

# CORPORATE TAXATION IN THE OECD IN A WIDER CONTEXT

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## Abstract

Against the background of increased globalisation statutory corporate tax rates have shown a clear downward trend over the last two decades. The sharp decline in these rates was accompanied by substantial tax base broadening and a comparable reduction in personal income tax rates only until the early 1990s. This suggests that corporate tax competition is of increasing importance. So far corporate tax revenues remain fairly stable. But an analysis of corporate taxation in the context of the overall tax systems shows that a substantial shift towards value added taxes has taken place. While the trends so far have been driven by smaller European countries, recent tax reforms indicate that increasing tax competition is inducing a shift towards consumption even for larger economies.

**JEL classification:** H25

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# 1 Introduction

Announcements of changes in corporate taxation often attract sizeable media attention. There are a number of potential reasons for that, but above all it is the frequency with which these changes occur. And they all seem to go into the same direction; towards a reduction in corporate tax burden. Recent very prominent examples are the United Kingdom reducing its rate from 30 to 28 percent for the fiscal year 2008, Germany with a reduction in the statutory corporate tax rate at the federal level from 25 to 15 percent and Italy with a drop from 33 to 27.5 percent for the coming year. The policy makers often claim that these tax reforms are a reaction to tax rate cuts in neighbouring countries.<sup>1</sup> This apparent pattern has triggered considerable discussion amongst policy makers and academics as to whether we are experiencing tax competition which may undermine the ability of countries to tax corporate income. However, evidence is inconclusive as can be seen in a sizeable amount of research which tends to support either side of the argument. Advocates of the tax competition hypothesis refer to a clear downward trend in statutory corporate tax rates while sceptics point out that corporate tax revenues are on the rise. To shed some light on this issue this paper sets out to examine the state of corporate taxation in the OECD in a wider context.

Since statutory corporate tax rate cuts coincided with falling personal income tax rates at least until 1990, we argue that the competitive pressure has increased only recently. However, the trend of corporate tax revenues does not yet reflect any difficulties of raising corporate tax revenues. An analysis of the corporate tax base reveals that the first wave of corporate tax rate cuts was accompanied by a significant broadening of the legal corporate tax base. The slow down of the base broadening in the last fifteen years suggests that the scope for further rate-cut-cum-base-broadening tax reforms is limited.

This paper examines corporate taxation in a wider context, i.e. against the background of other taxes. Comparing the overall tax systems in the OECD, countries vary widely with respect to their preferred tax mix. Further, countries with increasing revenue requirements tend to rely less on corporate taxation. Evaluating corporate taxation in the context of the two other main sources of tax revenues, countries have the choice between income or consumption taxes, as they frequently compensate corporate tax reduction with increasing value added taxes. In contrast, the incorporation decision links personal income taxes to corporate taxes which results in these two taxes moving together.

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<sup>1</sup>See for example the article in the International Herald Tribune on the German tax reform: <http://www.iht.com/articles/2006/11/02/business/tax.php>

With these interdependencies in mind we re-evaluate the trends in corporate taxation and find that a number of small European countries already display a strong shift towards consumption taxes. Taking into account the recently increased importance of corporate tax competition and the limited scope of further tax base broadening it is likely that this trend will continue or even become stronger. Recent tax reforms in Germany also confirm these trends.

The rest of the paper is organized as follows. Section 2 describes the trends in corporate taxation in terms of rates, revenues and tax base. Section 3 embeds these developments in a wider context of the overall tax system and section 4 re-evaluates the trends against this background. Section 5 concludes.

## 2 Stylized Facts in Corporate Taxation

This section starts with the well documented trend of falling statutory corporate tax rates and relates this to the predictions of the theoretical tax competition literature.<sup>2</sup> Further the downward trend in corporate taxation is compared to other trends in income taxation. More specifically we contrast the development of top statutory corporate income tax to its counterpart for personal income. The rationale behind this analysis is borrowed from Devereux, Lockwood and Redoano (2008), who distinguish between a common intellectual trend and corporate tax competition by investigating the degree of openness. They argue that co-movements of corporate tax rates are the result of a common intellectual trend if the country is not sufficiently open to actually compete for mobile factors. Similarly we try to identify the common movements in corporate taxation, which are not driven by tax competition for mobile capital or firms. The underlying reasoning is that generally lowering income taxes for both corporate and personal income can be attributed to changing paradigms in the government. In contrast, a decline in corporate tax rates only, leading to an increasing divergence between these two trends, would indicate corporate tax competition. Further we investigate the development of corporate tax revenues and the corporate tax base.

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<sup>2</sup>There is an increasing literature investigating the trends in corporate taxation, ranging from an early contribution of Chennells and Griffith (1997) to a recent analysis of Devereux (2007). See also Nicodème (2007) for an excellent overview of corporate taxation in the European Union.

## 2.1 Trends in Corporate Income Tax Rates

For the purpose of this study we define the statutory corporate tax rate as the top statutory tax rate including local profit taxes.<sup>3</sup> If the latter can be deducted from the tax base this is also accounted for. Even with the inclusion of local profit taxes, literally all countries in the OECD have reduced their statutory corporate tax rate in the last 25 years.<sup>4</sup> It is therefore given, that the unweighted average of statutory corporate tax rates in the OECD, as displayed through the solid black line in Figure 1, shows a clear downward pattern. Between 1982 and 2007 the rates dropped from an average of 47.0 percent to 27.5 percent. To account for the fact that our sample changes, because there are a number of new countries in the OECD, the dashed black line also reports the unweighted average for the balanced sample.<sup>5</sup> The reduction seems to be fairly constant over time apart from a small period between 1992 and 1997 where the tax rates remained fairly stable.

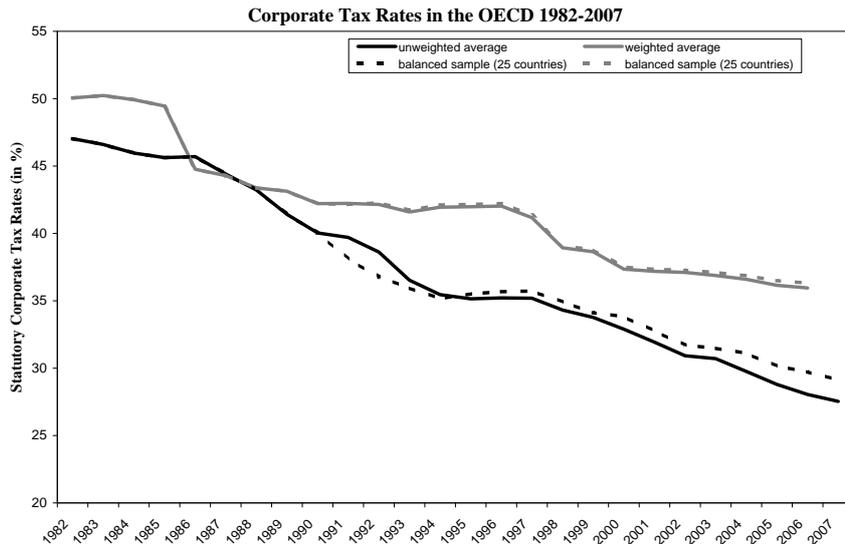


Figure 1: Trends in Statutory Corporate Tax Rates (1982-2007)

To further reinforce the point of falling corporate tax rates, Figure 1

<sup>3</sup>The dataset used for this paper is an updated and extended version of the Devereux, Griffith and Klemm (2002) dataset. See Appendix for data sources and definitions.

<sup>4</sup>The only exception in our dataset is Ireland, as we use the preferential tax rate of 10 percent applicable for the manufacturing sector for the years from 1982 to 2003. Subsequently the corporate tax rate in general was lowered to 12.5 percent and the preferential treatment was abolished. As the introduction of the preferential tax rate in falls just outside our sample period we also report results with the change of the standard corporate tax rate used where appropriate.

