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## **Computing effective corporate tax rates: comparisons and results**

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## Computing effective corporate tax rates: comparisons and results.

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**Abstract:** This paper investigates different methodologies for computing effective corporate tax rates. All methodologies present strengths and shortcomings, as well as different rankings of countries. One reason lies in the fact that different methodologies measure different things. This paper also computes effective corporate taxation for eleven European countries, the US, and Japan using financial statements of companies. It indicates that there are large differences between statutory and effective taxation, as well as between countries for different sectors and companies' sizes. Finally, it suggests that effective corporate taxation is sensitive to the business cycle.

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## **Introduction.**

Comparing tax systems is important for economic agents since taxes affect their decisions. When locating or doing business, companies assess tax consequences of their actions. Most surveys approach the question by comparing statutory corporate tax rates. Nevertheless, given the complexity and the diversity of elements composing the tax base, this approach has been deemed to be unsatisfactory. Statutory rates do not perfectly reflect the tax burden of companies and economists had to come up with measures of effective corporate taxation. Effective corporate tax rates are important for different reasons. First, comparing statutory and effective tax rates gives an idea of tax incentives given by authorities. These incentives can be either a lower tax base or a lack of enforcement. Second, the comparison of effective tax rates across countries gives indications whether there are substantially different tax treatments of companies with the same characteristics but located in different countries. These figures can indicate whether or not a large dispersion in statutory tax rates may hide little differences in effective taxation. Indeed, countries with high statutory rates can lower the base and/or decrease tax enforcement. The analysis of effective corporate taxation should shed light on how corporate tax competition functions.

This paper investigates the different methodologies to compute these effective rates and present arguments for or against their use. It proposes a map on how and when to use the different methods. It differs from previous studies, which have rather opposed methodologies, by giving hints on how to combine them for extensive analysis. Then, it uses BACH database containing aggregated financial statements of companies at sectoral level to compute corporate effective tax rates for eleven European countries, the US, and Japan, with a breakdown by sectors and size. Working on financial statements at sector and size levels allows investigating tax differences that could not appear at aggregate levels. The paper extends the works of Buijink et al. (1999) thanks to a larger sample in terms of companies and time-period. It also uses individual account of companies, as opposed to consolidated (group) financial statements, to better assess the part of taxation which should be directly attributed to the country and to eliminate double accounting of items between the parent company

and its subsidiaries. Section one compares the different methodologies to compute effective corporate tax rates. Section two presents the effective corporate tax rates derived from BACH database. It offers first a descriptive analysis of effective taxation in the sample countries for different sectors and sizes. Second, it compares these results with previous studies. Conclusions follow.

## **1. Methodologies to compute effective corporate tax rates.**

The economic literature offers different approaches to compute effective corporate tax rates<sup>1</sup>. Three methodologies can be distinguished that we name here the macro backward-looking approach, the micro backward-looking approach, and the micro forward-looking approach.

The distinction between macro and micro approaches depends on the data used. Macro studies compute tax rates from aggregate macroeconomic data such as national accounts. Micro approaches compute these rates using elements of financial statements, either with a theoretical perspective or with empirical data. The distinction between backward-looking and forward-looking approaches is based on the type of information used. Backward-looking approaches use ex-post real-life data to estimate the tax burden that companies bear. Forward-looking approaches use statutory features of the tax system to assess the tax aspects of specific decisions.

### **1.1. Macro backward-looking studies.**

Macro studies usually derive effective corporate tax rates from aggregate data published by national or international organisations such as the European Commission, the OECD, or national statistic institutes. These effective rates are measured as ratios of taxes paid by corporations on a measure of the tax base which can be the corporate gross operating surplus, or the aggregate corporate profit<sup>2</sup>.

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<sup>1</sup> Corporate taxation only takes into account taxes paid by companies whether corporate incomes tax, wealth tax, or tax on property. Taxation of capital is based on a factor of production approach, and includes a broader range of taxes such as withholding taxes paid by individuals on dividends, taxes paid by self-employed, or taxes on capital gains. The choice between corporate taxation and taxation of capital is a matter of research agenda.

<sup>2</sup> Some authors compute ratios of corporate income tax to GDP. We leave this methodology aside since, as GDP is not a good proxy for tax base, this ratio cannot be seen as a measure of effective

Different measures have been proposed in the literature. Mendoza et al. (1994), along with Gordon & Tchilinguirian (1998), proposed the ratio of taxes on profits, incomes, and capital gains of corporations, on the gross operating surplus of companies. Martinez-Mongay (1997) computed the ratio of taxes on corporations, including taxes on their net wealth, on gross operating surplus of corporations computed as the difference between the gross operating surplus of all companies and the gross operating surplus of unincorporated companies.

The attractiveness of the approach lies in its facility. Aggregate data are easily available from most statistical institutes, and ratios can be computed in a convenient and quick way. Furthermore, it is easy to compute time series to track the evolution of this ratio. Finally, predictions based on forecasts of aggregate data can also be computed without too much difficulty. These elements explain why this approach is commonly used.

Nevertheless, these rates suffer from shortcomings due to the aggregate items they use. Aggregate data do not generally offer separated entries for different taxpayers or different recipients. This leads to different mismatching problems regarding numerator and denominator of the ratio. For example, corporate operating surplus may include interests, rents, and royalties paid by corporations while taxes on these sources of incomes are actually paid by private owners and do not appear in the numerator. Unincorporated companies are also a problem. The relatively low effective corporate tax rate of German companies can be explained by the fact that a large number of companies (about 85%) do not pay corporate taxes. Their profits fall instead under the personal tax code and are taxed at owners' personal income taxes. This leads to an underestimate of effective taxation. Another issue is that aggregate gross operating profit usually also includes revenues from agriculture and forestry, revenues from royalties or rentals, revenues from capital assets, and revenues from tax-exempt institutions, which blurs the results. Finally, another shortcoming of the methodology lies in the timing of tax collection. Since taxes levied in year  $t$  are based

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taxation per se but rather as a measure of tax burden. Other authors compute effective taxation of capital.

on revenues from year t-1, computing ratios for the same year can lead to mismatching between numerator and denominator.

## **1.2. Micro forward-looking studies.**

Micro forward-looking studies encompass diverse approaches that are linked together by the fact that they rely on theoretical features of the tax system to compute implicit tax rates. In this field, the best-known method is the King and Fullerton approach, which draws on their well-known study "The Taxation of Income from Capital". This method, revisited by Devereux & Griffith (1998), looks at specific investments, using specific sources of financing, and derives the implicit taxation. Two measures are derived, the Effective Marginal Tax Rate (EMTR), and the Effective Average Tax Rate (EATR).

The EMTR is specific to a marginal investment project<sup>3</sup> that will produce cash flows subject to taxation. Taxation of these investments will depend on the activity and the way it is financed. EMTR is computed as the ratio of the difference between pre-tax and post-tax return on pre-tax return. The EATR is a concept introduced by Devereux & Griffith for cases for which investors face a choice between mutually exclusive projects. Conceptually, its measure summarises "the distribution of tax rates for an investment project over a range of profitability<sup>4</sup>". In other words, the EATR drops the assumption of no economic rent. The choice of "average" as opposed to "marginal" may look unfortunate since "average" is not taken here in the sense of average taxation paid by an investor considering its profits and losses, but as the "average" taxation borne by an investment for different level of profitability. The term refers then to the investment and not to the investor.

The results can then be aggregated into a model-firm approach, which uses a model based on industry-specific mix of assets and liabilities. The firm is supposed to carry

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<sup>3</sup> Technically, that is new additional projects with a marginal return on the last unit invested just equal to the marginal cost of the project. In other words, the Net Present Value of the Project is set to be zero, or the Internal rate of Return equals the market interest rate. This is based on the restrictive assumption of no economic rents. In other words, the pre-tax rate of return is the "value of marginal rates of return that equates the expected discounted present value of the future stream of after-tax profits with its costs net of grants and allowances, and after deducing the rate of depreciation" in Mendoza et al. (1994).

<sup>4</sup> Devereux & Griffith (1998), p.1.

out a set of investments in different assets and with different sources of financing whose respective weights are given. These weights are set to be identical in every country to isolate taxation effects. The isolation of specific tax features makes this methodology particularly attractive to compare domestic tax systems. Sensitivity analysis can also allow researchers to track the effects of specific tax features on the taxation of specific investments. Nevertheless, the method also suffers from shortcomings inherently due to the complexity of tax systems.

First, this method does not allow capturing observed effective taxation and compares instead differences in theoretical taxation. Indeed, the already complex models usually don't take into account important elements of the tax base that can dramatically affect effective taxation. A non-exhaustive list would contain different depreciation rules, the existence of progressive taxation in some countries, treatment of losses (carry-back or carry-forward), untaxed reserves and provisions, treatment of inventories (LIFO, FIFO, market value, cost value), reduction of values, treatment of specific regimes (shares buyback, capital increase, mergers, etc.), fiscal evasion and tax planning, rulings, share-buybacks, risk, and excess foreign tax credit positions on the part of multinational firms which are usually not included. Further issues that may be relevant such as thin capitalisation restrictions, and capital funding taxes (on contributions of equity capital to a firm), are usually also left out. Second, tax enforcement is not captured by this methodology. Lax tax enforcement can be collusive behaviour between taxpayer and fiscal authorities, which can be legally recognised<sup>5</sup>. A third problem is related to the choice of a desired after-tax of return. For the sake of comparison, the methodology arbitrarily fixes an after-tax rate of return and derives the pre-tax rate of return necessary to achieve this profitability. Indeed, the method is only valid for a marginal investor since the possibility of infra-

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<sup>5</sup> For example, in France, taxpayers can benefit from tax remission which can be either contentious - the taxpayer contests the tax accrued - or gracious - the taxpayer ask of gracious tax remission given its specific situation. According to the French Ministry of Finances, more than one million requests have been treated in 1998. For local taxes only, remissions amounted to FRF 43 billions (about € 6.6 billions) in 1996 (<http://www.finances.gouv.fr>). In Belgium, the Minister of Finances indicated at the Parliament that on December 31, 1999, the delay in tax payments older than one year amounted to BEF 732 billions (about € 18.1 billions), or about 25% of budgeted fiscal receipts. Out of this, BEF 216 billions (about € 5.4 billions) represented tax contentious (Minutes from Commission of Finances, February 6, 2001, COM 377, <http://www.fed-parl.be>).



marginal returns is not taken into account. Unfortunately, things are not the same in real life. The discount rate is not fixed but derived from interest rates market conditions, firm specific and project specific risk premiums. Therefore, in theory and in practice, two different projects undertaken by the same company could bear a different discount rate, and so could the same project undertaken by two different companies. Finally, the model-firm approach can also lead to misestimates in effective tax dispersion. Indeed, the financing and assets structure of a firm is not exogenous but largely influenced by taxation. By fixing weights for sources of financing and types of assets in which the firm invest, the model-firm approach does not acknowledge that firms will try to seek tax-minimizing types of financing. Taking a weighted average can alter differences in effective taxation.

### **1.3. Micro Backward-looking studies.**

A last methodology is the micro backward-looking one. These studies use financial statements to derive effective corporate taxation. One usually computes ratios of tax accrued on other items of the balance sheet such as pre-tax profit or gross operating profit. An advantage of this methodology is, like in the case of macro studies, that it uses real life data. This allows all the elements of taxation to be taken into account. A second advantage is that it makes it possible to study effective taxation at sectoral level and for different sizes. Finally, by carrying out regressions, the micro backward-looking approach makes it possible to identify the items of the balance sheet that have a significant influence on effective corporate taxation.

A shortcoming of this methodology is that it does not isolate the features of national tax systems. Indeed, it is not possible with this method to isolate tax characteristics individually and look at their separate effects. Taxes accrued indeed depend on multiple elements which are difficult to separate. Furthermore, it is not possible either to isolate the national tax system from the interference of foreign tax systems. Since companies do business across borders, different parts of their revenues might be taxed under different systems, and therefore aggregate taxes accrued does not necessarily depend on the home state taxation only. This changes the interpretation one should have from tax rates computed in this way. Effective tax rates do not in this case represent implicit tax rates derived from the national tax system but represent the tax burden that companies located in a specific country have to bear. Indeed, if companies

are less taxed in one country, this does not necessarily mean that this country's tax system is more favorable but it can for instance also be due to the fact that companies located in that country are able - e.g. thanks to more lenient administrative procedures - to optimize their foreign investment decisions in a more efficient way.

