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Corporation tax in the United Kingdom

Michael P. Devereux
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PREFACE

This report forms part of the output of the Oxford University Centre for Business Taxation, based in the Saïd Business School. The work was financed partly by a grant from the ESRC (grant RES-060-25-0033), and partly from donations from a number of UK companies, members of the Hundred Group. The full list of corporate donors is provided on the Centre's website, at www.sbs.ox.ac.uk/tax.

The research draws on anonymised, confidential, corporation tax CT600 returns for a very large number of companies over the period 2001/02 to 2007/08. We are very grateful to the HMRC for giving us access to these data. Our use of these data represented a pilot project for a new Datalab which HMRC is now making available to researchers more generally. We are grateful to the staff of the Datalab for their help and support, and in particular, to Aliya Saied, the manager of the Datalab. We would also like to thank staff of HM Treasury and HMRC for comments on an earlier draft of this report.

CONTENTS

EXECUTIVE SUMMARY

This report presents new information on the anatomy of corporation tax liabilities and payments in the United Kingdom. It uses two complementary company-level data sources: anonymised corporation tax data provided on a confidential basis by HMRC, and financial accounting data from the FAME database. Each data source has advantages and disadvantages, but by combining them we are able to provide a detailed description of the distribution of corporation tax in the United Kingdom.

We begin by presenting stylised facts, based on aggregate data.

- In 2010 the UK had the 7th lowest corporation tax rate in the G20, and the lowest in the G7.
- For over 25 years the UK's corporation tax rate has been well below the G7 average.
- Despite this, as a proportion of GDP, UK corporation tax revenue has generally been above the G7 average. Revenue peaked in 2007/08 at around £46 billion, before falling back to less than £36 billion in 2009/10.
- UK corporation tax revenues have been volatile: more volatile than both GDP and personal income tax revenues. Revenues from the financial sector have been particularly volatile.

Aggregate revenue figures mask significant differences between companies. We investigate the distribution of corporation tax liabilities and payments using the two databases described. Note that all distributional results relate to individual companies, rather than consolidated groups.

- One reason for the growth in corporation tax revenue up to 2007/08 was a substantial increase in the number of companies with positive taxable income. This more than doubled from 450,000 in 1998/99 to over 920,000 in 2007/08 before falling back slightly.
- The growth in the number of companies was associated particularly with the reduction to zero of the starting rate of corporation tax between 2002/03 and 2005/06.
- Despite the growth in the number of companies, corporation tax payments are highly concentrated. The top 1 percent of all companies pays 81 percent of UK corporation tax.

We allocate companies in the FAME data into four groups depending on whether they are independent or part of a group, and in the latter case whether the group is purely based in the UK or is a UK-owned, or foreign-owned, multinational.

- Independent companies pay just over 10 percent of UK corporation tax. By far the largest share of corporation tax is paid by companies that are part of multinational groups, with a similar proportion from UK-owned and foreign-owned groups.
- A significant proportion of companies that have a positive accounting profit (measured by EBIT - earnings before interest and tax) do not show a positive corporation tax charge in their accounts; this proportion is similar across the different groups, and ranges from 13 percent to 15 percent.
- Independent companies tend to have a higher proportion of zero tax liabilities. Companies that are part of groups have a higher incidence of negative tax liabilities, possibly because they are able to surrender losses to other companies through group relief.
- The distribution of effective tax rates is broad, but peaks in the distribution tend to lie at zero, at

the small profits rate and at the main corporation tax rate.

Tax return data from the HMRC Datalab can also be used to examine the distribution of corporation tax liabilities.

- Tax return data indicate that a significant proportion of companies do not have a positive tax liability.
- Amongst the smallest companies, this proportion is around 60 percent; as size increases, the proportion drops to 40 percent and then increases slightly to about 50 percent for the largest companies.
- Within each sector there is evidence that, as a proportion of trading profit, the tax liabilities of the largest 100 companies are generally lower than for other companies.

Tax return data also reveal the relative importance of various types of income and deductions.

- Although trading profit has consistently been the main element of income, financial profit has grown substantially over the last decade.
- Group relief is significantly larger in its effect on taxable profit than losses brought and carried forward.
- Only a small number of companies have overseas income; but for those companies the amount of overseas income has been large and highly significant.

Finally, using tax return data we are able to simulate the effects of various tax reforms over the last decade.