<sup>5</sup>This implies excluding Poland, Hungary, Czech Republic, Slovak Republic and Turkey as the tax rates for these countries are only available from 1991 onwards.

also includes the GDP weighted average of the statutory rates represented through the solid grey line. This measure shows a somewhat more moderate decline, but nevertheless drops from 50.1 percent to 36.0 percent. Again the dashed grey line represents the trend for the balanced sample which is very similar to the one for the unbalanced sample. The faster decline in the unweighted average of corporate tax rates reflects the fact that smaller countries behaved differently in cutting the corporate tax rates. The weighted average corporate tax rate is higher than the unweighted average for most of the period, which mirrors the fact that smaller countries tend to have lower corporate tax rates. Only in 1987 did the weighted average drop below the unweighted average due to the 1986 tax reform in the United States. Ever since then have smaller countries displayed a more aggressive behaviour in cutting statutory corporate tax rates. Note, that the trend in weighted average tax rates is partly driven by the growth in the countries. If one expects lower corporate tax rates to induce more growth, the downward trend will be overstated.

At this point it is useful to shortly summarize the main predictions of the theoretical tax competition literature to evaluate how the observed patterns relate to them.<sup>6</sup> The standard tax competition models of Zodrow and Mieszowski (1986) and Wilson (1986), predict a race to the bottom for small open economies, which despite a clear downward trend can not yet be observed. Allowing for the countries to be large enough to influence each others tax policies Hoyt (1991) finds that tax competition leads to inefficiently low tax rates, which is consistent with recent tax rate cuts. The more aggressive rate reductions in the smaller countries are in line with Bucovetskys (1991) and Wilsons (1991) models of tax competition between asymmetrical jurisdictions predicting a sharper drop for smaller countries.

Further Bucovetsky and Wilson (1991) model tax competition with more than one tax instrument and argue that tax competition induces a shift towards the less mobile factor. Following the literature in assuming that capital is more mobile than labour, this would imply corporate tax rate cuts relative to personal income tax reductions. This ties in with the above introduced argument that, investigating corporate and personal income tax rates jointly can help to understand to which extent corporate tax competition takes place.

Broadly speaking, there are two main reasons for governments to reduce corporate income tax rates. Either they are competing for mobile capital, investment or profits, or they have a changed perception about the appropriate

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<sup>6</sup>See Wilson (1999) for a comprehensive survey of the early theoretical tax competition literature.

rates of corporate taxation. If the latter is true, we are observing rate cuts in both personal and corporate income tax. Consequently we would expect that the corporate tax rate reductions are not necessarily due to tax competition, but are also the result of a common intellectual trend, that high top statutory rates on income are no longer desirable. In the next subsection we therefore analyse the trend of top statutory tax rates on personal income.

## 2.2 Trends in Personal Income Tax Rates

Above we have argued that falling tax rates might be due either to tax competition or to a change in the government view on income taxation. To get an idea how far latter is important we evaluate the changes in the personal income tax rates. Figure 2 presents the development of top statutory income tax rates on personal income in the OECD. Again, the measure we use includes the unweighted average of applicable local income taxes for large countries and the rate for the economic capital for small countries.

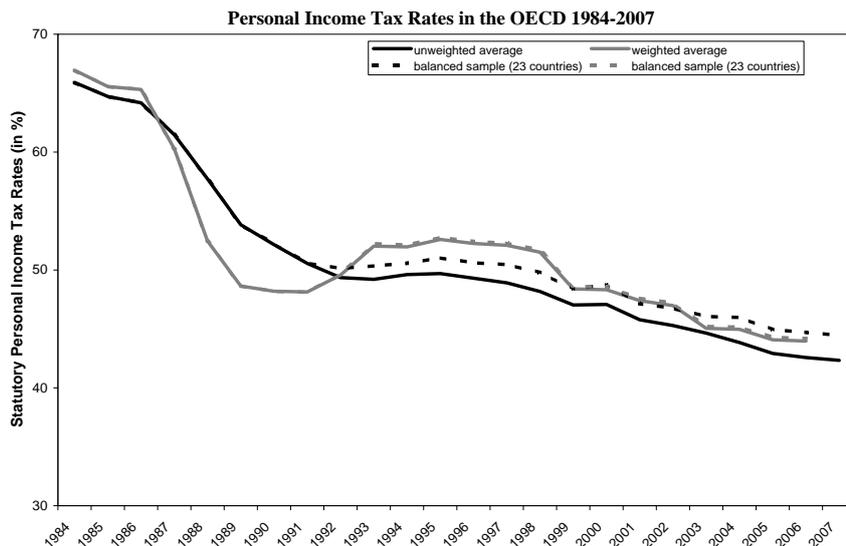


Figure 2: Trends in Personal Income Tax Rates (1984-2007)

Similar to the corporate tax rates the personal tax rates show a clear downward trend. However, the reductions in personal tax rates appear to ease off in the last decade. The solid black line representing the unweighted average drops from 65.9 percent in 1984 to 42.3 percent in 2007. Following the same logic as in the first graph the dashed black line shows the trend for the balanced sample, which displays a higher unweighted average for the last fifteen years.<sup>7</sup> The weighted average, as displayed through the solid grey line,

<sup>7</sup>The countries excluded are Czech Republic, Hungary, Iceland, Poland, Slovak Republic, Switzerland and Turkey.

shows a significant drop between 1986 and 1988, which is mainly due to the tax reforms in the United States and Japan. Overall the weighted average has decreased from 66.9 percent to 44 percent. The dashed grey line for the weighted average of the balanced sample lies again very close to the full sample which mirrors that the countries entering the sample are substantially smaller. Generally the weighted average is relatively close to the unweighted average indicating that smaller countries are behaving similar to the others in setting their personal income tax rates. This is a significant difference to the trend in corporate tax rates where the small countries are driving a continued drop in tax rates.

In fact the average tax differential between the top personal income tax rate and the top corporate income tax rate dropped from 19.5 percent in 1984 to 11.2 percent in 1990 and increased again to 14.5 percent in 2006. This would suggest that the drop in corporate and personal income tax rates up to 1990 are more the result of a common intellectual trend while over the recent years other forces start to play a role as well. The timing of the increasing divergence between these two trends also coincides with increasing globalisation. The advent of globalisation has triggered an extensive amount of empirical research whether globalisation has reduced corporate tax rates and whether tax competition has emerged. Slemrod (2004) surveys the earlier part of the literature and finds some evidence for economic openness affecting setting of the corporate tax rates. Further Winner (2005) finds evidence that increased openness has increasingly shifted the tax burden on labour. Similarly Haufler et al. (2008) conclude that economic integration has led to a shift from capital to wage taxation. While this is consistent with the theoretical tax competition literature it can be argued that strategic interaction between government is a key characteristic of tax competition. Along this line Devereux, Lockwood and Redoano (2008) find evidence for competition between governments in statutory corporate tax rates. More generally an extensive survey by Devereux and Loretz (2008) concludes that studies analysing competition in statutory corporate tax rates tend to support the tax competition hypothesis, especially over the last couple of years. In contrast studies using corporate tax revenues tend to be less conclusive. The question to ask is then, whether Bradford and Oates (1971) and Oates (1972) original concern that tax competition undermines the ability of governments to raise revenues turns out to be true. Hence the next subsection analyses the development of corporate tax revenues.

## 2.3 Trends in Corporate Tax Revenues

Figure 3 displays the share of corporate tax revenues as a percentage of the gross domestic product. The solid black line describes the development of the unweighted average of the corporate tax revenues. Between 1982 and 2005 the corporate tax revenues have increased from 2.5 percent of GDP to 3.7 percent. Again, the dashed lines represent a balanced sample which excludes the countries where the data is not available for the whole period.<sup>8</sup> It becomes evident that the downward trend in the tax rates is not reflected in the tax revenues as a percentage of GDP. On the contrary, over the last decade the unweighted average of corporate tax revenues seems to be increasing.