#### **1.4 Summing up: comparing methodologies.**

A first starting point to compare methodologies is to see whether they use real-life data or use theoretical features of tax systems. The distinction we made between backward and forward-looking studies follows this line. If theoretical models enable to compare specific features of national systems, real life data have the advantage to incorporate various elements that are left out in forward-looking studies. In that sense, forward-looking studies do not compute effective (i.e. observed; actual) tax rates but implicit ones. Nevertheless, these backward-looking studies can't isolate national tax systems from influences of other foreign tax systems. One important consequence is that studies using the forward approach may find larger dispersion of effective tax rates while backward-looking approaches may find a smaller one. The reason may then be that companies located in high taxed countries adapt and take advantage of the possibilities they have to do business and invest abroad to decrease their tax burden. From a policy-oriented perspective, this fact brings the question whether distortions should be looked at the level of national tax systems or with a broader geographical scope. In other words, is a situation in which national tax systems are different but in which companies have an equal opportunity to take advantage of the possibilities offered by the different systems, one of distortion? Should policymakers who want to reduce distortions act directly on tax systems or should they rather remove barriers to activities abroad and let the tax competition lead to some de facto harmonisation?

A second differentiation can be made on the level of aggregation they take. In theory, it is always possible to carry out the computations at least at sectoral level. The feasibility will depend on the availability of data. So far, these data seem to be only available using financial statements of companies. Macro studies can't compute these rates in practices because data on corporate taxes and operating profit are often not available. In that sense, the difference between macro and micro backward-looking studies is one of level of aggregation of data.

Another distinction is whether the methodology can isolate the effect of specific features of the tax system. The issue is mainly one of level of interaction between the different characteristics of a tax system. Backward-looking studies cannot tell what taxation would be in the absence or a change of a particular feature. Forward-looking studies can isolate the impact of the combination of several items on effective taxation but, for practicability reasons, they cannot take them all in consideration and have to leave some out since they cannot be introduced in a model (e.g. tax enforcement). Both types of studies produce effective tax rates which can be used as dependent variable in econometric studies trying to explain the determinants of taxation. Nevertheless, backward studies are superior in this field since effective tax rates from forward-looking studies are biased by the choice of variables used. For instance, it is obvious that rates built with only statutory rates and depreciation rules are likely to depend from these two explanatory variables.

A last differentiation is whether the study investigates taxation based on the nationality of the tax system or on the nationality of companies. Micro forward looking studies look at national systems taken separately. They mainly investigate taxation of domestic companies in their domestic system. If they also look at tax treatment of operations undertaken abroad, they lack information on the importance of these operations in companies' turnover. Micro backward-looking studies rest on the nationality of companies whatever the tax systems that actually apply to their operations. The case of macro studies is more difficult and depends on how data are collected.

One key message of this paper is that the different studies are actually not measuring the same thing even if the different measures can be linked. All approaches are correct from an economic point-of-view but do not give the same indicator. The question is to know which measure does correctly reflect what the researcher wants to measure. The corollary issue is that one needs to know what she/he want to measure and why. If she/he is interested in comparing national tax systems, trying for instance to explain why companies in country A favor debt over retained earnings while the opposite is true in country B, then the forward-looking approach is very instructive. If she/he want to see if companies in country A have the same average effective tax burden than companies in country B, then the backward-looking approaches will be useful.

All methods have their advantages, backward-looking approaches to detect overall taxation at national level, the micro forward-looking approach to detect tax differences for specific investment and financing decisions. For example, if one is interested in differences in treatment of companies in, say, the energy sector, a first step would be to use the backward-looking approach to compute effective tax rates. Some large differences can appear between, say, France and Germany. Then this backward-looking approach would allow computing different financial or structural ratios for the sector and seeing if, econometrically, these ratios have an influence on effective taxation. This would give the researcher suspects for explaining these tax differences. Imagine that we find that, say, leverage ratio and the investment in equipment have an influence. Then, it is useful to turn to the micro forward-looking approach to compute effective tax rates for investment in equipment using debt or equity. This method allows tracking possible differences and the source of possible discrimination. We therefore think that opposing both methods is a fruitless goal and advocate a more accurate use of these two useful tools.

### **1.5. Effective corporate tax rates: a policy-oriented analysis.**

Our purpose is not to provide an exhaustive and detailed comparison of studies on effective corporate taxation. Given the diversity of methodologies used, the exercise would not make sense. Rather, we would like to stress common features or dramatic differences across studies. Taking a policy-oriented perspective, we have to assess the dispersion of results, the ranking of countries, and the neutrality of taxation across subsets of companies.

#### *a. Differences in dispersion.*

Dispersion in results will obviously depend on the countries chosen for the analysis. This is important since most studies usually restrict their analysis to a limited set of countries that either are seen as representative of some trend in taxation, or are important in terms of GDP. Nevertheless, macro backward-looking studies usually show the largest dispersion in results. For instance, Martinez-Mongay (1997) find that effective tax rates in 1995 ranged from 4% in Greece to 58.4% in Luxembourg. The same size of dispersion can be found in Gordon & Tchilinguirian (1998) as well as in Mendoza et al. (1994). Micro forward-looking studies also present large dispersion,

although less dramatic than in the case of macro studies. In Baker&McKenzie (1999), effective corporate taxation in Europe ranged from 13.7% in Greece to 40.7% in France. Jacobs & Spengel's (1999) model-firm approach provided rates from 21.0% in the UK to 39.9% in France, but for a limited a set of 5 countries. Finally, Micro backward-looking approaches are more difficult to assess since they are less numerous. The main reason lays in the availability of the data. Buijink at al. (1999)'s study for the EU shows average effective corporate taxation for 1990-1996 ranging from 13.9% in Ireland to 38.5% in Germany. Its dispersion is pretty similar to the dispersion of micro forward-looking studies.

Study (between brackets: period covered)	Methodology	Coefficient of variation	Average effective corporate tax rate	Sample size
Buijink et al (average 1990-1996)	Micro Backward	28%	26.9%	15 (EU-15)
Baker&McKenzie (1999)	Micro Forward	31%	24.3%	15 (EU-15)
Pricewaterhousecoopers (1999)	Micro Forward	26%	31.5%	15 (EU-15)
Jacobs & Spengel (1999)	Micro Forward	25%	29.5%	5 (FRA, DEU, NLD, GBR, USA)
Martinez-Mongay (1995)	Macro Backward	65%	22.0%	15 (EU-15)
Martinez-Mongay (1995)	Macro Backward	64%	23.6%	17 (EU-15, JPN, USA)
Gordon & Tchilinguirian (average 1985-1996)	Macro Backward	51%	32.4%	11 (JPN, USA, EU-15 minus AUT, DNK, GRC, IRL, LUX, ESP)

Table 1: Coefficient of dispersion of some selected studies.

The difference in dispersion is certainly due to methodologies differences. As mentioned above, the aggregate data used in macro studies clearly underestimate effective taxation in some specific countries, leading to a larger dispersion in results than in real life. Still, dispersion is of importance for policymakers since low dispersion can indicate *de facto* harmonisation of corporate taxation. Differences in dispersion between studies blur this analysis.

#### *b. Differences in ranking.*

High differences in ranking make it even more disturbing for policymakers. Indeed, depending on the methodology adopted, the rankings give totally different pictures of

which are high-tax and low-tax countries. In the following graph, we compare corporate effective taxation for three studies using the three different methodologies. To resolve the problem of difference in ratios, we set EU-15 average equals to 100.

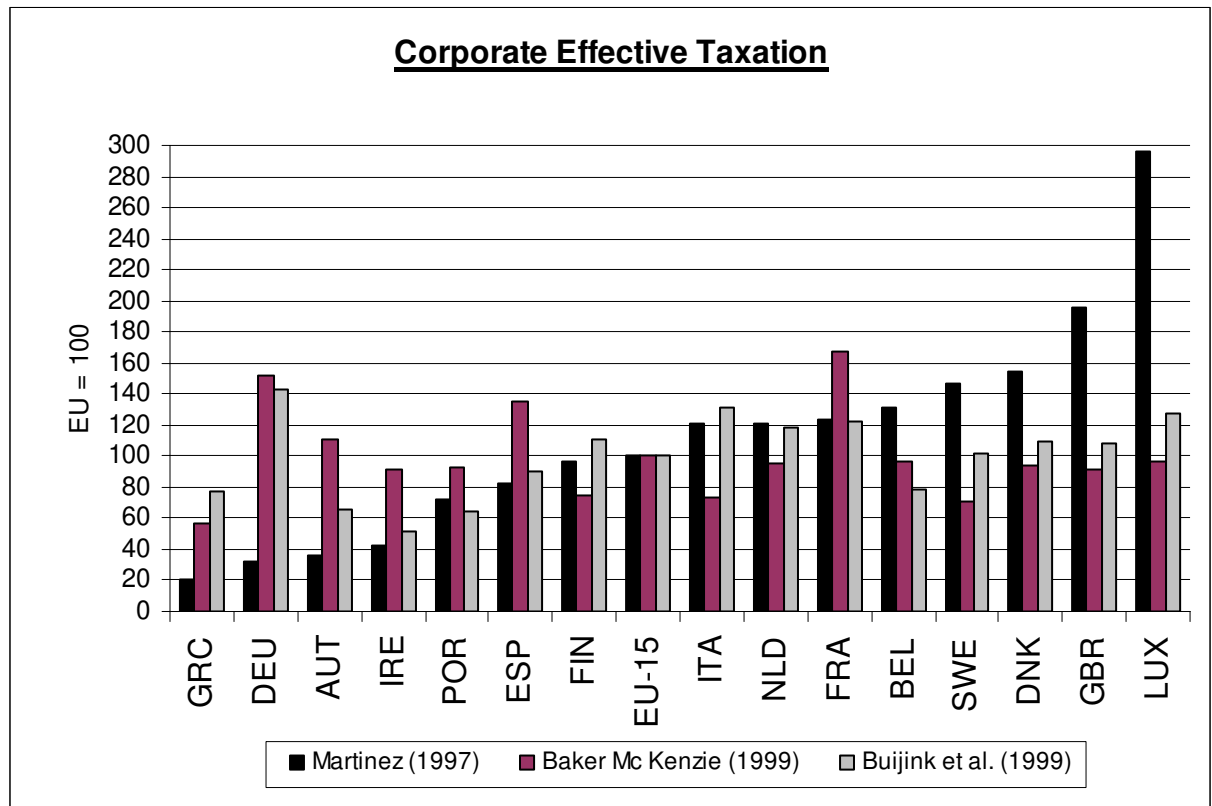


Figure 1: Differences in effective corporate taxation rankings.

It actually seems that ranking are method-specific. Indeed, if we run Spearman's rho test on the different studies, we find low correlation between studies using different methodologies and high correlation between the ones using the same method. This casts more doubts on which methods to use since the choice of a method will influence the ranking and the dispersion of effective taxation.

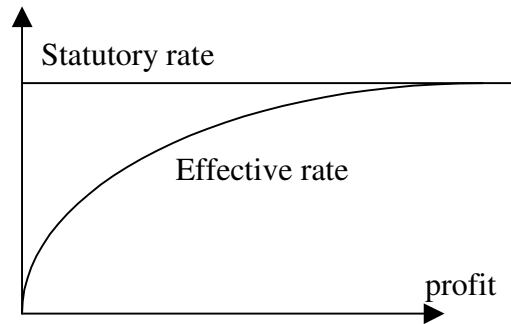
Null Hypothesis: independence in rankings - sample size: 15					
Study 1	Method	Study 2	Method	Spearman rho	Conclusion
Martinez (97)	Macro Backward	Baker&Mc Kenzie (99)	Micro Forward	-0.002	Can't reject null hypothesis at 0.1.
Martinez (97)	Macro Backward	PriceWaterhouse (99)	Micro Forward	-0.314	Can't reject null hypothesis at 0.1.
Martinez (97)	Macro Backward	Buijink et al. (99)	Micro Backward	0.346	Can't reject null hypothesis at 0.1.
Buijink et al. (99)	Micro Backward	Baker&Mc Kenzie (99)	Micro Forward	0.259	Can't reject null hypothesis at 0.1.
Buijink et al. (99)	Micro Backward	PriceWaterhouse (99)	Micro Forward	0.293	Can't reject null hypothesis at 0.1.
Baker&Mc Kenzie (99)	Micro Forward	PriceWaterhouse (99)	Micro Forward	0.516	Reject null hypothesis at 0.05

Table 2: Spearman test between different selected studies.