- The existence of discrete jumps in the marginal rate structure - exacerbated, for example, by the starting rate being temporarily reduced to zero - has led to companies choosing to locate their taxable profit at kink points in the marginal tax rate schedule. This could be explained by income taken in the form of profits being taxed at a higher rate above the kink point, or by investment incentives being lower below the kink point.
- Although the 2008 corporation tax reform reduced tax revenues overall, around 71 percent of companies had a higher tax liability because of the rise in the small profits rate, while only 1 percent of companies had a lower tax liability.
- By contrast, the 2010 corporation tax reform resulted in around 64 percent of companies having a lower tax liability.

1. INTRODUCTION

Although HMRC publishes aggregate statistics about United Kingdom corporation tax liabilities and payments, there is little information in the public domain about the derivation, distribution and nature of corporation tax payments. This report presents new information on these tax payments and the underlying corporation tax base.

We investigate several dimensions of the distribution of corporation tax payments. For example, we consider how aggregate payments are affected by developments in the number of tax-paying companies. We explore differences between domestic-owned and foreign-owned companies, and between multinational companies and purely domestic companies. We characterise the distribution of tax payments and effective tax rates within each of these groups, and show in each case the proportion of companies that have no positive tax liabilities. We compare effective tax rates by sector and by company size. We show the relative importance of the various factors which make up the corporation tax base, and in particular, we investigate the importance of tax losses and overseas income. We show that the non-linear tax rate schedule creates incentives for companies to locate themselves at particular levels of taxable income, and explore what proportion of companies are at each of these points. We explore the effects of the tax reforms in 2008 and 2010.

Our analysis draws on two microeconomic sources. First, we use publicly-available information from unconsolidated UK company accounts for just over 400,000 companies and 1.5 million observations over the period 1999-2009. These data are taken from the FAME dataset, published by Bureau van Dijk.

Second, we draw on anonymised confidential tax return data available to us through a pilot project for a new HMRC Datalab. This dataset contains information from more than 1.4 million corporation tax return CT600 forms over the period 2001/02 to 2007/08. The data contain the tax returns from the population of large companies, and a 10 percent sample of small companies.

In section 2, we present some broad stylised facts about corporation tax payments in the UK. We show that the UK raises substantial revenues from corporation tax, typically at the same or a higher proportion of GDP as other G7 countries; moreover this is despite having a much lower statutory rate than those countries. Among other things, we also demonstrate the highly skewed distribution of payments across companies, with 1 percent of companies contributing about 80 percent of total revenue.

In section 3, we examine some specific issues in more detail. We compare 4 groups of companies: UK-owned multinationals, foreign-owned multinationals, standalone domestic companies, and domestic groups. The two groups of multinational companies have paid just over 85 percent of UK corporation tax over the last 10 years. A relatively large proportion of companies pay no tax at all in some years. This is true of all these groups, and also true of companies throughout the size distribution. There are significant differences in effective tax rates across industries, ranging from very low rates of around 5 percent in the hotels and restaurants sector to over 30 percent in the mining sector. Within industries, there is evidence that larger companies tend to have lower tax rates.

There is also evidence that there are considerable unused taxable losses.

We are also able to identify the contribution to taxable profit of the various components of the tax computation. Using the tax return data we are able to identify precisely the level of taxable profit. One issue of interest here is that there is evidence of "bunching" at levels of taxable profit of £10,000 and £300,000. Section 4 discusses the incentives for entrepreneurs to locate at these points.

Finally, we simulate the effects of various reforms on company tax payments, holding constant the behaviour of the companies. The main changes in the 2008 Finance Act – reducing the corporation tax rate to 28 percent and reducing capital allowances – is estimated to have slightly reduced corporation revenues. Our estimates suggest that 71 percent of companies in the HMRC dataset had an increase in their tax payments, and only 1 percent had a reduction. The measures in the June 2010 budget, including the stepwise reduction of the main corporation tax rate to 24 percent, will significantly reduce revenues. Because the government also reversed the previous intention to raise the small companies' rate, a large share of 64 percent of companies will benefit from a reduction in their tax liabilities. However, we estimate that 9 percent of the companies will face an increased tax burden due to the reduction in capital allowances.

Section 5 provides a brief conclusion. A number of Appendices describe the sources of data in more detail.

2. STYLISED FACTS ABOUT CORPORATION TAX IN THE UK

This section briefly describes the key features of the corporation tax system in the UK in the past decade. It sets the UK system in an international context, before presenting a short analysis of the distribution of tax payments. This serves as an introduction to a more detailed analysis in the next section.