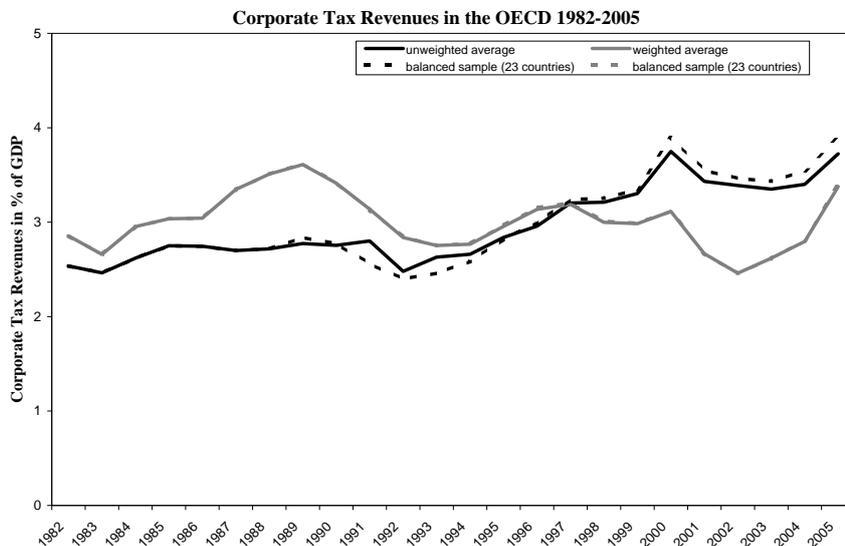


Figure 3: Trends in Corporate Tax Revenues (1982-2005)

Following the same logic as in the previous figures the grey lines display the GDP-weighted averages of the corporate tax revenues. The picture here is somewhat different, as the share of corporate tax revenues in GDO is more volatile and there is no apparent trend over the observed period of time. The weighted average of corporate tax revenues as percentage of GDP has been close to three percent and displays a moderate increase from 2.9 percent in 1982 to 3.4 percent in 2005. However, most of this increase is due to the significant rise in revenues from 2004 to 2005. Despite the lack of a clearly identifiable trend, there are still two things that can be learned from Figure 3. First corporate tax revenues seem to have become relatively more important

<sup>8</sup>For the following countries data is only available from the year in brackets onwards: Czech Republic (1993), Hungary (1991), Poland (1991), Portugal (1989), the Slovak Republic (1998) and Turkey (1991). Further Mexico is not part of the sample, as it reports no separate statistic for corporate income tax revenues.

in smaller countries as the unweighted average surpassed the weighted average. And secondly, the development of corporate tax rates is not reflected in the trend of corporate tax revenues.

The divergence in the trends implies an increase in the corporate tax base, which is discussed in the next subsection.

## 2.4 Changes in the Tax Base

The diverging trends of corporate tax rates and corporate tax revenues highlight the necessity to decompose the corporate tax receipts. Following Auerbach and Poterba (1987) we make use of the fact that tax revenues are determined by applying a tax rate to a tax base.<sup>9</sup> Abstracting from different tax rates, e.g. progressive schedules or reduced rates for certain industries, the tax base must have been subject to change to explain the differences between Figure 1 and Figure 3. It is therefore useful to have a closer look at the corporate tax base.

At a very abstract level, the corporate tax base changes because of two reasons; on the one hand, because a different number of taxpayers is subject to corporate income tax and on the other hand, because the corporate tax payers have a different average tax base. The latter can further be split into two determinants, namely the corporate income and the allowed tax deductions. While it is very difficult to collect reliable information about the number of corporate tax payers and their average profits,<sup>10</sup> researchers established a shortcut to measure the legal definition of the tax deductions.

In line with the cost of capital literature we approximate the tax base definition through the net present value (NPV) of capital allowances.<sup>11</sup> As the capital allowances vary across different kind of assets, it would be ideal to include a large number of different assets. However, as not all countries explicitly lay down legal provision for the each individual type of assets, we restrict ourselves to two main categories; industrial buildings and general plant and machinery. Figure 4 displays the trend of the NPV of depreciation allowances over the period 1982 to 2007. In doing so, the graph equally weights the NPVs of capital

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<sup>9</sup>Note that we use a different notation from Auerbach and Poterba (1987), as we discuss the legal definition of the corporate tax base under the heading corporate tax base, while they use the term tax base solely for corporate profits.

<sup>10</sup>The analysis of Auerbach and Poterba (1987) has led to some follow up studies focussing on the determinants of the US corporate tax revenues. For a summary of this literature and a recent analysis of US tax receipts see Auerbach (2007).

<sup>11</sup>This approach dates back to at least Jorgensen (1963) and Hall and Jorgensen (1967).

allowances for industrial buildings and plant and machinery.<sup>12</sup> The definition of the variable in the graph is such, that a drop in the NPV represents a widening of the corporate tax base.

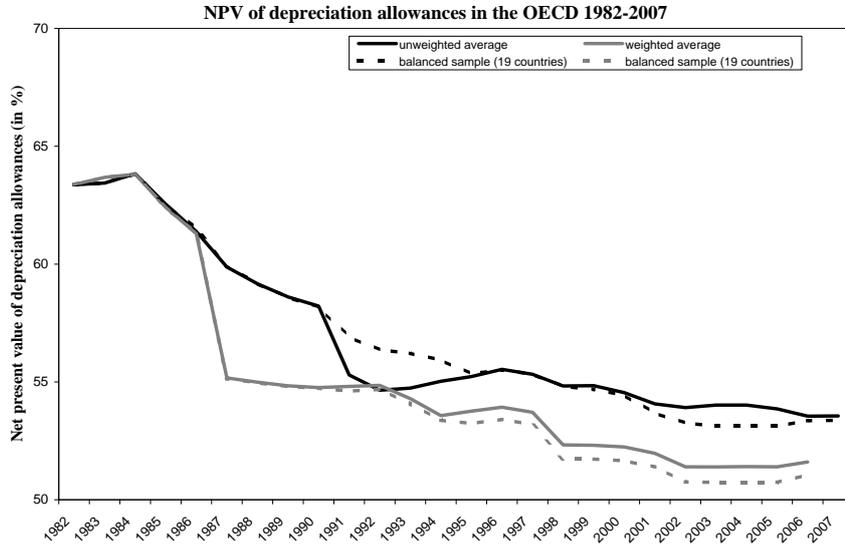


Figure 4: Trends in Corporate Tax Base (1982-2007)

In line with the previous graphs the black lines represent the unweighted average and the grey lines the GDP-weighted average. Figure 4 also distinguishes between two samples; the balanced sample of 19 countries which is unchanged over the whole period and the unbalanced sample which gradually fills up including the newer OECD members, most notably the Eastern European countries.<sup>13</sup> The most obvious pattern in the tax base is the significant drop in the depreciation allowances in the late 80s. In contrast to the trend in statutory tax rates the weighted average of the NPV is falling faster and drop further from 63.4 percent to 51.1 percent. The substantial drop in the 80s is again mostly due to the tax reform in the United States in 1986. For the unweighted average the downward trend is smoother which suggests that smaller countries widened their tax base more gradually. Overall the unweighted average dropped from 63.4 percent in 1982 to 53.4 percent in 2007. Around 1990 the balanced sample deviates from the unbalanced sample, which reflects that some of the newly added countries, most notably Turkey, had very generous tax allowances at the time.

One of the main features of the trend in Figure 4 is that the tax base

<sup>12</sup>See appendix for the definition.