*c. Differences in neutrality of corporate taxation.*

Neutrality of taxation refers to possible differences in effective tax treatment across different sectors or sizes of companies. A tax is levied in a neutral way if there are no significant differences in effective taxation between different categories of companies. Micro forward-looking approaches don't specifically look at this problem. Indeed, their method is based on statutory features of the tax system and for practical reasons it is difficult to include differences in sectors or sizes in their models. Macro studies, almost by definition, don't make this disaggregation and therefore don't bring much help on this. Finally, only the micro backward-looking approach allows creating clusters of companies and assessing differences in tax treatment between them.

The issue of neutrality is important. First, if statutory rates are usually the same for all companies, the different techniques to determine the tax base imply the intervention of elements which may prove to be more beneficial for some groups of companies. For example, the tax treatment of interest paid may favour sectors with high leverage ratios. The choice of depreciation systems may also influence the tax treatment of different sectors. Special tax regimes and tax breaks can create non-neutrality in taxation. Second, effective taxation may be function of the business cycle. Indeed, the influence of tax allowances diminish with profit and effective rates should theoretically tend to statutory rates.



*Figure 2: effective and statutory rates*

If this argument holds, then sectors with strong competition should also experience lower effective taxation since one may expect that more competition would reduce profits. Finally, there might also be difference in effective taxation between companies with different sizes. Indeed, one can expect larger companies to be able to devote larger resources to implement fiscal engineering to lower their taxation. The complexity of tax systems may be a cause of discrimination between large and small companies.

The study of Buijink et al. (1999) investigates the neutrality of taxation by looking at the relationships between effective corporate taxation and company characteristics such as size, industry, R&D intensity, the average number of employees, or investments. Overall, their study does not find "strong evidence for specific company characteristics strongly influencing the level of effective tax rates<sup>6</sup>". Their conclusion is that corporate income tax is levied in a neutral way in the European Union.

We now turn to our own computation of effective corporate taxation using BACH database.

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<sup>6</sup> Buijink et al. (1999), p. 64.



## **2. Computing effective corporate tax rates from BACH database.**

In this section, we will extend the works of Buijink et al (1999). We have opted for the micro backward-looking approach which, in our opinion and despite its own shortcomings, is, in a first step, a better approach to assess all the aspects of effective corporate taxation of companies. We used the Bank for the Accounts of Companies Harmonised (BACH) available at the European Commission. The first two sections present the database and the methodology we followed. The third section presents our results and findings. Comparison with previous studies follows.

### **2.1. Bank for the Accounts of Companies Harmonised.**

#### *a. General Introduction to BACH Database<sup>7</sup>.*

In 1985 the Directorate-General for Economic and Financial Affairs of the European Commission started building up a databank for the annual accounts. The aim was to analyse the financial structures of European companies, as well as American and Japanese corporations. The Bank for the Accounts of Companies Harmonised (hereafter BACH) presents the financial structures of non-financial companies, aggregated at various sectoral and size levels, in eleven Member States (hereafter EU\*)<sup>8</sup>, the United States and Japan. Data are presented using a single accounts layout based on the one set in the Fourth Community company-law Directive (76/660/EEC).

#### *b. Variables, sectoral grouping, and size breakdown in BACH.*

Bach data is a compilation of individual (as opposed to consolidated or group) financial statements of companies. They are presented in a structured form. Items from the balance sheet are given as a percentage of total assets (which of course is equivalent to total liabilities plus equity), while items in the profit and loss account are given as a percentage of the turnover. The data base also provides absolute figures for total assets and turnover. Data are harmonised through the use of the single account layout as mentioned above.

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<sup>7</sup> European Commission (2000a), *BACH user guide*, July 7, 2000.

<sup>8</sup> Are missing: Greece, Ireland, Luxembourg, and the United Kingdom.

BACH also offers a sectoral disaggregation including six main sectoral grouping (Energy and Water, Manufacturing Industry, Building and Civil Engineering, Trade, Transport and Communication, and Other Services). Manufacturing and Trade also offer more disaggregated data. Nevertheless, for the purpose of this analysis, we stick to the 6 main grouping proposed by the database. Finally, the database makes it possible to distinguish between different sizes (small, medium, and large) following a turnover criterion for European companies<sup>9</sup>.

## **2.2. Methodology to compute effective tax rates in BACH.**

We have used the Profit and Loss account available in BACH (all items in %-age of net turnover) to compute effective tax rates. We have named variables in the following way.

Name	PROFIT AND LOSS ACCOUNT
<b>OI</b> <i>(operating income)</i>	Net turnover.
+ (1)	Change in stock finished goods and work in progress.
+ (2)	Capitalised production.
+ (3)	Other operating income.
<b>= TOI</b>	<b>Total operating income.</b>
<b>- OC</b> <i>(operating cost)</i>	Costs of materials and consumables. <i>(Raw materials and consumables + Other external charges).</i>
- (4)	Other operating charges and taxes
<b>- EMPL</b> <i>(employment)</i>	Staff costs. <i>(Wages and salaries + Social security costs).</i>
<b>= GOP</b>	<b>Gross operating profit.</b>
<b>- DEPR</b>	Value adjustments on non financial assets + Depreciation on intangible and tangible fixed assets + Other value adjustments and provisions
<b>= EBIT</b> <i>(Earnings before interest and taxes)</i>	<b>Net operating profit</b>
+ <b>FININC</b>	Financial income

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<sup>9</sup> US data only provide two sizes.

<i>(financial incomes)</i>	
<b>+ (5)</b>	Value adjustments on financial assets
<b>-FINCH</b> <i>(financial charges)</i>	Interest and similar charges <i>(Interest paid on financial debts(INT)+ Other Financial charges)</i>
<b>= EBT</b> <i>(earnings before taxes)</i>	<b>Profit on ordinary activities before taxes</b>
<b>+ EXINC</b>	Extraordinary income
<b>- EXCH</b>	Extraordinary charges
<b>- T</b>	<b>Taxes on profit</b>
<b>= NTP</b> <i>(net total profit)</i>	<b>Profit or loss for the financial year</b>

Different possibilities were available to compute effective tax rates.

- A first option was to compute the ratio of taxes paid on profit on ordinary activities before taxes adjusted for extraordinary activities:

$$\tau_* = \frac{T}{EBT + EXINC - EXCH} .$$

This would have been the best option to compare effective rates with statutory rates. Unfortunately, because this item is the result of numerous additions and subtractions (from turnover to tax), and because of possible differences in accounting rules, the use of this ratio may be problematic for comparisons. Indeed, the determination of profit differs from country to country and we therefore lack a common denominator.

- A second option was to compute a ratio on a more stable denominator. The turnover would have been a solution:

$$ETT = \frac{T}{OI} .$$

Unfortunately, ratios computed in this way lead to very small figures which makes it difficult to adequately compare countries. Furthermore, the use of the turnover can lead to misinterpretations because information on costs is lost. A small ratio does not necessarily mean that the company's profits face low taxation because a large turnover might be necessary to cover large costs.

- The option retained here as an alternative measurement of effective taxation is to compute the ratio of tax paid on gross operating surplus:

$$\tau = \frac{T}{GOP}.$$

This ratio is similar to the one used in macro backward looking studies such as Martinez-Mongay (2000). The use of gross operating surplus is interesting because it gives profit before depreciation. This is important to obtain a denominator whose definition does not differ too much from country to country. Indeed, depreciation rules differ not only on the linearity versus accelerated dimension but also on whether the historical value or the market value of the asset is taken into account. Therefore, taking gross operating profit allows us to reduce some of the problems due to differences in accounting methods. Gross Operating Profit is more comparable between countries than profit on ordinary activities.<sup>10</sup>

<b>Ratio</b>	<b>Definition</b>
<b>Effective Corporate Tax Rate</b>	$\tau = \frac{T}{GOP}$ <p><i>The effective tax rate is defined as the ratio of taxes paid on Gross Operating Profit.</i></p>

<sup>10</sup> A possible shortcoming of this method is the impact of financial activities on the ratio. Indeed, financial activity is not included in the ratio and therefore companies having a financial profit (i.e. a positive financial income net of charges) will have a higher effective tax ratio with our method since taxes paid on this income will appear in the nominator while the profit will not appear in the denominator. This possible shortcoming would be particularly relevant for the financial sector but this sector is not included in the database.

This rate has been computed per country, size, industry and year. The rates for the European Union are averages of effective corporate taxation weighted by gross value added in the economy. Averages for a period, an industry or a specific size have been computed by summing similar items over the period. These data are then used to build aggregate statistics for a period, an industry or for a size.

For example, the effective rate for period n to n+m for Industry I and Size S is:

$$\tau_{I,S}^{n \rightarrow n+m} = \frac{\sum_{t=n}^{n+m} (\text{taxes})_{t,I,S}}{\sum_{t=n}^{n+m} (\text{GOP})_{t,I,S}}$$

This ratio has been preferred to a weighted average of yearly effective tax rates. Indeed, using this latter would have created problems due to losses for some specific years. The ratio we have computed (total taxes paid over a long period on total gross operating profit over the same period) reduces this problem<sup>11</sup>.

### **2.3. The BACH effective corporate tax rates.**

*a. The evolution of effective corporate tax rates in the EU, the US, and Japan.*

A first step in the analysis is to compare effective corporate tax rates in the US, Japan, and the European Union. To allow for a better comparison, we took the manufacturing sector since this sector offers the best data availability<sup>12</sup>.

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<sup>11</sup> For example, a firm has a GOP in year t of 100 for a turnover of 400 and pays 20 of taxes. In year t+1, the company has a negative GOP of -10 for a turnover of 500 and pays 10 of taxes. Our ratio would give an effective tax rate of 33.33 % (i.e. 30/90) while a weighted average (turnover as weight) would give an effective tax rate of -46% (i.e. 4/9 of 20% plus 5/9 of -100%). This latter ratio does not represent the real picture of the firm over the whole period.

<sup>12</sup> For the European Union, we take the average of individual countries' effective tax rate weighted by gross value added in the manufacturing sector. Data for the European Union are partially estimated for 1990 and 1999. The results for the sectors of "energy and water" and "trade" - the two other sectors for which the USA offer data - are given in the appendix.

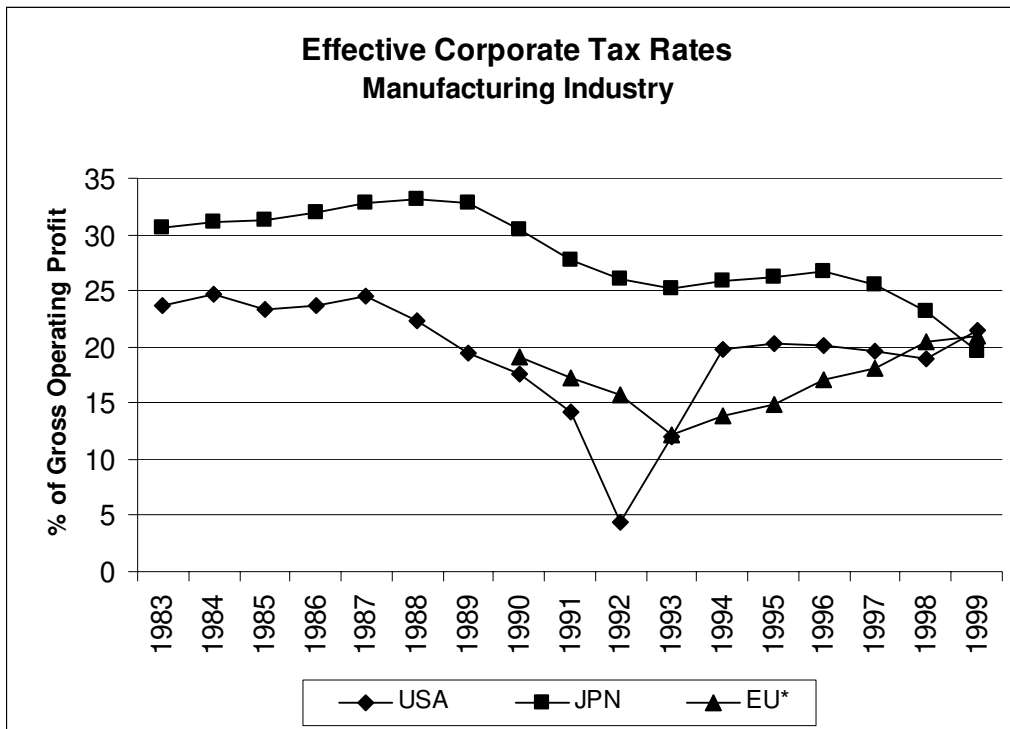


Figure 3: Effective Corporate Tax Rates - Manufacturing industry

Source: BACH.