2.1. CURRENT CORPORATION TAX SYSTEM

After the major tax reform of 1999, which included the abolition of the advance corporation tax (ACT), the broad structure of the UK corporation tax system has remained relatively unchanged. We briefly describe its most important features.

2.1.1. STATUTORY CORPORATION TAX RATES

The tax reform of 1999 saw the reduction of the main statutory corporation tax rate to 30 percent and the introduction of a 10 percent starting rate. The most significant changes in the broad structure of the corporation tax rate schedule during the last decade all concerned the starting rate.[1] Table 1 summarises the corporation tax rate schedule in the United Kingdom between 2000/01 and 2010/11.

Table 1: Marginal corporation tax rates in the United Kingdom 2000/01 to 2010/11

	Marginal corporation tax rate				
Taxable Profit (£)	**2000/01 to 2001/02**	**2002/03 to 2005/06**	**2006/07**	**2007/08**	**2008/09 to 2010/11**
0 to 10,000	10%	0%	19%	20%	21%
10,001 to 50,000	22.5%	23.75%	19%	20%	21%
50,001 to 300,000	20%	19%	19%	20%	21%
300,001 to 1,500,000	32.5%	32.75%	32.75%	32.5%	29.75%
More than 1,500,001	30%	30%	30%	30%	28%

The main rate of corporation tax, applied to taxable profit over £1.5 million, remained at 30 percent until being reduced to 28 percent from 2008/09. It will be reduced to 27 percent in 2011/12 and then progressively to 24 percent by 2014/15.

1. Other significant tax reforms (e.g. the introduction of a new intangible assets regime and the substantial shareholdings exemption) were enacted in during this period, but for the purpose of this report we focus on the most general and visible reforms in the tax rate structure.

The small profits rate[2] has generally been applied to companies with taxable profit below £300,000. This has varied slightly over time, between 19 percent and 21 percent, and will be reduced to 20 percent from 2011/12. For taxable profit between £300,000 and £1.5 million, a higher marginal rate is applied. This ensures that the total tax liability at a profit of £1.5 million is equal to the main rate applied to £1.5 million, despite lower profits being taxed at different marginal rates.

In addition to the small profits rate, a starting rate was also used until 2005/06, which applied to taxable profit up to £10,000. This rate was 10 percent from 2000/01 to 2001/02, and was then set to zero for three years before being abolished.[3] While it was in use, a higher marginal rate also applied to taxable profit between £10,000 and £50,000.

2.1.2. OTHER ASPECTS OF THE CORPORATION TAX SYSTEM

Recent rate cuts have been accompanied by a broadening of the corporation tax base by reducing capital allowances. Until 2008/09, the general pool of plant and machinery was deductible at 25 percent on a declining balance basis and expenditure on industrial buildings was deductible at 4 percent straight line. Alongside the reduction in the main rate of corporation tax in 2008/09, capital allowances for plant and machinery were reduced to 20 percent in 2008/09. A further reduction to 18 percent declining balance has been announced to take effect from 2012/13. Starting from 2008/09, capital allowances for industrial buildings are being phased out, and will no longer be allowed from 2011/12.

The abolition of the ACT in 1999 also saw a change in the dividend taxation. The tax credit for dividends was reduced to 10 percent, in line with the dividend tax rate for basic income taxpayers. The rate for higher rate taxpayers was reduced to 32.5 percent of the grossed up dividend, which is equivalent to 25 percent of the net dividend. The taxation of the dividends at the individual level has remained unchanged since 1999.