<sup>13</sup>The following countries enter the sample only after the year in brackets: Denmark (1985), Czech Republic, Luxembourg, New Zealand, Hungary, Slovak Republic and Turkey (1990), Iceland and Poland (1991), Mexico (1994) Korea (1995)

broadening seems to significantly slow down in the early 90s. To some extent this is due to the narrow measure of the tax base we are using, which only includes depreciation allowances, but it is also very likely to reflect a more general issue for the tax authorities. It appears to become increasingly difficult to further broaden the tax base. There are a number of aspects in the corporate tax base that have been used to allow for revenue neutral tax rate reductions; for example the limitation of interest deductibility via the introduction of thin capitalization rules or controlled foreign company provisions which include foreign income in the domestic tax base under specific circumstances. However, recently it has been argued that countries increasingly use these measures, or the lack thereof, as a tool for tax competition.<sup>14</sup> In any case it is likely that the trend in Figure 4 reflects an inconvenient truth for governments, namely that there is limited scope to further broaden the corporate tax base. This would imply that governments are facing increasing difficulties to implement revenue neutral rate-cut-cum-base-broadening tax reforms. Section 3 examines the revenue implications more directly.

To get a better understanding of the magnitude of this tax base broadening, we combine the statutory rates with the NPV of the capital allowances into measures of the effective tax burden. The economic literature introduces two measures for this purpose; the effective marginal tax rate (EMTR), which measures the tax burden for an investment earning just the cost of an alternative investment and the effective average tax rate (EATR), measuring the tax burden for an inframarginal investment project with a real economic rent.<sup>15</sup> Figure 5 displays the trends for both measures of effective tax rates.

The upper part of Figure 5 displays the development of the EMTR between 1982 and 2007, while the lower part shows the trend for the EATR over the same period. Again, following the same approach as in the previous figures, we present both the unweighted and the GDP-weighted average and further distinguish between the small unchanged sample of 19 OECD countries and the larger sample which is filling up over time. Both graphs seem remarkably similar and show a short period of stable or slightly increasing effective tax rates until 1987 and a clear downward trend ever since then. This clearly is at odds with the idea, that the tax base broadening was large enough to offset the tax rate cuts. However, examining the numbers more closely, it can be observed that the drop in the EMTR is less pronounced than in the statutory tax rates as displayed in Figure 1 and slightly less pronounced than the

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<sup>14</sup>See for example Bucovetsky and Hauffer (2008)

<sup>15</sup>The data set we use here is an extended version of the Devereux, Griffith and Klemm (2002) data. See appendix for more information.

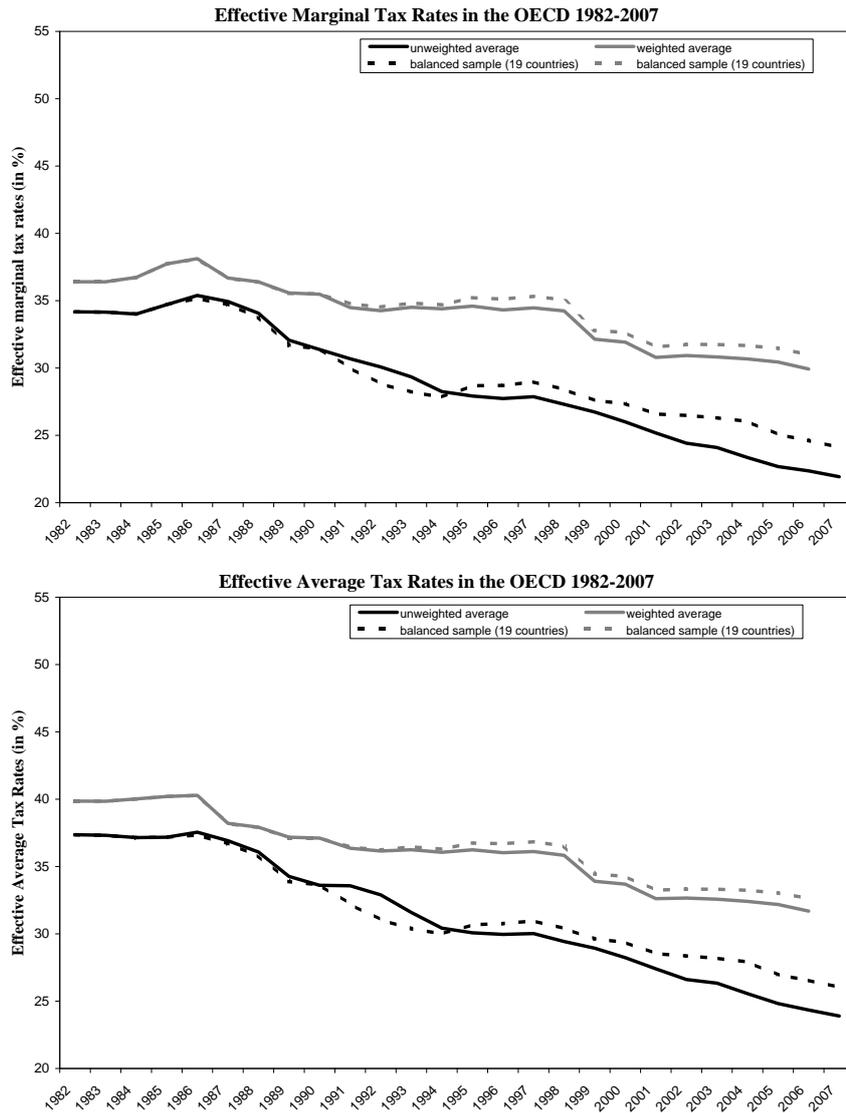


Figure 5: Trends in Effective Tax Rates (1982-2007)

reduction in the EATR. For the unbalanced full sample the EMTR dropped from an unweighted average of 34.2 percent to 21.9 percent while the EATR fell from 37.4 percent to 23.9. This pattern is in line with the observation of Devereux, Griffith and Klemm (2002) that countries reduced their EATR further in order to attract profitable business. This is particular true for the newer OECD member states as the smaller balanced sample excluding these countries displays a slower drop in effective tax rates. Further, comparing the trends for the unweighted effective tax rates with their GDP-weighted counterparts, it can be seen that larger countries lowered their effective tax rates less, leading to the weighted average falling from 39.9 percent in 1982 to 32.6 in 2006.

Although the decrease in both measures of effective tax rates is less pronounced than in the statutory tax rates, they still display a very different trend to that of the corporate tax revenues. This suggests that either the number of corporate tax payers or their average profit level have changed. Either of these changes can be influenced by other taxes, most notably the tax on personal income. For example, the number of tax payers can change because a larger number of businesses become incorporated.<sup>16</sup> One main argument for corporate taxes is the backstop function to the personal income tax, as a large differential between personal and corporate income tax would induce more profits to be channeled through corporations.<sup>17</sup> Therefore it is necessary to evaluate the observed pattern against the background of personal income taxes or more generally the tax system overall. Before we set out to do so in the subsequent section, it is also worthwhile to have a short look into the international aspects of corporate taxation. This is of importance insofar as the average profit of corporate taxpayers can potentially depend on their ability to shift production or profits between jurisdictions. Both the attractiveness and the possibility of profit shifting for companies is influenced by interaction of international tax laws, which is addressed in the next subsection.

## 2.5 Developments in International Corporate Taxation

The increasing importance of multi-jurisdictional corporations puts more weight on international aspects of corporate taxation. In a first instance legally independent subsidiaries are subject to corporate taxation where they operate. Given that some countries tax corporations on their worldwide income, corporations active in more than one country might be subject to double taxation. On top of that some countries impose withholding taxes on interest or dividend flows between parent and subsidiaries in different countries.<sup>18</sup>

The tax obstacles to international investment and the extent of double taxation depend on the interaction of unilateral provisions, bilateral treaties and multilateral agreements. The latter includes legally binding directives like the parent-subsidiary and the interest and royalties directive of the European Union.<sup>19</sup> These two directives directly reduce the tax burden for

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<sup>16</sup>See de Mooij and Nicodeme (2007a and 2007b) for studies on the number of firms incorporating themselves because of tax reasons. Further Fuest and Weichenrieder (2002) provide an in-depth analysis of the incorporated vs. unincorporated sector.