A first look at the data seems to suggest differences in levels of effective corporate taxation. As seen on figure (3), taxation in Japan is consistently higher - with the exception of 1999 - than taxation in the US and the EU. We also see a general decline for the three geographic areas during the period 1987/8 - 1992/3. The trend is then a stabilisation followed by further decrease in Japan, an exit of a V-curve followed by stabilisation in the US, and a gradual increase in the EU. The important point is the apparent convergence of effective corporate tax rates between the three geographic areas in the late 90's. Another interesting finding is that low levels of taxation seem to correspond to periods of economic slowdown, suggesting that effective taxation might be driven by the business cycle.

A quite similar picture is found in Martinez-Mongay (2000). Using the macro data, one can spot the same relative position of the three blocks and the highest and lowest periods of taxation to be similar. One of the few differences is the date when the position of the EU and the USA are inverted - 1995-1996 for Martinez-Mongay (2000) and 1997-1998 for this study. This may be explained by a small difference in

timing between the manufacturing industry we examined, and the total economy surveyed by Martinez-Mongay (2000).

*b. Effective corporate tax rates in the EU.*

We now turn to the analysis of the evolution of effective corporate taxation in the EU. In the previous section, we have identified the trend.

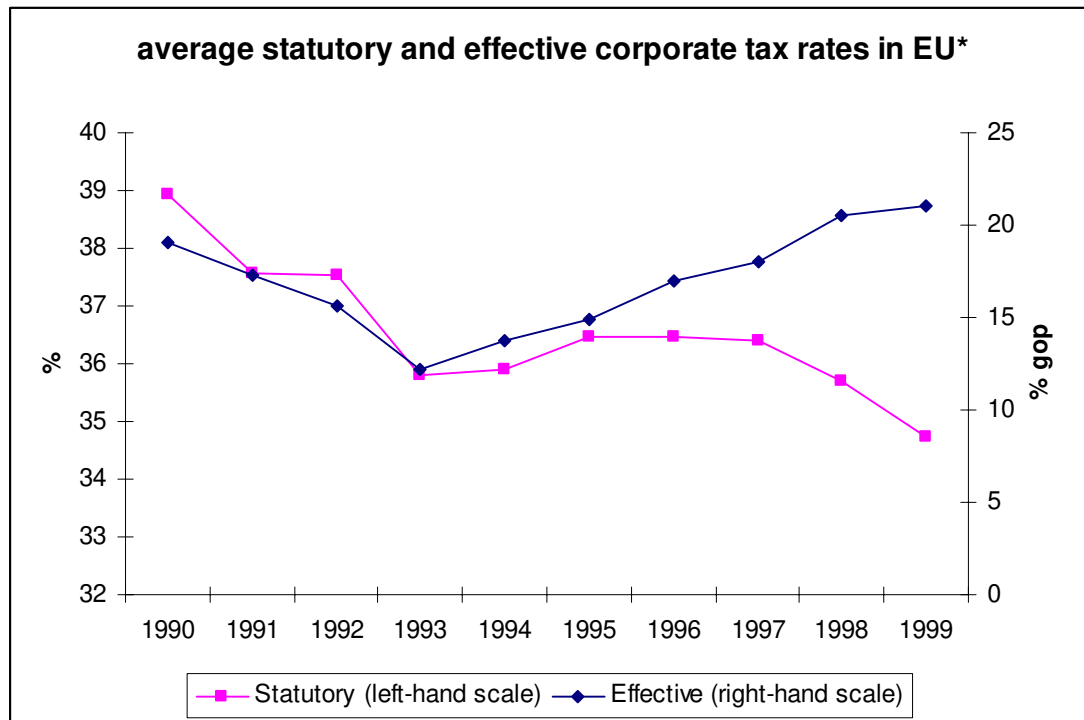


Figure 4: Weighted average of Statutory and effective Corporate Tax Rates in the sample.

The reaction to the economic slowdown in 1992-1993 has generally been one of cuts in corporate tax rates (in Denmark, Finland, France, Germany, and Greece). Nevertheless, as an answer to the need to reduce deficits, this period has been followed by increased in corporate taxation, generally by ways of tax surcharges (e.g. a 3% crisis tax surcharges in Belgium, a solidarity surcharge in Germany, or an employment surcharge in Luxembourg). This has certainly contributed to the upward trend in Europe from 1994 onwards. In the most recent period, namely from 1996-1997, one has seen new corporate tax reforms (e.g. Germany, Italy, Luxembourg, Portugal, Denmark, and the UK). These reforms have taken the form of cut in rates accompanied by larger tax base. These increases in tax base coupled with better economic cycle seem to have counteracted the effects of smaller tax rates and left

companies with higher effective tax rates as suggested by figure 4. The respective contribution of each effect should be part of new research agenda on corporate taxation. More recently, new reforms are currently prepared thanks to an ease in budgetary position. These reforms usually also aim at decreasing statutory rates and enlarging tax bases.

The evolution of dispersion in the EU sample is also instructive. We can identify a sharp decline for the period 1992-1993 and a stabilisation afterward.

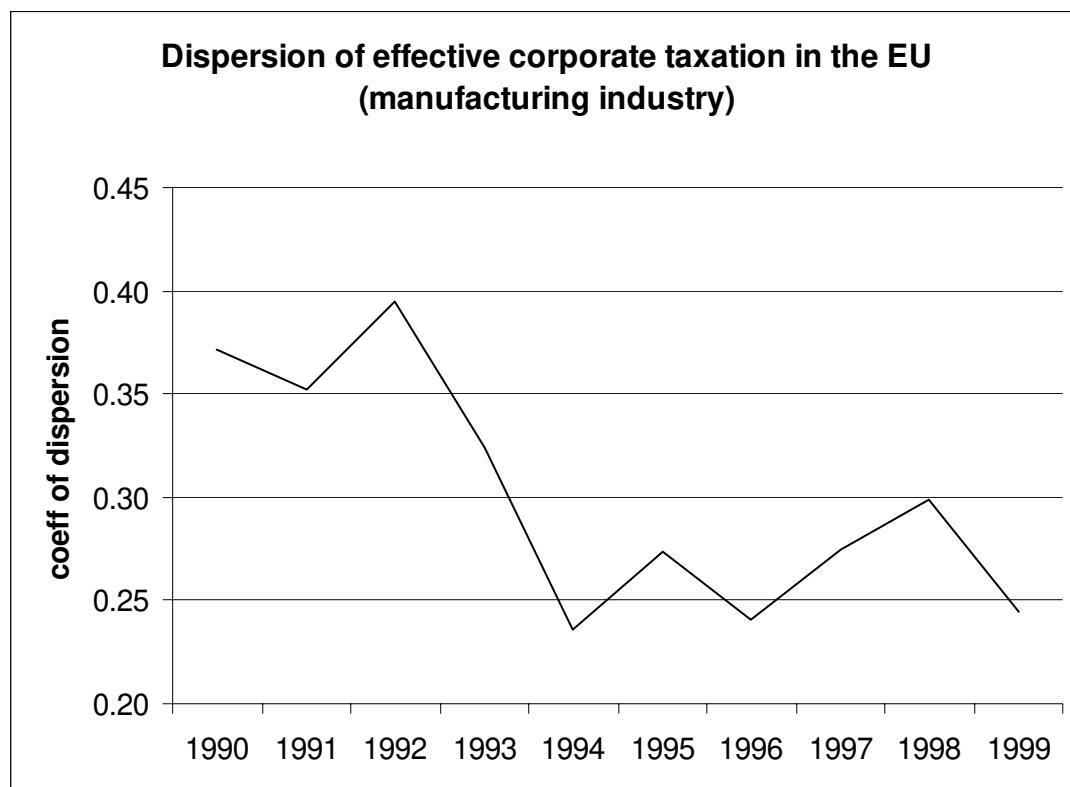
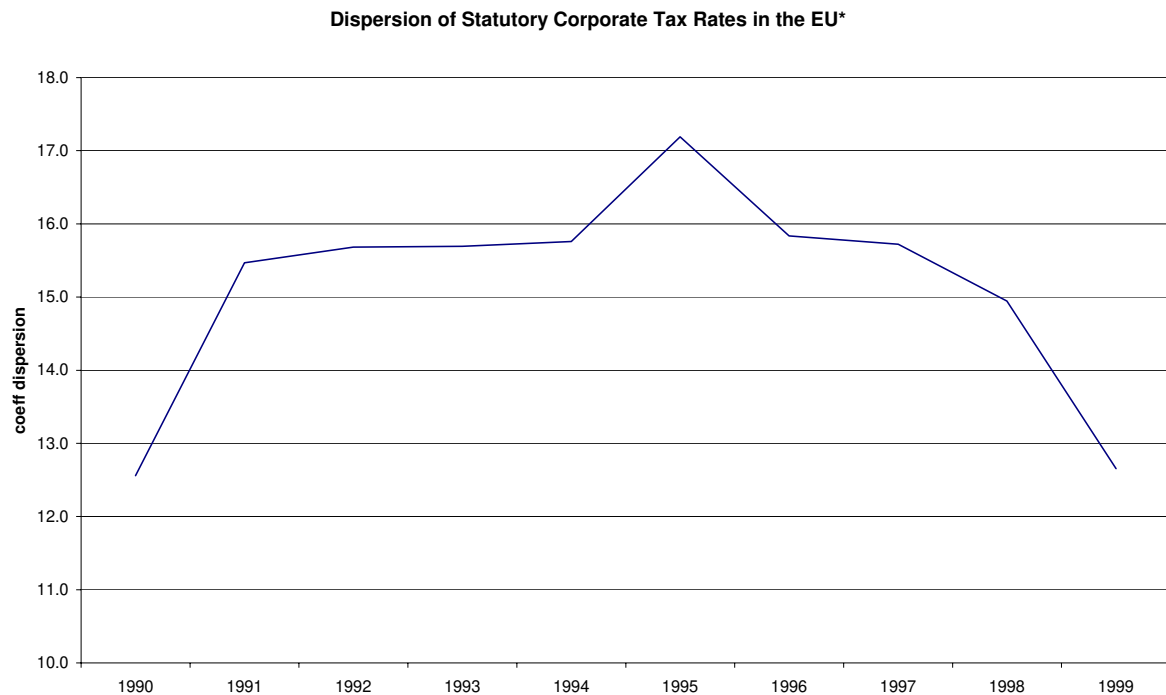


Figure 5: Coefficient of dispersion of Effective Corporate Tax Rates - Manufacturing industry  
Source: BACH.

This decrease is not surprising. Indeed, in theory, the effective tax rate is a function of profit and statutory tax rate. Since the profit is the difference between revenues and costs, the effective corporate tax rate should normally show a curve which is increasing with revenues (marginally decreasing though) and has a horizontal asymptote at the statutory rate. Therefore, during periods of low economic activity, effective taxation tends to concentrate in levels close to zero taxation, while during periods of high economic activity, differences in statutory tax rates amongst countries are more visible. The economic slowdown in Europe around 1992-1993 can explain



this decrease in dispersion in effective taxation. The following stabilisation of dispersion around the 1993 value is nevertheless an interesting element. Effective taxation has followed a similar upwards trend in the different European countries, leaving dispersion unchanged.



*Figure 6: Coefficient of dispersion of Statutory Corporate Tax Rates in the sample.*

Finally, the dispersion of statutory rates in our sample does not strictly follow the same trend as for effective rates. The relative stability of the dispersion during the whole period seems to indicate that changes in statutory tax rates have been done on relatively similar timespan and scale across Europe. The difference in the evolution of dispersion and average between statutory and effective tax rates also confirms that investors should not focus only on statutory rates as it is too often the case. Clearly, statutory tax rates are only part of the picture and tax base matters at least as much.

### *c. Level of taxation.*

If we take the manufacturing industry, effective corporate taxation ranges in the EU from 10.2 % in Sweden to 20.4% in Germany for the period 1990-1999. The ranking shows Sweden, Austria, and Belgium among low tax countries, while Germany, Italy, and the Netherlands are among the high tax countries.