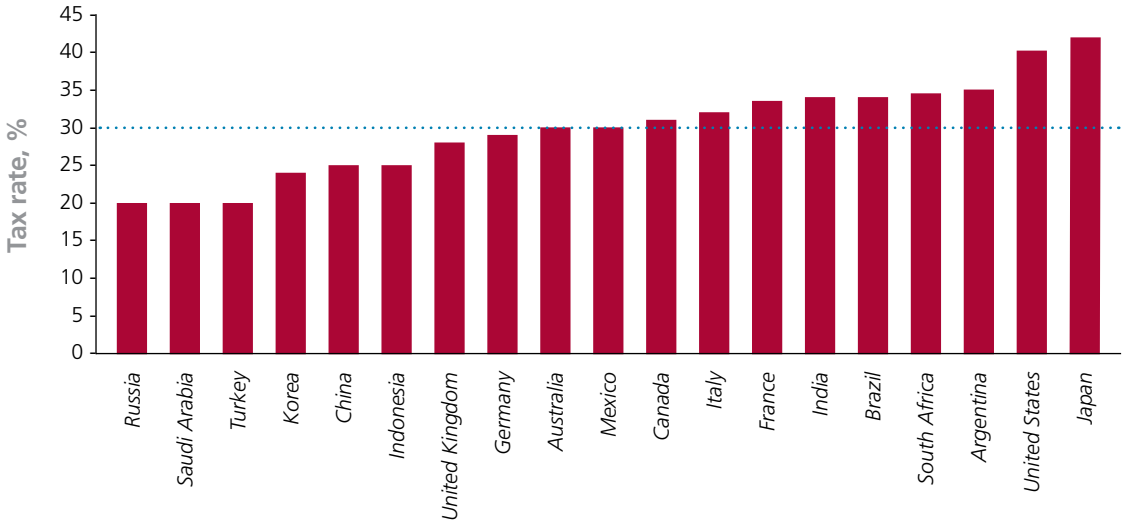
In contrast the tax treatment of dividends received by corporations from foreign subsidiaries changed in 2009. Until July 2009 such foreign source dividend income was taxable in the United Kingdom with a tax credit for foreign corporation tax paid abroad. Since July 2009 overseas dividend income has been largely exempt from UK corporation tax. At the same time, a new restriction was introduced on relief for interest payments, with relief permitted in the UK depending on the worldwide third party debt of the company.

2.2. LOW RATES AND SIGNIFICANT BUT VOLATILE REVENUES

The UK government has recently set an aim of having "the most competitive corporation tax regime in the G20".[4] Figure 1 makes one comparison between G20 countries, showing the main corporation tax rates in each country (including local tax rates where appropriate).[5]

2 This was previously known as the small companies' rate.
3 In 2004–06, the starting rate only applied to retained profits and those distributed to corporate shareholders.
4 HM Treasury and HMRC (2010).
5 Data are taken from KPMG (2010).

Figure 1: Main corporation tax rates in the G20, 2010



In 2010, The UK had the seventh lowest main corporation tax rate in G20, slightly below the average rate of the G20 countries (shown by the dotted line). However, such a simple comparison could be misleading for several reasons. Most notably, it does not include any measure of the tax base. It excludes a number of major factors which affect effective tax rates, ranging from capital allowances to the treatment of losses and foreign profit. We are not able to make a detailed comparison of these factors for all of the G20 countries. However, this report does aim to provide information on these factors for the UK.

To begin with, though, we explore the competitiveness of the UK system over the last three decades, relative to the other G7 countries. In Figure 2 we compare the main rates of corporation tax, and also the consequences for corporation tax revenues. In both parts of Figure 2 the red line represents the UK and the blue line represents the unweighted average of the other G7 countries. The dashed blue lines indicate this average plus and minus one standard deviation of the other six rates, which gives an indication of the variability between them.

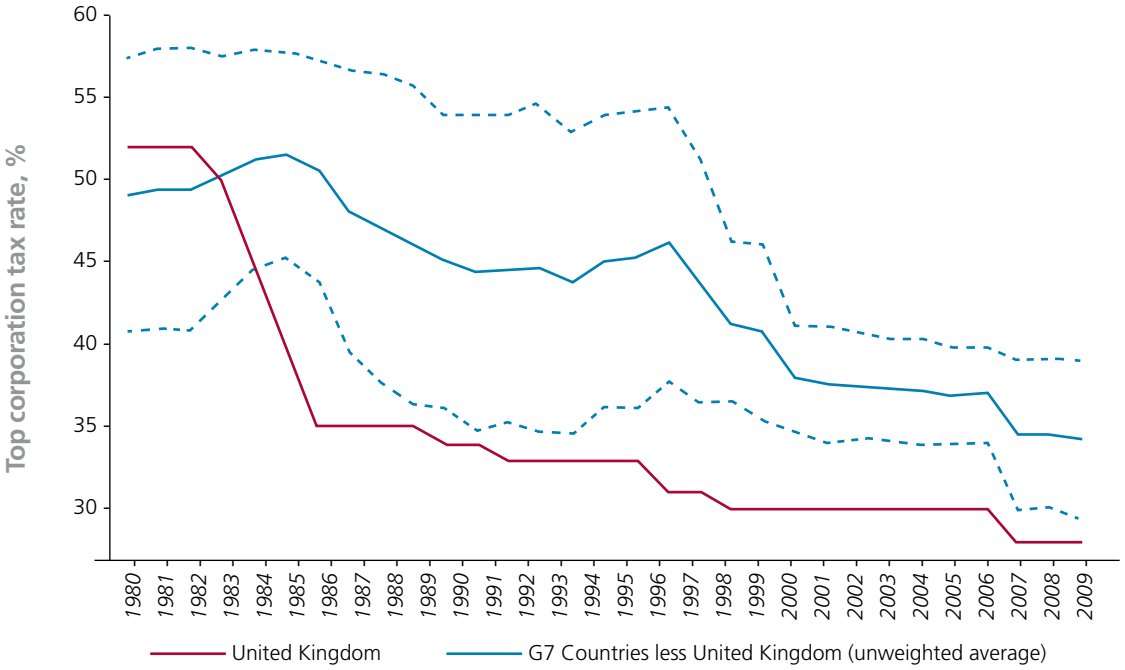
The 1984 tax reform left the UK with a corporation tax rate significantly below the average of the other G7 countries, although to put this further into perspective, the UK rate is close to the average of OECD countries.[6] The top half of Figure 2 indicates that there has been a general downward trend in rates; this trend slowed in the last decade. Given the difficult economic situation many countries are currently in, it is possible that further corporation rates cuts will be enacted in an attempt to help the economies to get back to growth again. As noted above, in the June 2010 Budget, the government announced gradual corporation tax rate cuts to 24 percent over the next four years, which might further fuel downward competition.