<sup>17</sup>See also Slemrod (2004) for a discussion of the determinants of corporate tax rates and revenues.

<sup>18</sup>For a discussion of the international tax system see for example Huizinga and Voget (2006)

<sup>19</sup>The Council Directive 90/435/EEC of 23 July 1990 governs that dividends paid from a subsidiary to its parent company should be exempted from withholding taxes, and the Council Directive 2003/49/EC of 3rd June 2003 governs the withholding taxes on Interest and Royalties flows.

bilateral investments through the abolition of withholding taxes on dividends, interest or royalty payments between affiliated companies. Further multilateral initiatives, which are guidelines rather than legally binding, are pursued by the OECD. However, these initiatives can be of some significance, like the OECD model tax treaty, which has now been signed by an increasing number of OECD countries. Between 1982 and 2007 the percentage of the bilateral country combinations within the OECD that fall under a tax treaty increased from 50.7 percent to 92.3 percent.<sup>20</sup>

On a unilateral level one can observe a tendency of countries to adopt an exemption system.<sup>21</sup> This implies that foreign income of corporations is not taxed in the home country. All else equal this tends to reduce the tax burden of cross-border investment. In sum, the overall trend in international corporate taxation, appears to be towards an alleviation of the corporate tax burden for cross border investment. Along these lines Loretz (2007) finds a significant reduction in the bilateral effective tax rates, which is even more pronounced than for domestic effective tax rates.

### 3 Corporate Taxation in Context

The previous section demonstrates that there is an discrepancy in the trends of corporate tax rates and corporate tax revenues. The possibility that high tax rates might not translate into higher revenues has been discussed even before economic literature existed. The fourteenth-century philosopher Ibn Khaldûn notes the taxed activity will not be performed if taxes are too high.<sup>22</sup> Similarly Swift (1724) mentions this point and Smith (1776) remarks that '[h]igh taxes, sometimes by diminishing the consumption of the taxed commodities, and sometimes by encouraging smuggling, frequently afford a smaller revenue to government than what might be drawn from more moderate taxation.' Later on the fact that the relationship between tax rates and revenues might be parabolic became popularly known as the Laffer curve.<sup>23</sup> While the original concept of the Laffer curve aims to explain the tax revenues from individual income tax, the concept has recently been applied to corporate

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<sup>20</sup>In absolute numbers this signifies an increase - out of a total from 870 country pairs - from 441 to 803 country pairs.

<sup>21</sup>This is more evident for qualified ownership, as most countries only introduce a system of participation exemption. For anecdotal evidence see Huizinga and Voget (2007) or Loretz (2007).

<sup>22</sup>See Boulakia (1971) for a discussion of Khaldûn's contribution to the economic literature.

<sup>23</sup>The Laffer curve is named after the economist Arthur Laffer, who allegedly sketched the parabolic relationship between tax rates and revenues on a napkin to explain it to a journalist.

taxation as well.<sup>24</sup> The main arguments are that corporate tax rates which are substantially different from the rates of other countries induce profit shifting into or out of the country. Further corporate tax rates below the individual income tax rates lead to a shift into the corporate sector. In either way, this might influence the ability of countries to tax corporate income. Therefore more insights about the ability of jurisdictions to tax corporate profits can be gained if corporate taxation is examined against the background of other taxes.

Difficulties in taxing corporations potentially manifest themselves in various ways. The most extreme outcome would be that the government might be forced to reduce the overall tax burden, because it faces difficulties to raise the revenues in any other way.<sup>25</sup> On a less dramatic note, tax competition could induce a general shift from direct taxation, i.e. personal and corporate income to indirect taxation, i.e. consumption or property taxes. Or a shift could take place within income taxes between corporate and personal income taxation. The following subsections address each of these issues.

### 3.1 Corporate Taxes relative to Total Taxation

One very important aspect which is often overlooked in the tax competition debate is the fact that countries within the OECD are very diverse. They differ in economic size, geographical proximity to each other, openness and most importantly in fiscal preferences. There are large differences in government size between OECD countries, and hence the need to raise tax revenues. In 2005 for example the size of total tax revenues varied from 19.9 percent of GDP in Korea to 50.3 percent in Denmark and 50.7 percent in Sweden. Given the discussion in this paper so far, one could conjecture that countries with bigger governments tend to use corporate taxation less intensively, as it seems to be difficult to raise more revenues.

Figure 6 therefore displays the share of corporate tax revenues as a percentage of total taxes relative to the total taxes as a percentage of GDP. Abstracting from Norway, which represents an outlier because of very large corporate tax revenues from North Sea oil producers, a negative correlation of -0.47, significant at the 5 percent level can be observed. At the one end of the spectrum countries like the Australia, Korea, or Japan have rather small governments which are

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<sup>24</sup>Clausing (2007) finds empirical evidence for a relatively high revenue maximising corporate tax rate, while Brill and Hassett (2007) argue that the Laffer curve moved over time, and the revenue maximising corporate tax rate has fallen over time. Along these lines Devereux (2008) finds only weak evidence for the existence of a Laffer curve.

<sup>25</sup>This includes scenarios where it would be economically feasible to raise other taxes, it could be politically impossible to do so.

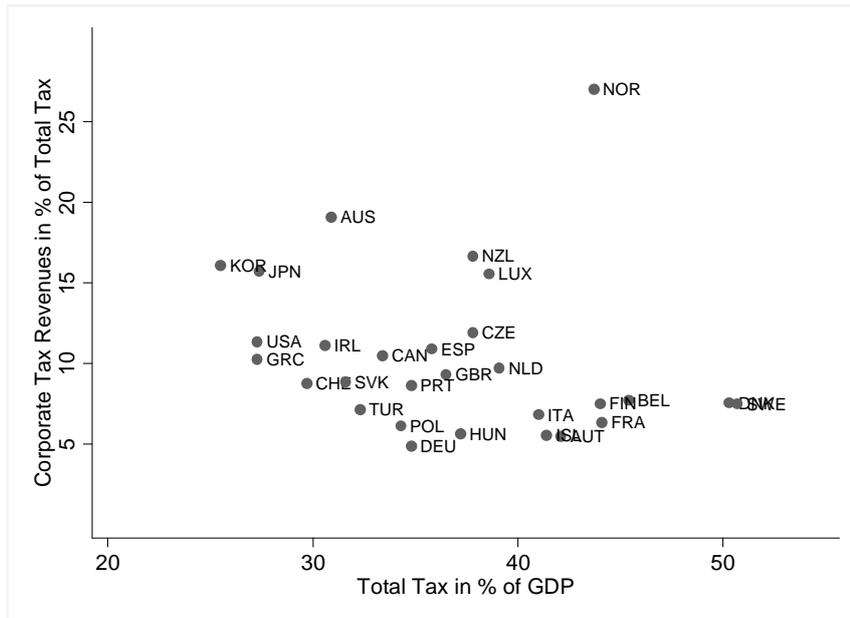


Figure 6: Corporate Taxation vs. Total Taxation (2005)

financed to a substantial extent through corporate tax revenues. On the opposite end of the continuum one can observe a number of European countries, e.g. Belgium, Denmark, Finland, France, and Sweden with large governments which are financed to a lesser extent through corporate taxation. One reason for this could be that countries with large revenue requirements prefer to rely on sources other than the corporate sector, as the corporate tax revenues tend to be more volatile. This can not be directly interpreted as evidence for, or the result of, tax competition but at least does points in the direction that countries with different revenue requirements choose a different tax mix.