**Effective Corporate Tax Rates**  
Manufacturing Industry - average 90-99.

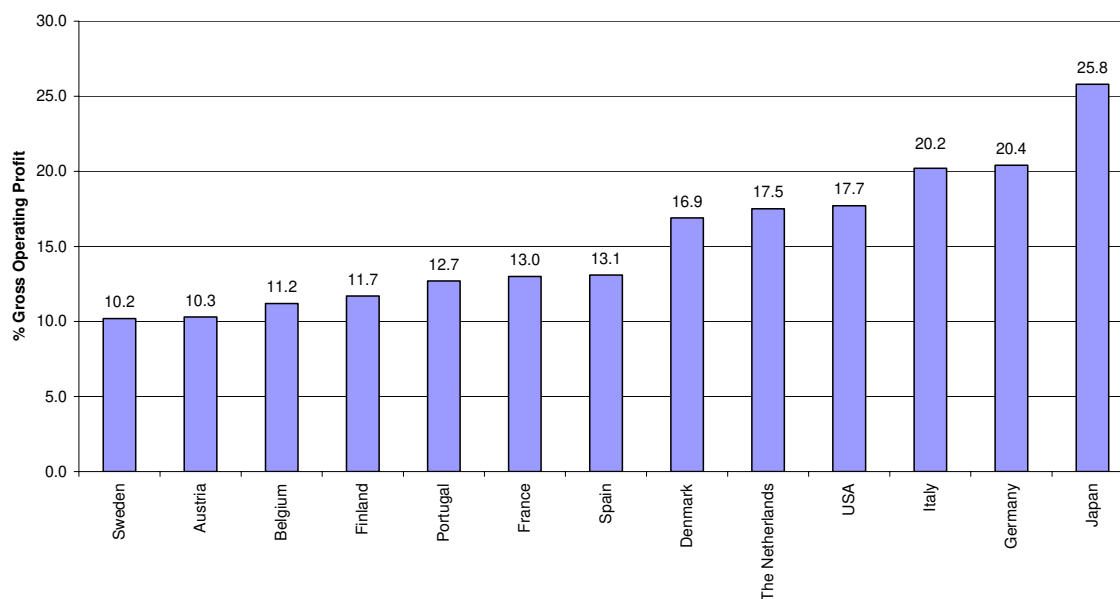


Figure 7: average effective tax rate 1990-1999.

Manufacturing Rank	1990-1994		1995-1999	
	Country	Rate	Country	Rate
1	Germany	20.2	Italy	21.8
2	Italy	17.7	Germany**	20.6
3	Netherlands	15.9	Netherlands**	19.1
4	Denmark	15.0	Denmark**	18.3
5	Spain	12.3	Finland**	15.5
6	Portugal	11.8	France	15.0
7	France	11.0	Spain	13.5
8	Belgium	10.6	Portugal	13.3
9	Austria	9.8	Belgium	12.1
10	Sweden <sup>†</sup>	9.4	Austria	10.7
11	Finland	7.1	Sweden**	10.4
	Average EU*	12.8	Average EU*	15.5
	USA	14.0	USA	20.1
	Japan	27.2	Japan	24.3

Table 3: EU-11 ranking in manufacturing for sub-periods 1990-1994 and 1995-1999  
(<sup>†</sup>1991-1994; \*\*:1995-1998).

It also appears to be interesting to compare the ranking for two sub-periods, one with economic slowdown and one of higher economic expansion. This is done in table 3. Effective taxation has increased everywhere in Europe between the two sub-periods. With reference to corporate taxation, Germany, Italy, the Netherlands, and Denmark are high-taxed countries, while Austria and Sweden are low taxed countries. Portugal stays in the middle, while Belgium keeps its place in low-intermediate range. France moves from low-intermediate to intermediate. Spain moves the other way around, mainly because its effective taxation has increased but in a smaller proportion than other European countries. The case of Finland is the most obvious with a move from the lower range to high-intermediate level. Finally, note that Japan and the US are in the higher range for both periods.

The comparison with relative positions in other sectors provides a quite similar picture for most countries.

Country	Energy	Manufac.	Building	Trade	Transp.	Oth. Ser.
<b>Austria</b>	Low	Low	Low	Low	Low	Low
<b>Belgium</b>	Low-inter	Low-inter	High-inter	Low-inter	Low-inter	Interm.
<b>Denmark</b>	High	High-inter	High	N/A	N/A	N/A
<b>Finland</b>	Low-inter	Low-inter	High-inter	Interm.	Interm.	Interm.
<b>France</b>	Low	Interm.	Interm.	Low-Inter	Low	Interm.
<b>Germany</b>	N/A	High	High	High	N/A	N/A
<b>Italy</b>	High-inter	High	High-inter	High	High	High
<b>Japan</b>	High	High	High	High	High	High
<b>Netherl.</b>	High-inter	High-inter	High-inter	Interm.	High-inter	High
<b>Portugal</b>	High	Interm.	Low-inter	N/A	High	N/A
<b>Spain</b>	Interm.	Interm.	Interm.	Interm.	Low	Interm.
<b>Sweden</b>	Low	Low	Low	Low	Low-inter	Low
<b>USA</b>	Interm.	High-inter	N/A	High-inter	N/A	N/A

Table 4: relative effective taxation by country and sector.  
 "high", "intermediate", and "low" refer to comparison within the sector.

As a conclusion, with reference to corporate taxation, Denmark, Germany, Italy, and the Netherlands can be seen as high-taxed countries, while Austria and Sweden can be depicted as low-taxed countries. The others range in the middle.

<b>High-taxed</b>	<b>Low-taxed</b>
Denmark	Austria
Germany	Sweden
Italy	
The Netherlands	

Table 5: low and high taxed countries

*d. Effective and statutory rates compared.*

An interesting point is to compare effective and statutory tax rates. Indeed, investors and policymakers typically focus on statutory tax rates while these only represent part of the picture. It is sometimes argue that countries with high level of statutory rates compensate with lower tax base and/or lower enforcement. We reproduce in table 6 the statutory and effective rates for 1998<sup>13</sup> in the manufacturing sector.

<b>Rank</b>	<b>Country</b>	<b>STR</b>	<b>Rank</b>	<b>Country</b>	<b>ETR</b>
<b>1</b>	Germany	47.5	<b>1</b>	Italy	26.4
<b>2</b>	France	41.6	<b>2</b>	Germany	24.3
<b>3</b>	Belgium	40.2	<b>3</b>	Finland	19.2
<b>4</b>	Portugal	37.4	<b>4</b>	Denmark	19.0
<b>5</b>	Italy	37.0	<b>5</b>	Netherlands	17.1
<b>6</b>	Greece	35.0	<b>6</b>	France	16.7
	Netherlands		<b>7</b>	Belgium	13.7
	Spain		<b>8</b>	Spain	13.3
<b>9</b>	Austria	34.0	<b>9</b>	Portugal	13.2
	Denmark		<b>10</b>	Sweden	13.0
<b>11</b>	Ireland	32.0	<b>11</b>	Austria	9.9
<b>12</b>	Luxemb.	31.2			
<b>13</b>	UK	31.0			
<b>14</b>	Finland	28.0			
	Sweden				

Table 6: Statutory Tax Rates and Effective Tax Rates in manufacturing industry for EU countries.

Notes: Germany: rate on non-distributed profits; all countries: including local and social surcharges.

<sup>13</sup> Last year for which we have actual (i.e. non-estimated) data for all countries.

We can see large differences between statutory and effective corporate tax rates<sup>14</sup>. These differences are exemplified by the ratio of effective to statutory tax rates as shown in table 7. A larger difference between both measures can be due either to more favourable depreciation and interest expenses deductibility rules, or lower enforcement of statutory rules.

<b>Rank in 1998</b>	<b>Country</b>	<b>Etr/Str 1998</b>	<b>Etr/Str 1996</b>	<b>Etr/Str 1994</b>	<b>Etr/Str 1992</b>	<b>Etr/Str 1990</b>
<b>1</b>	Italy	0.71	0.45	0.39	0.47	0.44
<b>2</b>	Finland	0.69	0.50	0.37	0.14	0.23
<b>3</b>	Denmark	0.56	0.53	0.50	0.37	0.36
<b>4</b>	Germany	0.51	0.42	0.34	0.39	0.52
<b>5</b>	Netherlands	0.49	0.56	0.43	0.39	0.57
<b>6</b>	Sweden	0.46	0.39	0.43	0.23	N/A.
<b>7</b>	France	0.40	0.36	0.34	0.28	0.36
<b>8</b>	Spain	0.38	0.36	0.29	0.30	0.47
<b>9</b>	Portugal	0.35	0.34	0.33	0.33	0.26
<b>10</b>	Belgium	0.34	0.29	0.28	0.26	0.27
<b>11</b>	Austria	0.29	0.34	0.24	0.35	0.35

*Table 7: EU countries ranked by ratio of effective to statutory tax rate.*

It shows that in 1998 Italy, Finland, and Denmark are, along with Germany and the Netherlands, among the countries that seem to offer the least tax incentives or the highest tax enforcement, while Austria, Belgium, and Portugal are among the ones that provide the highest tax incentives or lowest tax enforcement. Another explanation is that companies located in countries presenting a low ratio might be able to better take advantage of tax planning and optimisation of foreign investment decisions. This

<sup>14</sup> Even if part of the difference comes from the fact that the effective tax rates are computed on gross operating profit. Therefore, the level should not be interpreted per se.

picture holds with results for different years<sup>15</sup> and roughly fits to the results of Buijink et al.<sup>16</sup>.

*e. Sectoral analysis.*

A more thorough descriptive analysis seems to indicate differences of effective taxation between sectors. Clearly the sectors "Energy and Water" and "Transport and Communication" seem to experience lower effective taxation, while "Trade" seems higher. The picture holds, with a few exceptions, for all the countries in the sample. These differences should be part of agenda for further research. Issues of degree of competition as well as the financial structure of companies should be considered. For example, one can expect the high level of tangible assets in the sectors of "energy and water" and "transport" to play a role through depreciation.

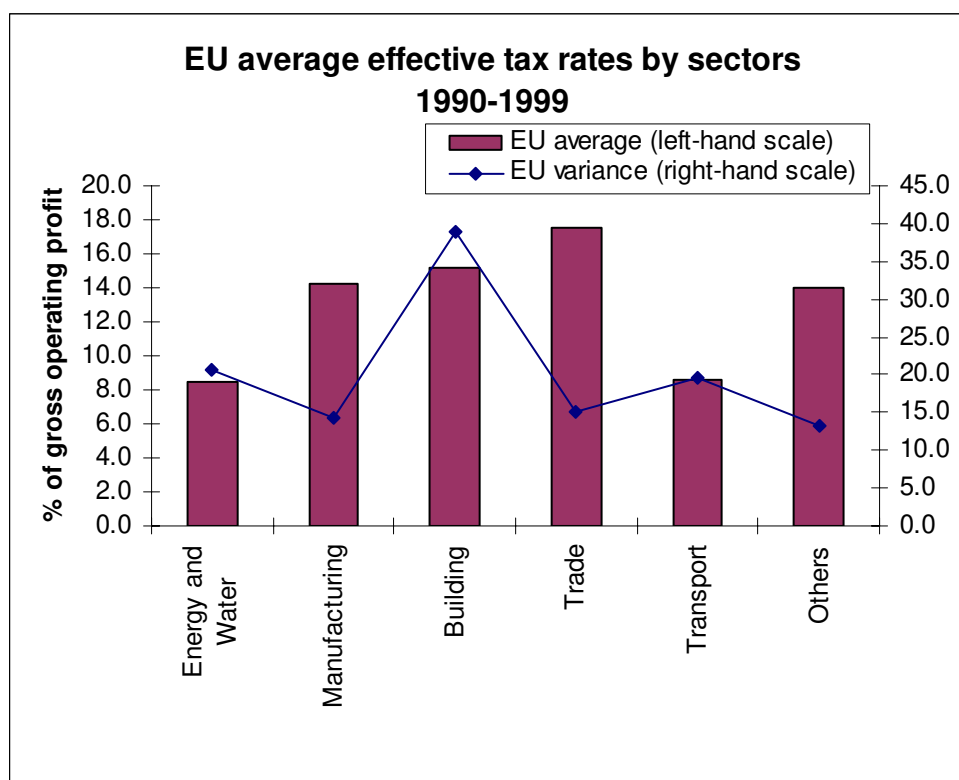


Figure 8: non weighted average and variance of effective tax rates by sectors in the EU sample for 1990-1999 source: BACH.