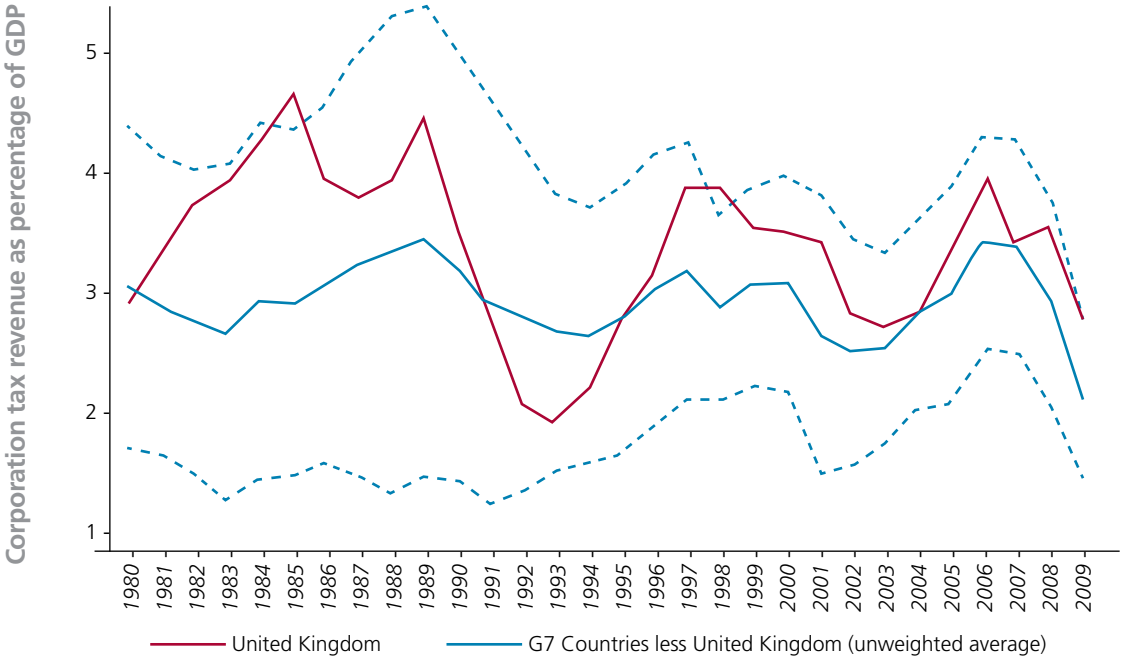
The lower part of Figure 2 shows the development of the corporation tax revenues in the same period, expressed as a percentage of GDP. The average of the other G7 countries is close to 3 percent of GDP throughout the period. The UK corporation tax revenues appear to be more volatile, although this is partly because the volatility of the other G7 countries is masked by reporting only the average. For most of the observed period, corporation tax revenue in the UK is higher than that in the other

6. This can be seen clearly graphically in Loretz (2008) p. 651 where the UK is placed right in the middle of the figure, indicating that it is about average, both in terms of statutory corporation tax rates and corporation tax revenues.

G7 countries. This is remarkable, given the lower rate shown in the top part of the Figure, because it implies that the UK was able to collect higher revenues on average than other G7 countries despite having a significantly lower tax rate.