### 3.2 Corporate Taxation relative to Consumption Taxation

Given a certain revenue requirement governments face a decision whether to rely more on direct or indirect taxation. Abstracting from distributional issues value added taxes, as a form of indirect taxation, are an alternative to corporate taxation. Figure 7 compares the two different taxes against each other. The left hand side plots the statutory corporate tax rates against the statutory value added tax rates. The right hand side displays the corresponding tax revenues as a percentage of total taxation.<sup>26</sup>

The dispersion of value added tax rates is less wide than for the statu-

<sup>26</sup>The statutory rates use tax information from 2006, whereas the revenues figures are from 2005, the latest year available. For the United States we use the average of general sales taxes, as they come closest to a value added tax.

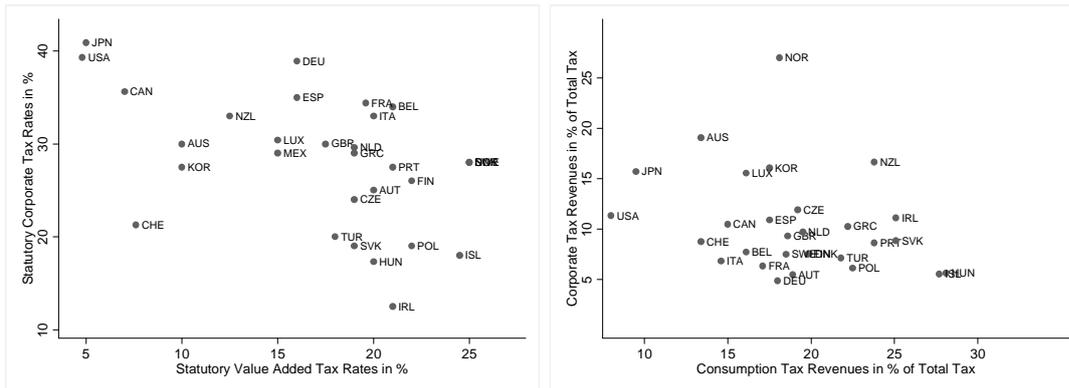


Figure 7: Corporate Taxation vs. Value Added Taxation (2006/2005)

tory corporate tax rates and varies from 4.8 percent in the United States or 5 percent in Japan to 25 percent in Denmark, Norway and Sweden. Overall a significant negative correlation of  $-0.48$  can be observed, supporting the claim that corporate taxation can be substituted through consumption taxes. The right hand side of Figure 7 further strengthens this point, as the negative correlation holds even for the revenues of corporate and consumption taxation.<sup>27</sup> This suggests that policy makers can potentially shift from corporate taxation towards consumption taxation as a response to tax competition.

### 3.3 Corporate Taxation relative to Personal Taxation

The other main source of tax revenues on which governments can draw is taxes on personal income. Following the same approach as before Figure 8 again displays the relative statutory rates on the left side and the relative tax revenues on the right side. Given that small and medium sized businesses can to some extent choose whether or not to incorporate and hence be subject to corporate taxation, corporate tax rates and personal income tax rates can not be set completely independently. Assuming that policy makers are concerned with the backstop function of corporate taxation, one would expect corporate taxation to be a strategic complement to personal income taxation.

The left side of Figure 8 confirms this hypothesis and shows a significant positive correlation of  $0.41$  between top statutory corporate tax rates and top personal income tax rates. The top personal income tax rates vary from 19 percent flat tax in the Slovak Republic to almost 60 percent in Denmark.<sup>28</sup> The statutory corporate tax rates are less spread with rates between 12.5 percent in Ireland and 40.9 percent in Japan. This is consistent with the idea

<sup>27</sup>Excluding Norway the correlation is  $-0.37$ , significant at the 10 percent level.

<sup>28</sup>We use the top marginal tax rate including local taxes and applicable surcharges.

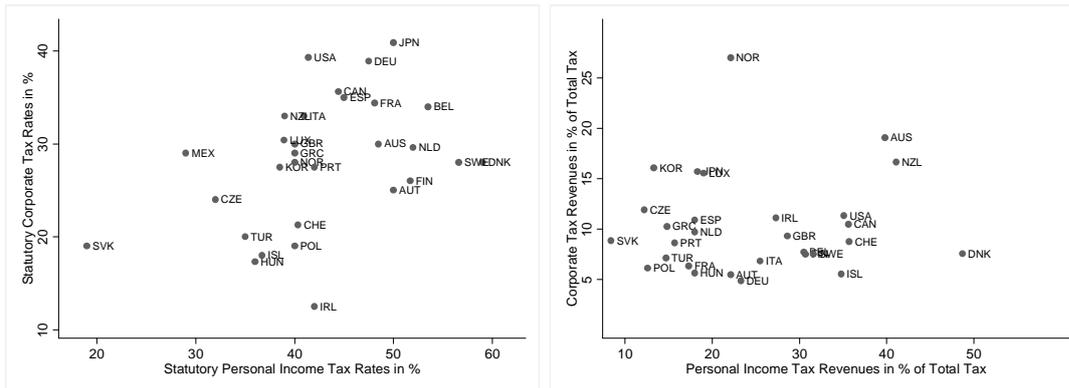


Figure 8: Corporate Taxation vs. Personal Income Taxation (2006/2005)

of countries compete over internationally mobile investment or profits to larger extent then they compete for mobile workforce via personal income taxation. Bearing in mind, that the graphs in Figure 8 are based on tax information from 2006, they already incorporate past policy changes. Therefore relatively lower corporate tax rates might partly be induced through international tax competition pressure. This in turn could jeopardize the tax base of the personal income tax rate, as more businesses incorporate.

The right hand side of Figure 8, displays the other side of the backstop function story. The lack of a clear correlation between the tax revenues from personal income taxes and corporate tax revenues is consistent with the claim that income is shifted between the unincorporated sector and the the corporate sector.<sup>29</sup> The income shifting into the incorporated sector does not necessarily take the form of incorporation. For example, once a manager-owned business is incorporated, an increased tax differential might induce the manager to leave more of the profits in the corporation to defer the higher personal income taxes.

The analysis in this section establishes three stylized facts. First countries with larger governments tend to rely less on corporate tax revenues. Hence we expect the observed downward trend in statutory corporate tax rates to be different in countries with different revenue requirements. Second, a negative correlation between corporate and value added taxation in both rates and revenues exists. Therefore a switch between corporate taxation and value added taxation is likely to be observable. Third corporate tax rates and personal income tax rates a positively correlated, while there is no apparent correlation between the corporate and personal income tax revenues. This suggests that

<sup>29</sup>See also de Mooij and Nicodème (2008) for an analysis of this phenomenon, i.e. the reduction in personal tax revenues due to reduced corporate tax rates.

the interdependence between these two taxes induces a co-movement in the changes. The next section sets out to re-examine changes in corporate taxation with these stylized facts in mind.

## 4 Trends in Corporate Taxation revisited

So far we established that there is a clear downward trend in all measures of corporate tax rates. The slowing downward trend in personal income tax suggests that the corporate tax reductions might be increasingly induced by tax competition. Consequently we would expect that the ability of governments to raise tax revenues from corporate income tax might be undermined. However, so far the development in average corporate tax revenues does not reflect this threat. Despite this it is possible, or even likely, that some of the OECD countries are already struggling to tax corporate income and are therefore reacting with changes in other forms of taxation as well. This section therefore relates the corporate tax rate changes (i.e. the corporate tax rate cuts) in the OECD countries to the changes in the overall tax systems.

Along the lines of the stylized facts established in the previous section we re-evaluate the corporate tax rate changes relative to the changes in the overall tax revenues, and against the changes in personal income tax rates and value added tax rates. This allows us to get some insight into how governments adjusted their overall tax system to facilitate corporate tax reductions. As argued above, there could be an overall reduction in the size of government, because an increase of other taxes rates is not feasible. Or the corporate tax cuts could be financed via an increase in other taxes like personal income tax rates or value added taxes. In any case, it is highly unlikely that the corporate tax rate cuts did not have any feedback effects on the rest of the tax system of the countries. To adequately account for the possible interdependencies we therefore analyse the change of the corporate tax rates relative to the changes in other taxes all in one figure.