<sup>15</sup> Provided that the results for specific years depend on business cycle and specific events, one should look at trends. One exception is Finland which seems to reduce over time the difference between effective and statutory rates.

<sup>16</sup> Buijink et al (1999), *Op. Cit.*, page 35.

*f. Size*

The issue of size is also of importance. Indeed, Buijink et al. (1999) have already identified some reasons why size would matter<sup>17</sup>. On one hand, authorities may want to favour SMEs through their tax system since these are often seen as a major contributor to employment. These favourable treatments may range from reduced tax rates (e.g. Belgium has a progressive corporate tax rate) to specific allowances. Another reason why large companies would bear a higher taxation is that their actions are more closely watched and they would have less opportunities to escape taxation. On the other hand, one can argue that large companies, being large contributors in terms of jobs and tax revenues, have more power to negotiate favourable tax treatments, for example through professional unions. Furthermore, large companies are also the ones that can more easily mobilise fiscal engineering resources to avoid taxation, for example by developing specific financial structures or by pursuing tax planning abroad. A theoretical relationship between effective taxation and size does therefore exist, even though the sign of the correlation is not determined.

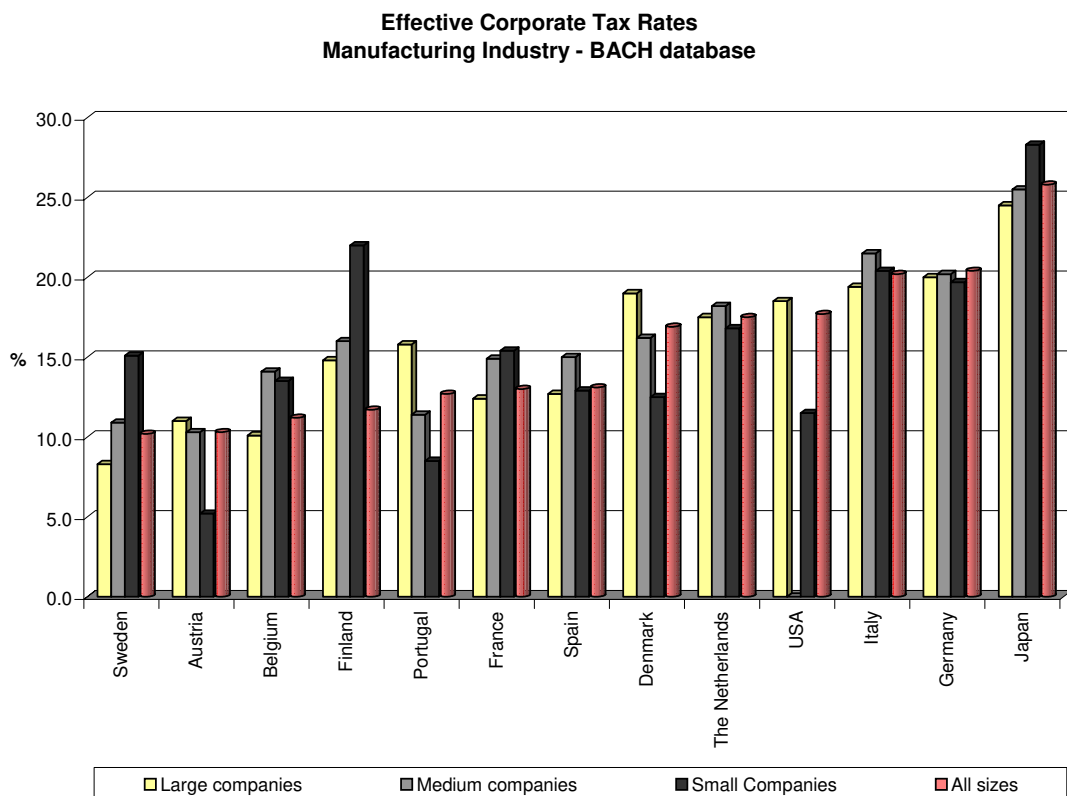


Figure 9: 1990-1999 Effective corporate taxation in manufacturing industry per country and size.

In the manufacturing sector, one can spot apparent tax differences between sizes for some countries. While in Finland, Sweden, and, to a lesser extent, Belgium and France, effective taxation is negatively correlated with size - i.e. small companies have a higher relative burden - the opposite seems to apply to Austria, Portugal, and Denmark.

Country	Ratio of effective rates of large companies on small ones.
Sweden	0.55
Finland	0.67
Belgium	0.75
France	0.81
Japan	0.87
Italy	0.95
Spain	0.98
Germany	1.02
The Netherlands	1.04
Denmark	1.52
USA	1.61
Portugal	1.86
Austria	2.12

Table 8: large versus small companies for manufacturing sector 1990-1999.

With a few exceptions for specific sectors in specific countries, these relationships globally hold for other sectors. This indicates that size matters but the relationship between size and taxation vary amongst countries. This evidence is a potential source of a double discrimination: between companies of different sizes within one country and between companies of the same size in different countries.

#### **2.4. BACH effective corporate tax rates in perspective.**

Our study is part of the micro backward-looking approach. We follow the path taken in the first part of this paper to assess dispersion and ranking. To be able to compare studies<sup>18</sup>, we will only look at results for corporate taxation (putting aside shareholder personal taxation).

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<sup>17</sup> *Ibid.*, pages 28-29.

<sup>18</sup> With the necessary caveat on the different methods and data available.



We computed an EU-11 (15 minus Greece, Luxembourg, UK and Ireland) for all studies. This study shows an average effective tax rate slightly lower than other studies - which is due to the fact that, like macro studies, we computed tax rates on gross operating profit - but the dispersion is comparable to other studies.

Study (period studied)	Methodology	Coefficient of dispersion	Average effective corporate tax rate	Sample size
Nicodème (average 1990-1999)	Micro Backward	27%	14.3%	11 (sample)
Buijink et al (average 1990-1996)	Micro Backward	25%	27.7%	11 (sample)
Baker&McKenzie (1999)	Micro Forward	31%	25.7%	11 (sample)
Pricewaterhousecoopers (1999)	Micro Forward	25%	33.5%	11 (sample)
Martinez-Mongay (1995)	Macro Backward	41%	20.0%	11 (sample)

Table 9: Coefficient of dispersion and average effective corporate tax rate of some selected studies - results for sample of 11 BACH countries.

As noted in the first section, the rankings are method-specific. This is confirmed by the fact that our ranking is correlated with the one found by Buijink et al. and not with the ones from other studies (except Pricewaterhousecoopers).

Null hypothesis: independence in rankings with this study - sample size: 11.			
Study	Method	Spearman rho	Conclusion
Martinez (1997)	Macro Backward	0.077	Can't reject null hypothesis at 0.05
Baker&McKenzie (1999)	Micro Forward	0.420	Can't reject null hypothesis at 0.05
PriceWaterhouse (1999)	Micro Forward	0.713	Reject null hypothesis at 0.05
Buijink et al. (1990-1996)	Micro Backward	0.731	Reject null hypothesis at 0.05

Table 10: Spearman test for this study.

The differences and similarities between studies can be stressed within a table comparing high-taxed and low-taxed countries. We see that Germany, France, and Italy, are almost consistently in the higher range regarding corporate taxation. On the other hand, Austria, Ireland, Finland, Sweden, and Greece are in the lower range.

<b>Corporate Effective taxation</b>	<b>Martinez-Mongay (1997) (macro backward)</b>	<b>Buijink et al. (1999) (micro backward)</b>	<b>Baker &amp; McKenzie (1999) (micro forward)</b>	<b>PWC (1999) (micro forward)</b>	<b>Nicodème (2001) (micro backward)</b>
<b>High Taxed Countries</b>	<i>Luxembourg</i> <i>UK</i> Denmark Sweden	Germany Italy <i>Luxembourg</i> France Netherlands	France Germany Spain	France Germany Italy	Germany Italy Netherlands
<b>Low taxed countries</b>	<i>Greece</i> Germany Austria <i>Ireland</i>	<i>Ireland</i> Portugal Austria	<i>Greece</i> Sweden Italy Finland	Sweden <i>Luxembourg</i> <i>Ireland</i> Finland	Austria Finland Sweden

*Table 11: high taxed and low taxed countries in different studies.  
(in italics, countries not surveyed in BACH).*

## **Conclusions.**

Economic literature offers three types of methodologies to compute effective corporate tax rates. We named them the macro backward-looking, micro-backward-looking, and micro forward-looking approaches. All methodologies show very different rankings and all present strengths and shortcomings. The macro backward-looking methodology works on macroeconomic aggregate data. It allows deriving quickly effective rates but the level of aggregation sometimes makes it difficult to disentangle different sources for both tax paid and tax base. The micro forward-looking approach derives effective taxation by looking at pre-tax and post-tax rates of return of hypothetical investments. It allows isolating the effects of specific tax codes' provisions but, when applied to the level of the firm as a whole, the method relies on somehow arbitrary assumptions. Further, the method does not take into account important elements of tax avoidance and tax evasion such as fraud or lack of enforcement. In this sense, it does not measure an observed tax burden. The micro backward-looking approach works with financial accounts of companies. It makes it possible to take into account all elements of taxation but nevertheless fails to discern precisely the different explanatory variables of effective taxation. Clearly, the choice of the method dramatically influences the ranking and dispersion of effective tax rates.

We used this micro backward-looking approach to compute corporate effective tax rates for eleven European countries contained in BACH database, Japan, and the USA. Our analysis has brought interesting results. First, it shows that effective corporate taxation in Europe is not higher than in the US or in Japan. During most of the 90's, while increasing, the tax burden of European companies has consistently been lower than in the two other geographic areas. Our empirical findings also suggest that the business cycle might be a determinant of effective taxation.

Second, comparing statutory and effective tax rates, one finds that from 1993 onwards, these two measures have followed a different pattern for the European Union. The effect of lower statutory tax rates might have been counteracted by an increase of the tax base coupled with a favourable economic outlook. Dispersion of taxation in the EU has sharply declined in the beginning of the 90's because economic

slowdown has contracted profits. Nevertheless, dispersion remains stable the rest of the period indicating that tax reforms in Europe have followed a similar timespan.

Our analysis also allows identifying high and low taxed countries with regards to corporate taxation. The first category includes Germany, Italy, Denmark, and the Netherlands while the second encompasses Austria and Sweden. The extent to which countries offer tax incentives or lower tax enforcement is partly captured by the comparison of statutory and corporate tax rates. According to this indicator, Austria, Belgium, and Portugal provide favourable treatment or are places where it is easier for their companies to optimise foreign investment decisions, while Italy, Finland, Germany, and Denmark offer few incentives or are places where these tax planning are more difficult to achieve.

The analysis also indicates differences of taxation between sectors. "Energy and Water" and "Transport and Communications" enjoy lower effective taxation, while "trade" is clearly above. Finally, more favourable treatment for small companies compared to large ones in Austria, Portugal, and Denmark, with reverse situation in Sweden, Finland, Belgium, and France, indicates that the issue of size is of importance for a complete analysis.