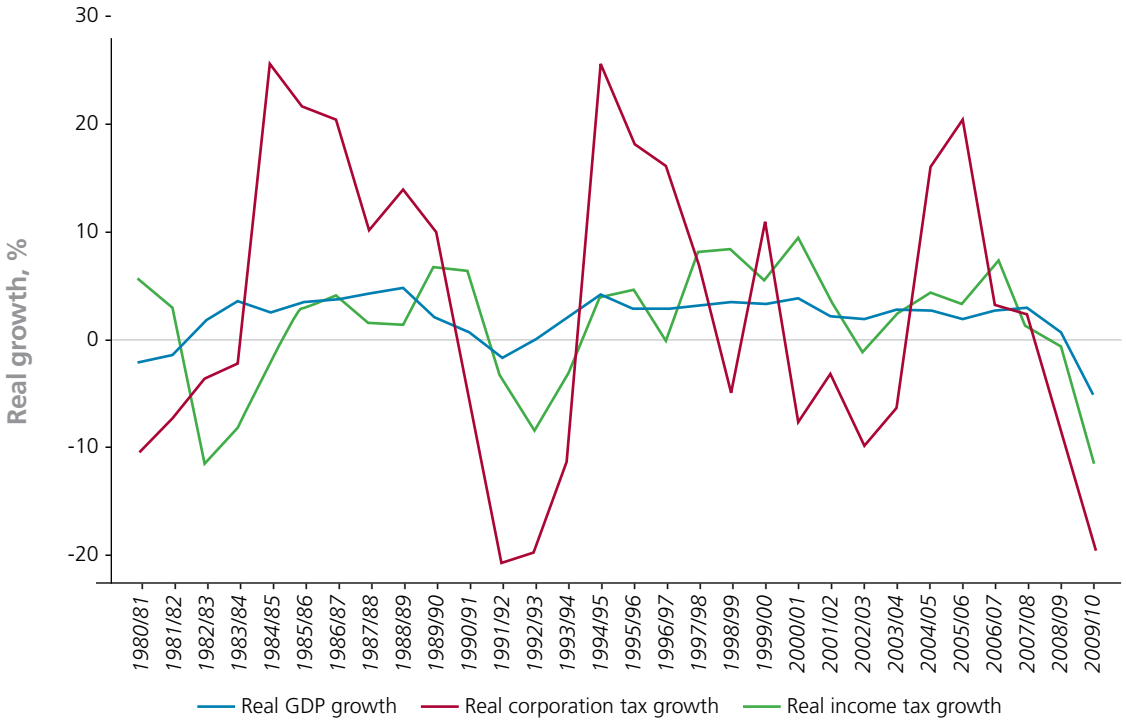
Figure 2: Corporation tax rates and revenues in the UK and other G7 countries





In Figure 3 we investigate further the volatility of UK corporation tax revenues. This Figure compares the real rate of growth in corporation tax revenues (the red line) with the real rate of growth of personal income tax revenues (the green line) and the real rate of growth of GDP (the blue line), all since 1979. It is clear that real economic growth is significantly less volatile than both forms of tax revenues. In fact real GDP rose consistently for a prolonged period from the early 1990s to 2007 when the economic crisis unfolded. In contrast the growth of corporation tax revenues was negative several times in the same period, and reached minus 20 percent in 1991/02 and 2009/10. But it also exceeded plus 20 percent on three occasions. Overall it is clear that corporation tax revenues are much more volatile, not only than real GDP, but also than personal income tax revenues.

Figure 3: Real growth in GDP, corporation and income tax revenues in the UK



The Figure also indicates that corporation tax revenues appear to recover with a slight delay from recessions. This could partly be due to the fact that GDP is measured as it accrues, while corporation tax payments are measured in receipts and more importantly are generally due on the profits from the previous periods. Another factor is that taxable losses accumulated during the recession can be carried forward to reduce subsequent tax liabilities.

Before analysing the composition and the underlying cause of the net corporation tax receipts in more detail, we make use of the official, aggregate, statistics compiled by the HMRC.