The top part of Figure 9 plots the changes in the corporate tax rates between 1984 and 2005 against the change in total tax as a percentage of GDP in the same period. The middle part relates the corporate tax rate changes to the changes in personal income tax rates while the lower part displays the changes in the value added tax rates.

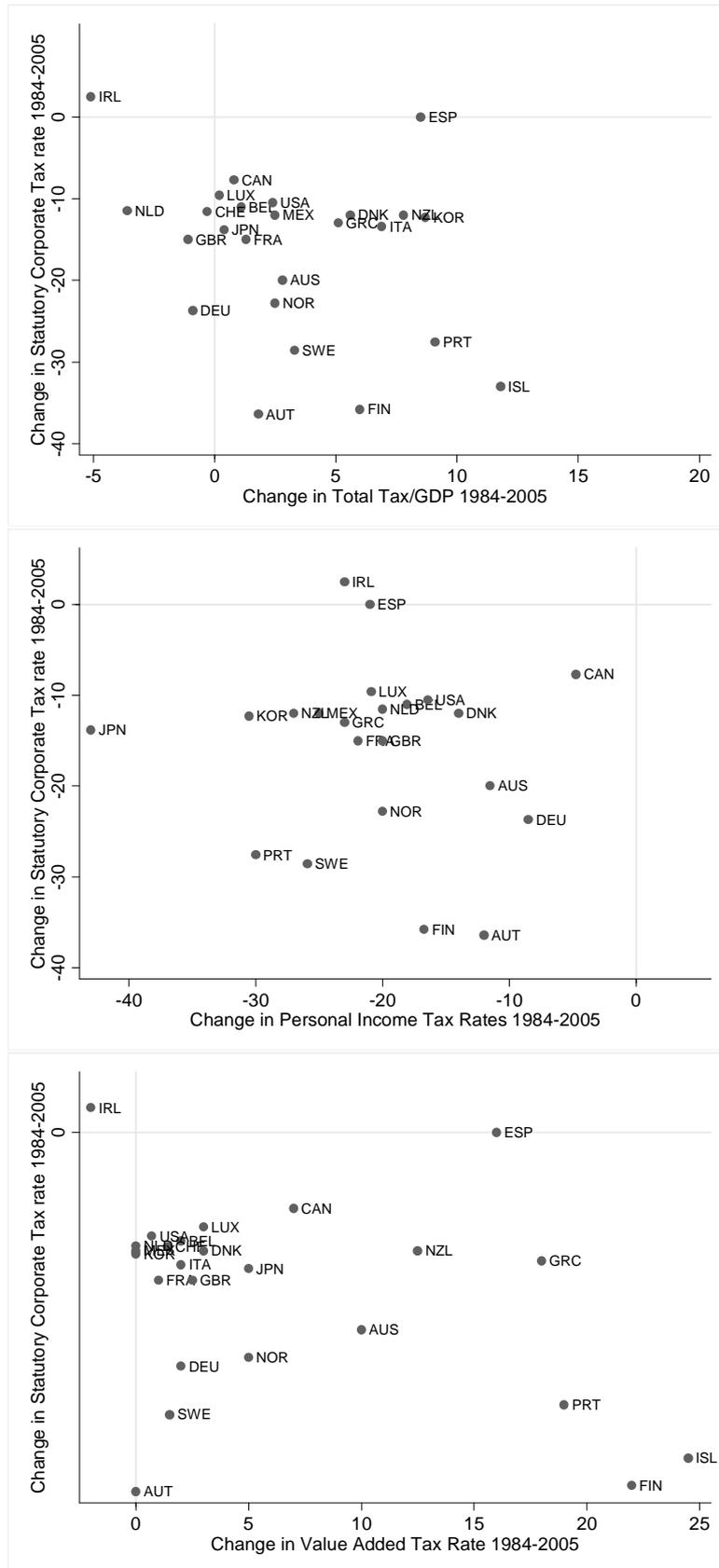


Figure 9: Changes of Corporate Taxation relative to other Taxation

One of the striking features, which has already been mentioned in section 2, in all three graphs in Figure 9 is that almost all countries have lowered their corporate income tax rates. In Figure 9 Ireland and Spain do not appear to have reduced their tax rates. While for Ireland this due to the abolition of the preferential rates in combination with a slightly increased general corporate tax rate, Spain has indeed lower its corporate tax rate only in 2007 which is why the rate reduction is not captured in the graph. In the upper part of Figure 9 one can also observe that in most countries the total tax burden increased between 1984 and 2005. This implies that the tax rate cuts did not entail a reduction of the overall tax revenues, which suggest that governments were either experiencing no tax revenue loss because of the corporate tax rate reductions or that they have raised other taxes to compensate for the corporate tax rate cuts.

The middle part of Figure 9 displays change in corporate tax rates as compared to the change in top personal income tax rates. As the downward trend in Figure 2 already suggests, literally all countries in our sample have reduced the personal income tax rates between 1984 and 2005. For some countries, e.g. Spain, Ireland, Korea, New Zealand and Japan the reduction in the personal income tax rates was substantially larger than in the corporate income tax. For other countries the corporate tax reduction surpassed the personal income tax rate reduction by far. This was most notably the case in Austria, Finland and Germany. While the latter implies a relative shift towards personal income taxes, there is no evidence that countries use personal income taxes to compensate for potential revenue losses in corporate taxes. This is also reflected on the right hand side of Figure 8 where Austria, Finland and Germany do not show above average tax revenues from personal income tax. The conjecture that personal and corporate income taxes are co-moving is reinforced in the analysis of the trends of both of these tax rates.

In the lower part of Figure 9 the change in statutory corporate tax rates is plotted against the change in value added tax rates. Again most countries in our sample move into the same direction, namely they increased or introduced value added taxes. The countries with the largest increases in the value added taxes are the ones that only introduced value added tax between 1984 and 2005. These countries include Iceland, Finland, Portugal, Greece, Spain, New Zealand and Australia. However, with the exception of Ireland, most of the countries which had a value added tax in already place increased their rates and none of the countries actually reduced its value added tax rates. Against the background of substantial tax rate cuts for both corporate and personal income, this is evidence for a switch between income and consumption taxes.

Even more striking is the fact that the countries which introduced a value added tax with a relatively high rate are the countries displaying substantial cuts in corporate tax rates.

Linking the three pictures within Figure 9 some more interesting features of the changes in the tax mix in particular countries can be discovered. The obvious country to look at is Ireland, as this is typically cited as the OECD country with the most aggressive tax competition behaviour. In fact Ireland stands out in all three parts of Figure 9 as it appears to compensate its low corporate tax rate with a reduced size of government, displaying the biggest reduction in total taxes of all OECD countries. The fact that Ireland has also reduced both the personal income tax rate and the value added tax rate highlights the successful attraction of investment and even more so profits via the sustained low corporate tax rate.

Another country with a relatively large change in its tax system is Iceland which substantially reduced corporate tax rates while the introduction of value added taxes at a very high rate of 25 percent still allowed for a big expansion of the total tax revenues. A similar development can be observed in Finland and Portugal where the substantial tax reduction in corporate and personal income taxes have been accompanied by an introduction of a value added tax with a high rate. Two more countries which are pursuing the same strategy are Austria and Sweden, although here the picture is less clear, because these countries already had high value added tax rates.