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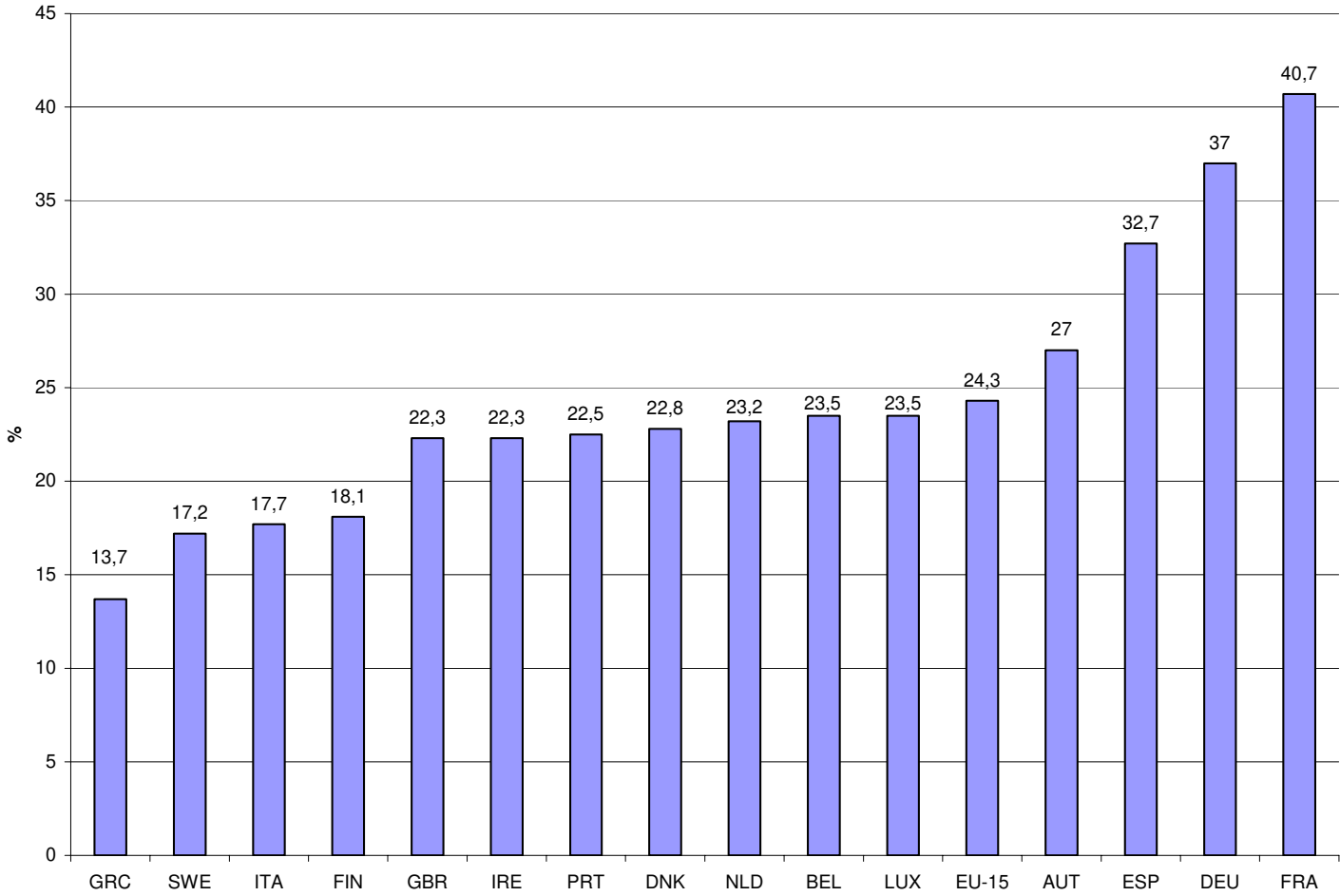
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## **Appendix**

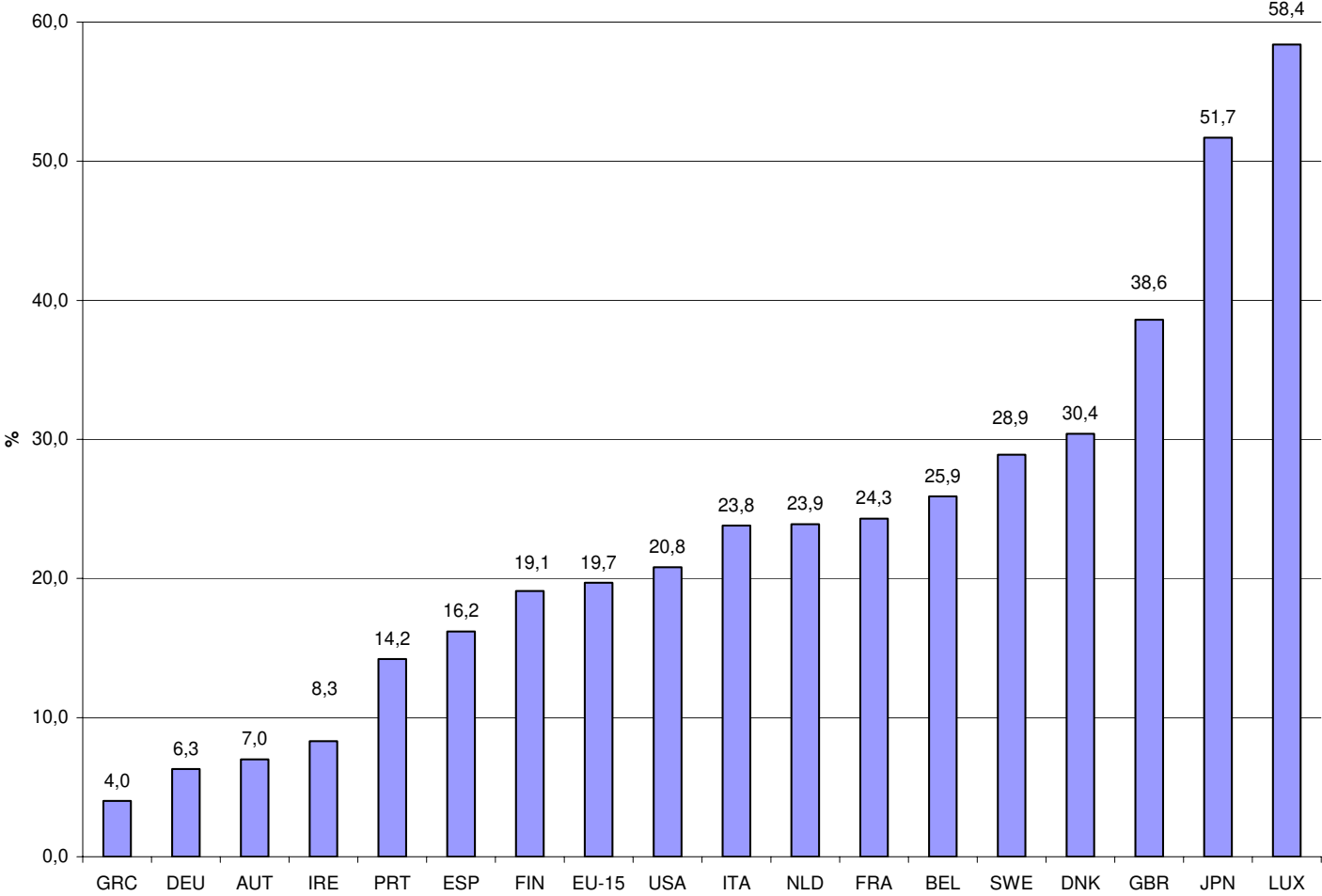
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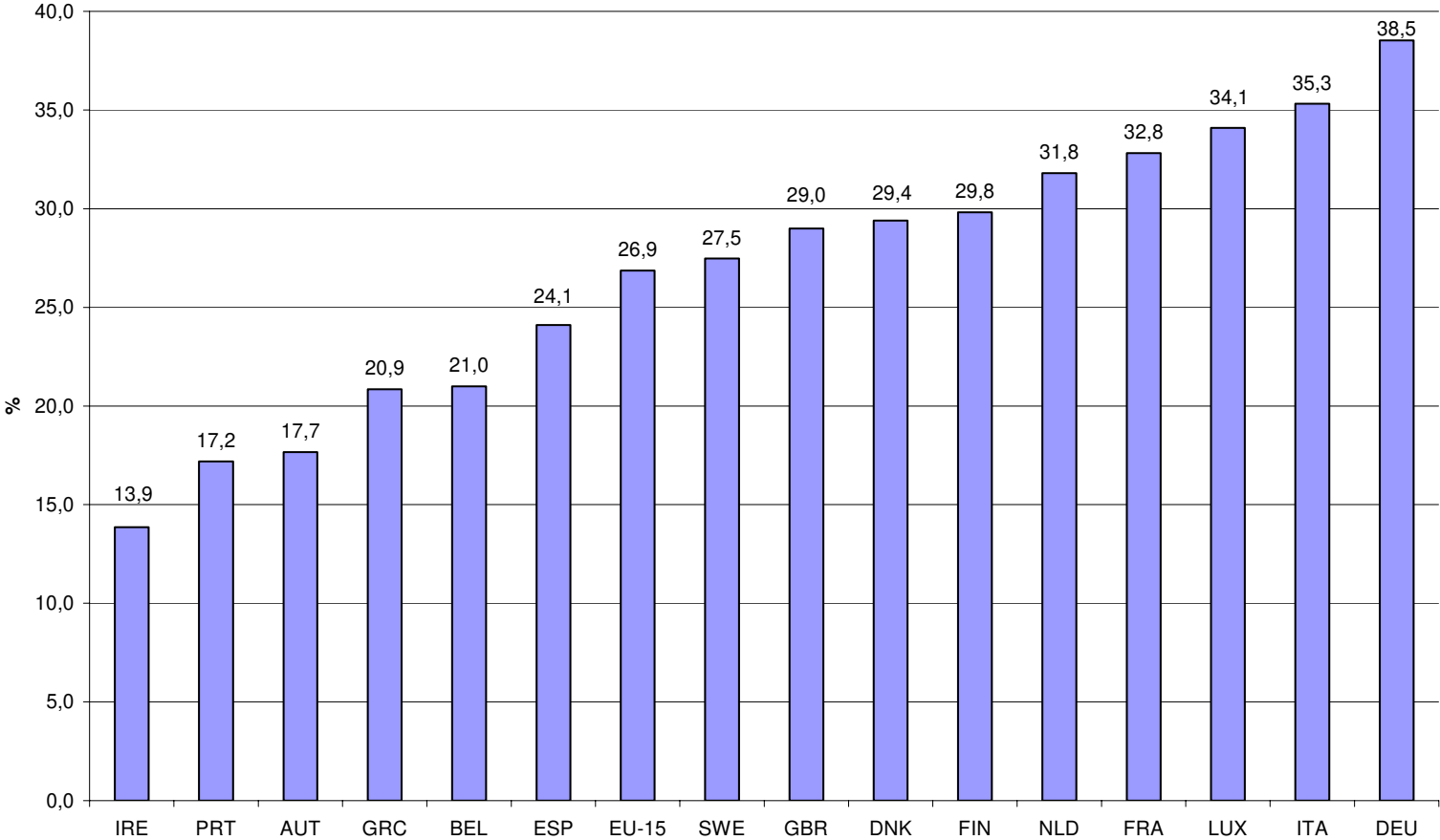
Appendix 1: Baker & McKenzie's 1999 effective corporate tax rates.



Appendix 2: Martinez-Mongay's 1995 effective corporate tax rates.



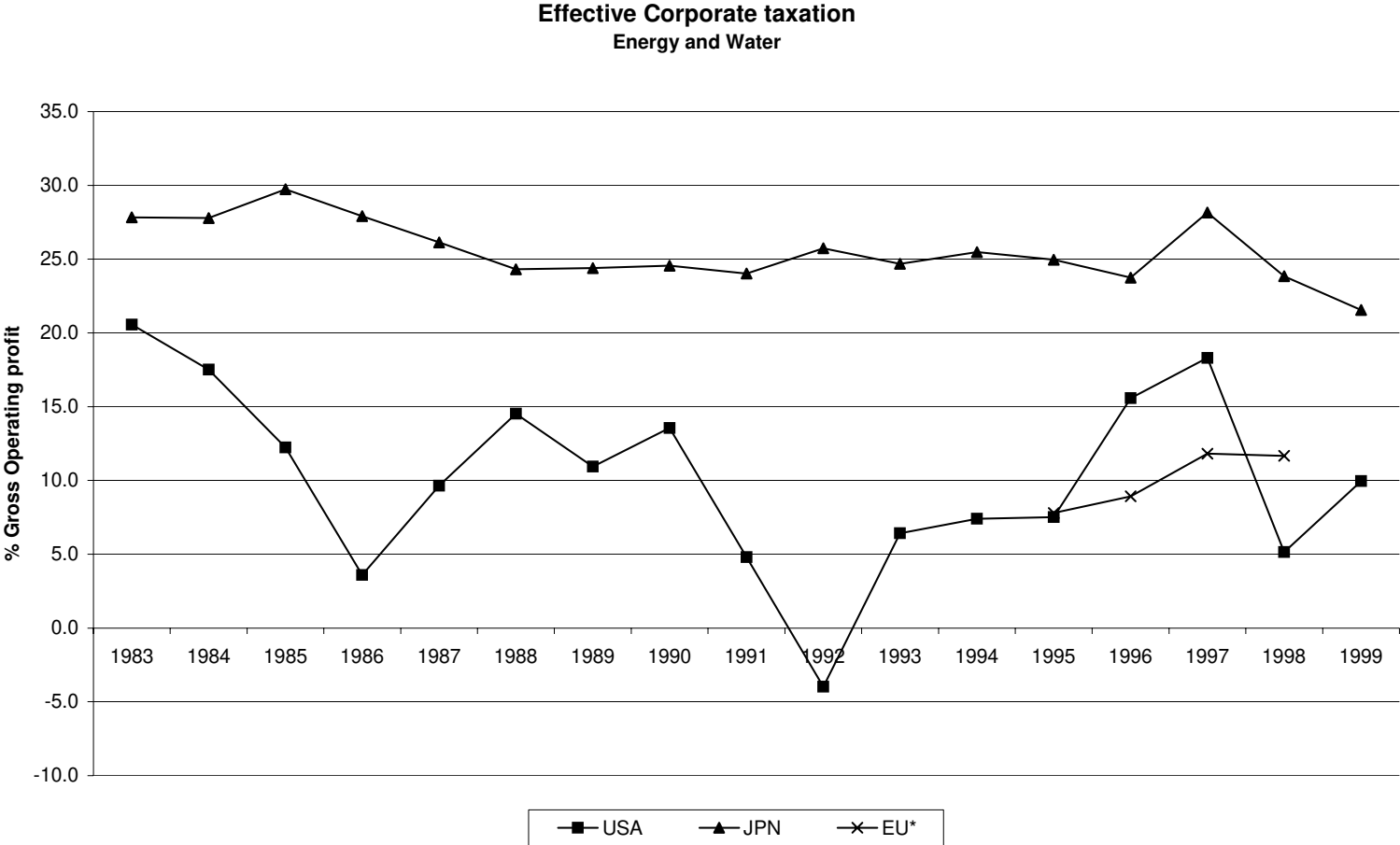
Appendix 3: Buijink et al. 's 1990-1996 corporate effective tax rates.