2.3. SUBSTANTIAL, THOUGH VOLATILE, REVENUES FROM FINANCIAL SERVICES

Figure 4: Net UK corporation tax receipts 2000/01 to 2009/10

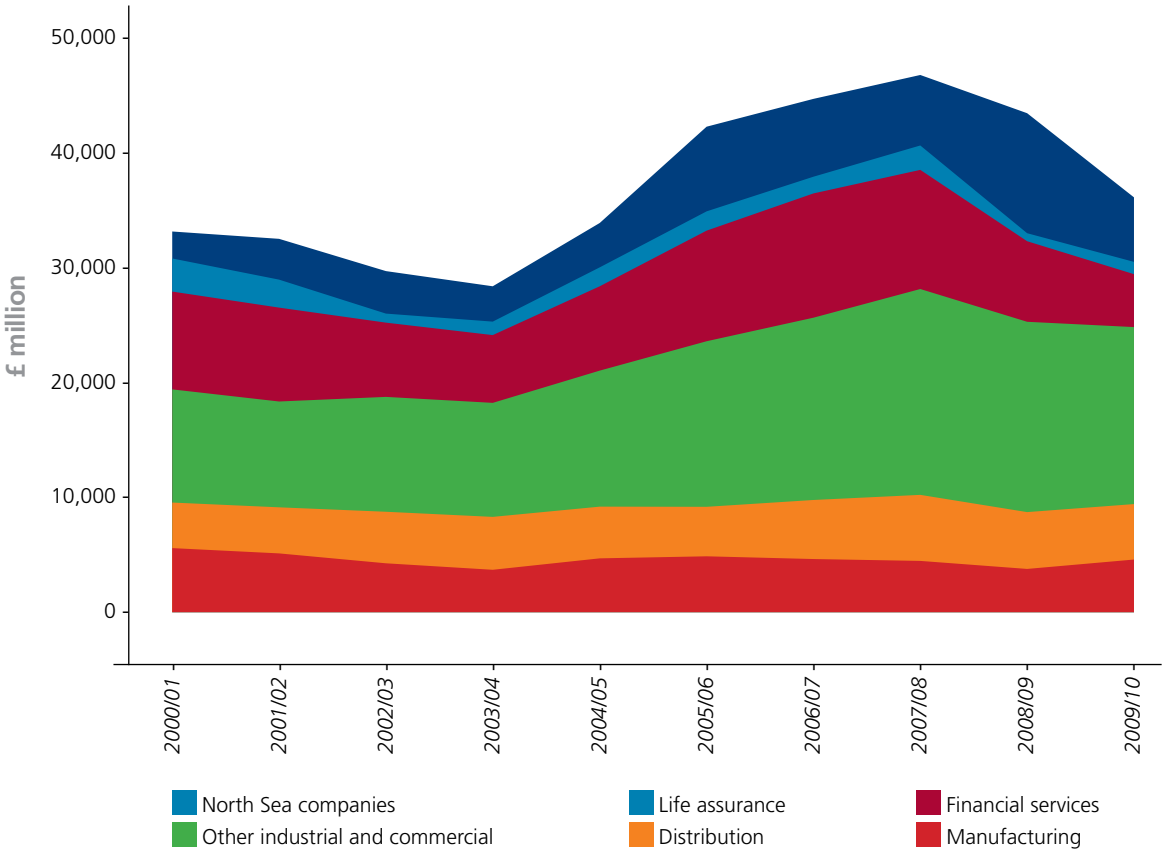


Figure 4 displays the trend of net corporation tax receipts between 2000/01 and 2009/10 and splits the tax receipts into broad industrial sectors.[7]

There was a significant increase in tax revenues from £32 billion in 2000/01 to £46 billion in 2007/08, before they fell back to less than £36 billion in 2009/10. Revenues from the financial sector are particularly volatile. They accounted for over £8 billion in 2000/01, before falling back to under £6 billion in 2003/04, rising to nearly £11 billion in 2006/07, before falling back again to around £4.5 billion in 2009/10. Revenues from other industrial and commercial companies (excluding manufacturing, distribution, finance and life assurance) almost doubled between 2000/01 and 2007/08, to over £18 billion, before falling back to just over £15 billion. The other onshore sectors were relatively more stable.

During 2008/09, a significant reduction of £8 billion in revenues from onshore activities was offset by a rise of over £4.5 billion in revenues from the North Sea activities, to over £10 billion. However, this rise was short-lived, and revenues from the North Sea fell back to less than £6 billion in 2009/10.

7 Figure 4 is based on information from HMRC, Table 11.1, available online at: http://www.hmrc.gov.uk/stats/corporate_tax/table11_1.xls. See also Table A.2.