One thing all of the above mentioned countries have in common is that they are all relatively small countries. This is very much in line with the observation in Figure 1 that smaller countries have tended to be more aggressive in reducing their corporate income taxes. Further, the significant rise in the unweighted average of the corporate tax revenues in Figure 3 suggests that these rate reductions are not inducing a large loss in corporate tax revenues. This would imply that these countries are on the right hand side of their Laffer curves where a tax rate reduction yields higher tax revenues. Apart from a general increase in corporate profitability, which might not be the result of a tax reduction, the increased revenues can be the result of increased profit shifting into these countries.<sup>30</sup> The upward trend of the unweighted average of corporate tax revenues in Figure 3 in combination with the sharper drop of the weighted average of corporate tax rates provides some evidence for this hypothesis. However, the lack of a clear downward trend in

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<sup>30</sup>See Auerbach and Poterba (1987) and Auerbach (2007) for further explanations of changes in the corporate tax base.

the weighted average of corporate tax revenues in Figure 3 shows that the increased corporate tax revenues in smaller countries did not purely come at the expense of the larger OECD countries. A further explanation is a shift into the corporate sector because of an increased tax differential between personal and corporate income tax rates. However, most of these countries have also lowered their income tax rates to some extent in order to mitigate this problem.

The other common feature of the countries with the largest reductions in corporate tax rates is, that they are all European. This is consistent with the evidence that geographical proximity triggers more aggressive tax competition behaviour.<sup>31</sup> Consequently the larger European countries come under more pressure as they are increasingly surrounded by countries with substantially lower corporate tax rates. Therefore it is likely to expect larger European countries to respond with tax rate cuts themselves. Indeed judging from the cited examples in the introduction, we start to see the same pattern of changes in the tax systems in larger European countries as well. The German rate cut in corporate income taxes from 25 to 15 percent came at the same time as the increase in value added taxes from 16 to 19 percent. So the original concern of Oates (1972) that tax competition might undermine countries ability and willingness to tax certain types of income might come true. It is likely that corporate tax competition will not immediately jeopardise the overall tax revenues, but rather that it will induce a further shift towards indirect taxation like value added taxes.

## 5 Conclusion

The paper starts with the observation that corporate tax rates display a significant downward trend, which is frequently interpreted as evidence for corporate tax competition. We argue that the simultaneous drop in personal income tax rates until the early 1990s suggests that a change in government perceptions might have caused some of the tax rate reductions. However, the more recent tax rate reductions, especially by smaller European countries, have not been matched by corresponding rate cuts for personal income. Further, an analysis of the development of the corporate tax base indicates that it has become increasingly difficult for countries to broaden their tax bases. In connection with the falling corporate tax rates this might put increasing pressure on governments to raise revenues. However, so far the revenue pressures have not manifest themselves in falling corporate tax revenues. Nevertheless,

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<sup>31</sup>See Loretz (2007) for direct evidence. Further the tax competition literature finds that distance weighted neighbour tax rates outperforms other measures of the competitors tax rates. See Devereux and Loretz (2008) for a survey.

the revenue argument highlights the necessity of analysing corporate taxation through a more holistic approach, i.e. against the background of the overall tax system.

Analysing the role of corporate taxation in the overall tax systems of the OECD countries we find three main interdependencies. First countries with larger governments tend to rely less on corporate taxation. Further it can be observed that corporate taxation and personal income taxation tend to move together. On the other hand governments seem to compensate for corporate tax reductions by increasing value added taxes. In consequence, over the last two decades a shift from income taxation towards consumption taxation, i.e. value added taxes, can be observed. So far this trend is most pronounced for smaller European countries. However, more recent tax reforms, most notably in Germany, indicate that these tendencies might continue unabated and also for larger economies.

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## A Data sources and definitions

### A.1 Corporate tax data

The corporate tax dataset is an extended version of the Devereux, Griffith and Klemm (2002) dataset which used to be available for download at the Institute for Fiscal Studies website.

The additional tax law information is mainly gathered from the following publications of the International Bureau of Fiscal Documentation (IBFD) in Amsterdam: European Tax Surveys, Global Tax Surveys and Tax News Service. Further information is obtained from the OECD Tax Database, PriceWaterhouseCoopers Worldwide Tax Summaries, KPMG corporate tax rates surveys and directly for the ministries of finance of the OECD countries.

The statutory corporate tax rate is defined as the top marginal tax on corporate income. Any applicable surcharges and the local profit taxes are included. For the local taxes we use the unweighted average of the local profit taxes rates for large countries, e.g. the United States or Germany and the applicable rate for the economic capital, e.g. Luxembourg City or Zurich for smaller countries.

For the net present values of depreciation allowances  $A$  we use the most generous allowed depreciation scheme and also include generally available extra allowances or accelerated depreciation. Where a switch between the declining balance method and straight line depreciation is allowed we assume that this is done at the tax optimal time. For more detailed equations see also Devereux and Griffith (1999). For the parameterisation we use the assumptions of Devereux, Griffith and Klemm (2002), i.e. a real discount rate  $r$  of 10 percent and a fixed inflation rate  $\pi$  of 3.5 percent. Abstracting from shareholder taxation this implies a discount factor  $\rho = (1+r)(1+\pi)-1$ .

For the calculation of the effective tax rate a unit investment changing the capital stock for only period is considered. This implies an investment of 1 in the first period and a divestment of  $(1 - \delta)$  in the next period, where  $\delta$  denotes the economic depreciation. The investment creates an additional return of  $(p + \delta)$ , where  $p$  is the economic return. Under the assumption of constant inflation the net present value of this income stream can be simplified to  $R^* = (p-r)/(1+r)$ .

Introducing taxation has two effects. First the return is subject to the statutory corporate tax rate  $\tau$ . And secondly the depreciation allowance creates

tax savings of  $(1 - A)$ , lowering the both cost of the investment in the first period and the divestment in the second period. Therefore the net present value of the income stream after tax can be written as

$$R = \frac{(p + \delta)(1 - \tau) - (1 - A)(r + \delta)}{(1 + r)}$$

The cost of capital  $\tilde{p}$  is the rate of return required to break even, i.e.  $R = 0$ . The effective marginal tax rate is then defined as  $EMTR = (\tilde{p} - r)/\tilde{p}$ .

The effective average tax rate is defined for a fixed  $p = 0.2$  as the difference between the NPV of the income stream with and without taxes as a proportion of the discount economic rent  $p/(1 + r)$ .

Further we adopt the following assumptions from the literature, more specifically from Devereux, Griffith and Klemm (2002): 3.61 percent economic depreciation for buildings, 12.25 percent economic depreciation for plant and machinery. We assume that the investment is fully financed by retained earnings and abstract from shareholder taxation. Finally we equally weight the effective tax rates for buildings and machinery.

## A.2 Personal income tax data

The personal income tax data is a combination of the OECD tax database, the Michigan World Tax Database and the PriceWaterHouseCoopers publication Individual Taxes Worldwide Summaries. Further the dataset is corrected and completed with information directly from the ministry of finances of the individual countries.

In line with the statutory corporate tax rates with use the top marginal income tax rate including surcharges and local income taxes. Again the local income taxes are the unweighted average for large countries and a typical rate of the economic center for small countries.

## A.3 Value added tax data

The value added tax rates are from the OECD tax database and complemented with data from the study 'VAT Rates Applied in the Member States of the European Community' of the European Commission.

For the United States we use the unweighted average of the local sales taxes.

#### A.4 Tax revenue and GDP data

The data source for the tax revenue data is the OECD revenue statistics. All the Table numbers correspond to the 2007 edition. The data for corporate tax revenues (item 1200) as a percentage of GDP or as percentage of total taxation as used in Figure 3, Figure 6, Figure 7 and Figure 8 is taken from Table 12, respectively Table 13.

The total tax as a percentage of GDP, as used in Figure 6 and Figure 8 is taken from Table 3. This measure also includes social security contributions in contrast to the measure of total tax revenue as reported in Table 4.

For the tax revenue data for value added taxes, as employed in Figure 7, we use the tax revenue from general consumption (item 5110) as a percentage of total tax from Table 29. The tax revenues from personal income taxes (item 1100), used in Figure 8 are from Table 11.

The GDP data employed to weight the tax rates is from the national statistics database provided by the OECD. All the GDP data is 2000 US dollars.

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