Appendix 4: Sectoral grouping in BACH.

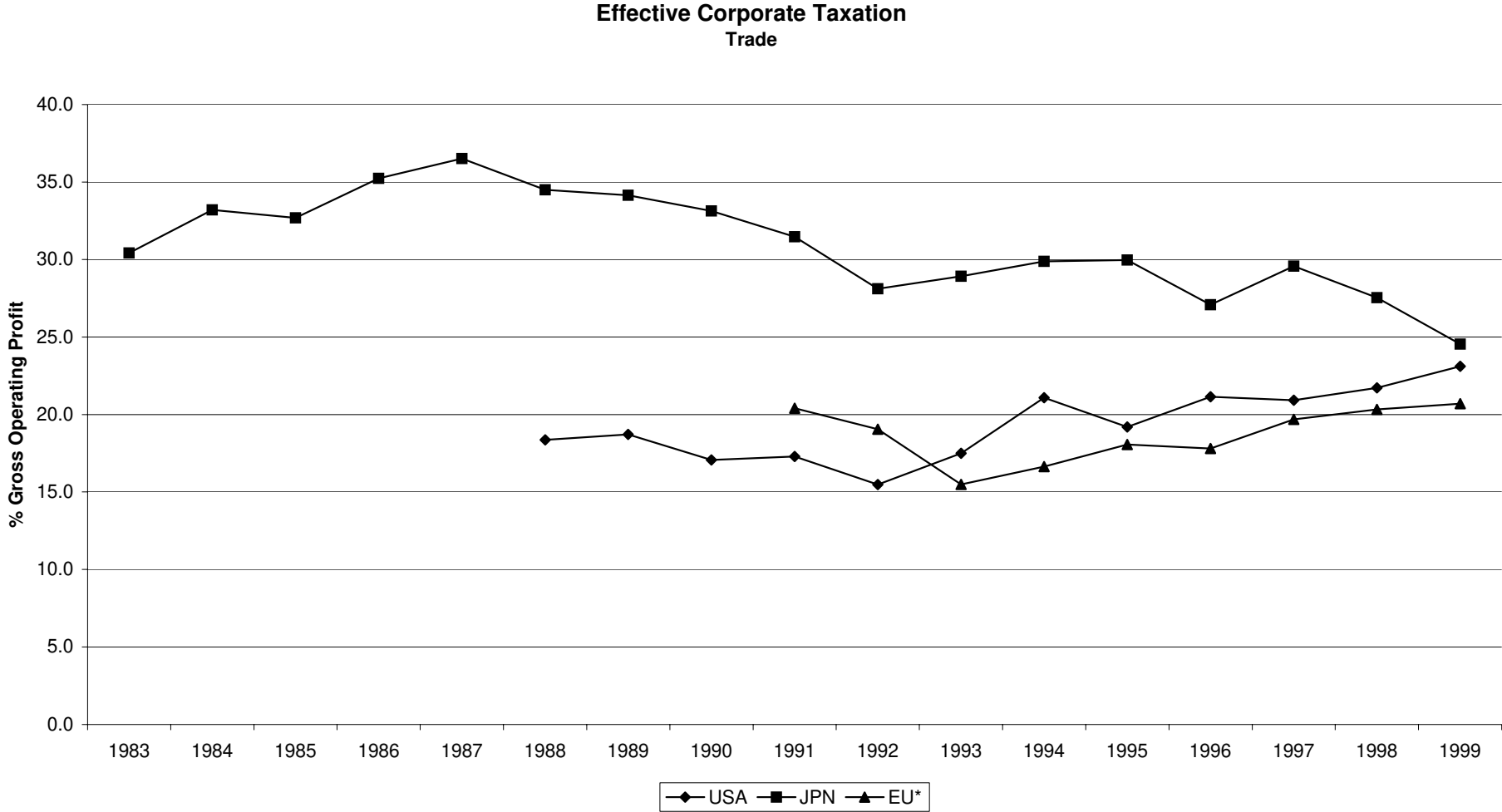
<b>Code</b>	<b>Sector</b>	<b>Former NACE sector codes</b>	<b>New NACE sector codes</b>
<b>1</b>	<b>ENERGY AND WATER*</b>	<b>11+12+13+14+15+16+17</b>	<b>10+11+12+23+40+41</b>
<b>2</b>	<b>MANUFACTURING INDUSTRY</b>	<b>21+22+23+24+25+26+31+32+ 33+34+35+36+37+41+42+43+ 44+45+46+47+48+49</b>	<b>13+14+15+16+17+18+19+20+ 21+22+24+25+26+27+28+29+ 30+31+32+33+34+35+36</b>
<b>3</b>	<b>BUILDING AND CIVIL ENGINEERING</b>	<b>50</b>	<b>45</b>
<b>4</b>	<b>TRADE</b>	<b>61+62+63+64+65+66</b>	<b>50.1+50.3+50.4+51+52.1- 52.6+50.5+55</b>
<b>5</b>	<b>Transport and communication</b>	<b>71+72+73+74+75+76+77+79</b>	<b>60+61+62+63+64</b>
<b>6</b>	<b>Other services n. e. s.</b>	<b>67+(83 à 98)</b>	<b>50.2+52.7+67+70+71+72+73+ 74+75+80+85+90+91+92+93+ 95</b>

Appendix 5: Evolution of corporate effective tax rates in the sector of "energy and water".



Nota Bene: EU-10 (Aut, Bel, Dnk, Esp, Fin, Fra, Ita, Nld, Por, Swe).

Appendix 6: Evolution of corporate effective tax rates in the sector of "Trade".



Nota Bene: EU-8 (Aut, Bel, Deu, Dnk, Esp, Fin, Fra, Ita, Nld, Swe).

Appendix 7: Effective taxation by country, sector and size.

Country	High taxed	Medium taxed	Low taxed	notes
<b>Austria</b>			Yes Small companies as well as "energy and water", "building and civil engineering", and "transport and communication".	
<b>Belgium</b>		Yes, on average.	Large companies "energy and water", "manufacturing", and "transport and communications".	
<b>Denmark</b>	Yes, on average "energy and water".	"manufacturing".	"building and engineering". Small companies.	Sectors "trade", "transport", and "other services" not available.
<b>Finland</b>	Small companies in "manufacturing"	Yes, on average	Large companies "energy and water", "manufacturing".	Size disaggregation not always available.
<b>France</b>	Small companies in "energy and water".	Yes, on average: low-intermediate taxation	Large companies in "energy and water", and "transport and communication".	
<b>Germany</b>	Yes.			Sectors "energy and water", "transport", and "other services" not available. No major differences regarding sizes.
<b>Italy</b>	Yes.			Large companies generally less taxed than small ones.
<b>Japan</b>	Yes.		Large companies for "other services".	
<b>Portugal</b>		Yes, on average.	Small companies in "energy and water".	Sectors "trade" and "other services" not available. Small usually less taxed than larger ones.
<b>Spain</b>		Yes, on average: moving from intermediate to low taxation.	Sector "transport and communication".	
<b>Sweden</b>			Yes, usually Large companies less taxed.	
<b>The Netherlands</b>	Yes, usually			
<b>USA</b>	Intermediate to high taxation.			Sectors "building and engineering", "transport", and "other services" not available.

*Discussion of the table.*

The simplest case is **Germany** which is always among high tax countries for all sectors whatever the size of companies<sup>19</sup>. There does not seem to be large difference of treatment for different sizes in this country. The case of **Italy** is similar. Italy is among high tax countries for all sectors and all sizes. Large companies are taxed in the same way than others with the exception of the sectors "Energy and water", "Other services", and, to a lesser extent, "building and engineering".

The **Netherlands** is also always situated in the upper range<sup>20</sup>. Differences of tax treatment for different sizes do not seem to be large, except for sector "building and civil engineering" and sector "other services", where small companies face a higher burden. **Denmark** is among high tax countries for the different sectors. Small companies enjoy a better tax situation in all three available sectors.

At the lower end, **Austria** and **Sweden** compete for the lowest taxed country. They are in the low tax range for all sectors and all sizes<sup>21</sup>. In Austria, small companies have a favourable treatment but in sector "building and engineering" where the difference is less obvious. Sectors "energy and water", "building and engineering" and "transport and communication" are generally less taxed than other sectors. In Sweden, large companies enjoy a better treatment in all sectors, especially sectors "building and engineering", "trade" and "other services" where differences are large. Sectors "energy and water", "building and engineering" and "transport and communication" also enjoy low effective tax rates as a whole.

The situation of **France** is more complex. France is in the intermediate group, except for sector "Energy and water"<sup>22</sup> and sector "transport and communication"<sup>23</sup> where it

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<sup>19</sup> The only exception is the sector "other services" for large companies.

<sup>20</sup> Except medium size companies in the sector "energy and water".

<sup>21</sup> Except Sweden for medium size companies in the sector "Building and Civil Engineering" (due to high effective rates in 93-95), and small size companies in sectors "Manufacturing" and "Other services" (for this latter sector, the result is influenced by the high effective tax rate in 1998, due to low gross operating profit).

<sup>22</sup> With high gross operating profit and low taxes in terms of turnover.



is among the lowest. These two results are mainly due to an extremely favourable treatment for large companies compared to other sizes in these sectors. In comparison, small companies in the sector of "energy and water" are among the highest taxed across countries. On average, large companies have a favourable treatment but this picture is mainly due to some sectors ("energy", "building", and "transport"), which are low tax sectors.

The situation of **Portugal** is mixed. It belongs to low tax countries in the sector of "building and engineering" (whatever the size) and for small companies in general. Portugal is among the high tax countries for "transport and communication" but this hide a situation which is more favourable for larger companies than for smaller ones. The same can be said for "energy and water"<sup>24</sup>. On the whole, small companies enjoy a better tax situation especially in sector "energy and water" and "manufacturing".

**Belgium** is below the average in all sectors<sup>25</sup>. Its advantage seems to derive especially from the sectors of "energy and water", "manufacturing industry" and "trade", while it has a (small) disadvantage in "building and engineering". This situation is especially true for large companies since effective taxation of small companies is in the average of the sample. **Finland** almost offers the same picture (with an additional advantage in the sector "other services"). Detailed results are only available for sectors "energy and water" and "manufacturing". No conclusion can therefore be definitively drawn. Finally, **Spain** has an advantage in "transport and communications" while the sector "trade" is highly taxed. The picture is influenced by large companies<sup>26</sup>. Recently, Spain is moving from intermediate to low effective taxed countries.

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<sup>23</sup> Idem.

<sup>24</sup> With zero effective taxation during 1990-1993.

<sup>25</sup> Except "Building and Engineering" where it is just above the average.

<sup>26</sup> The high taxation of large companies in the sector 6 is influenced by negative gross operating profits in 1993 and 1994. On the other hand, the sector of "transport and communication" shows very high gross operating surplus (about 40% of turnover) compared to other countries.