with identical participation (i.e. 10 p.c.), the shareholder relief applies.

<sup>68</sup> See GAMMIE (1998), p. 434-435, for details.

the tax implications for already existing capital stocks can be considered. Therefore, effective average tax rates are calculated for more complex and realistic conditions that are relevant for decision making. At the same time the flexibility of such computer-based model-firms allows the economic assumptions (e.g. profitability, financing, structure of assets, structure of expenses and dividend policies) to be altered to suit individual circumstances (e.g. considering different industries).

- *Coverage of tax provisions*: Due to its flexibility an important advantage of the model-firm approach is the possibility to include much more relevant and complex provisions of the tax codes. The model-firm approach accounts not only for all relevant taxes (corporate, personal and non-profit taxes) and the statutory tax rates but includes various important items of the national tax bases. In particular, many rules for profit computation including tax electives are covered (e.g. depreciation, valuation of inventories, capitalization of development costs, accounting for pension costs, accounting for provisions for bad debts, rules for eliminating or mitigating double taxation of (foreign sources) income and loss relief) which allows a detailed analysis of their tax effects. Furthermore, the model includes the relevant national provisions for stimulating new investment (e.g. tax credits and grants). Finally, complex tax provisions such as progressive tax rates, tax exempt amounts, and minimum tax provisions that are relevant for differences between the marginal and the average effective tax burden are covered by the model.

A concrete comparison of the EATR of corporations and their shareholders in five different countries was carried out in the *second part* of this paper. This comparison as well as various sensitivity analysis for alternative assumptions of both economic and tax data revealed not only the areas of application of our European Tax Analyzer but also the wide spread between the EATR in the countries covered by this study. Based on the comparison of the EATR between Germany, France, the UK, the Netherlands, and the USA the following main conclusions are possible:

- If one can take a medium-sized manufacturing company as typical, the EATR both for corporations and shareholders is highest in France. This result is above all due to the high level of non-profit taxes. The USA and in particular Germany, that can be characterized by a high level of direct taxes on profits, are only in a little more favourable position. In the Netherlands and especially in the UK significantly lower burdens are imposed.
- This conclusion, however, cannot be generally applied to every situation as there are many options and planning opportunities which can increase or decrease the EATR in the countries. As examples, the effects of tax electives and the tax base as a whole, as well as the effects of alternative assumptions concerning relevant economic data like profitability, financing and dividend policy etc. have been shown. In particular situations, the EATR of Germany, France and the USA can cross. The Netherlands and the UK, on the other hand, always show the lowest effective tax burdens. This also holds for the EATR of different industries.
- The differences between the national EATR are related to the individual characteristics of the national tax systems. The model of the European Tax Analyzer enables to show the user the impact of the corporate tax system, the various profit and non-profit taxes, the tax bases and the tax rates on the EATR. It could be worked out that the profit taxes, corporation tax systems and tax rates have the highest impact on these differences. Nevertheless, the impact of the tax bases on the EATR cannot be neglected. Thus harmonizing tax bases as suggested by the „Ruding Committee“ is besides the harmonization of taxes and tax systems another important condition for lowering the distorting effects of different systems for company taxation in Europe.



- For the time series 1995-2000 it could be shown that the differences between the national EATR have declined a little. In spite of this convergence, however, tax distortions of competition did not become significantly less.

In summary, we believe that the European Tax Analyzer is a new important instrument for computing and analyzing the EATR for many complex economic situations taking into account the most relevant provisions of the national tax codes.

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