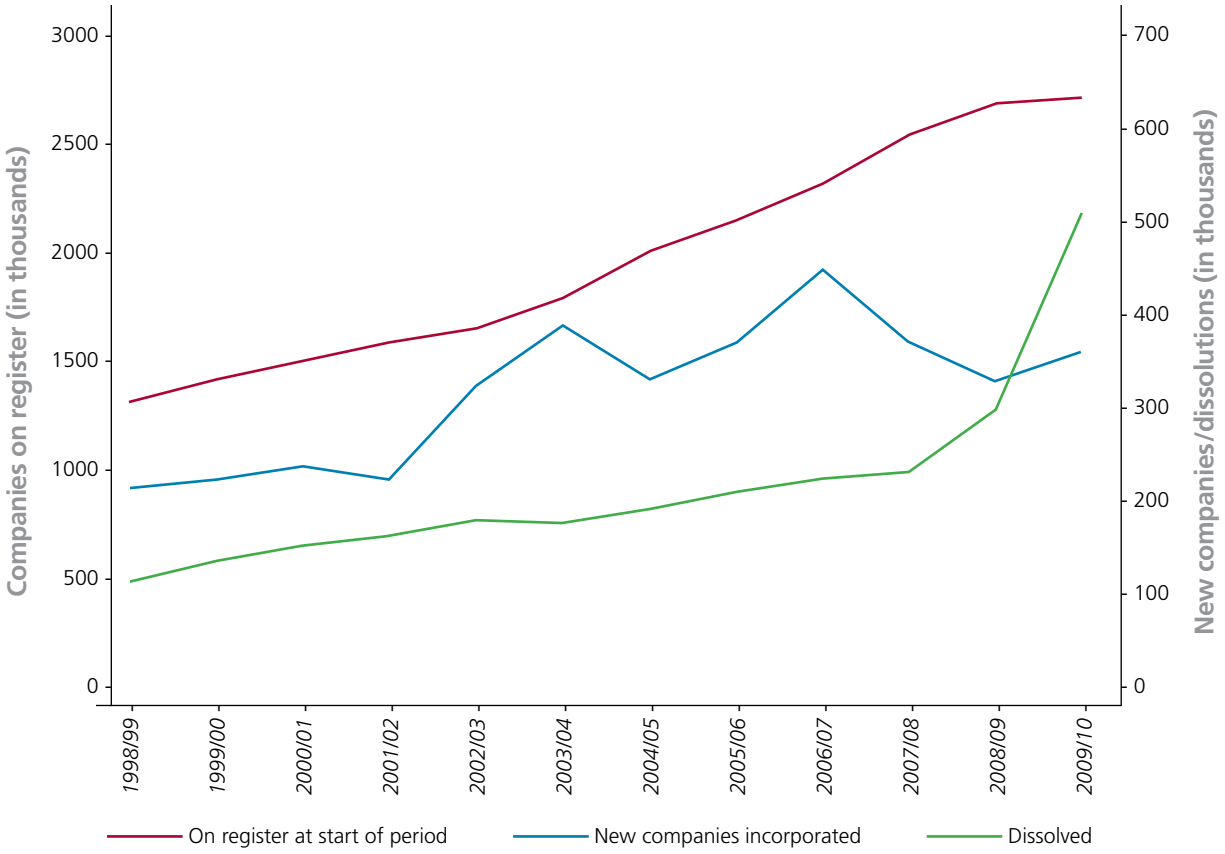
2.4. INCREASING NUMBER OF COMPANIES AND TAXPAYERS

Tax revenues can increase in two ways. Either taxpayers can pay more tax on average, or there can be more taxpayers. It is therefore useful to investigate the number of corporation taxpayers.

We begin by analysing data from the register at Companies House. This register encompasses all potential corporation taxpayers. Figure 5 displays the number of companies registered in the United Kingdom, and new incorporations and dissolutions of companies for the period between 1998/99 and 2009/10.[8] Looking at the red line one can see on the left hand axis that the number of companies registered roughly doubled from 1.3 million businesses to 2.7 million. It is worth noting that these numbers include dormant companies which amounted to roughly 362,000 companies in 2008/09.[9]

The blue line depicting the new incorporations (using the right hand axis) shows two distinct waves of incorporations. One is from 2002/03 to 2003/04 which coincides with the lowering of the starting rate to zero. The second peak is in 2006/07, which could be due to a legislative change concerning the Managed Service Companies - see Crawford and Freedman (2008) for a further investigation of the small business sector in the United Kingdom. Finally the green line (right hand axis) shows companies dissolutions are also on a steady rise. However, until the jump in company dissolutions during the financial crisis in 2009/10, there had consistently been more incorporations than dissolutions.

Figure 5: Number of companies 1998/99 to 2009/10

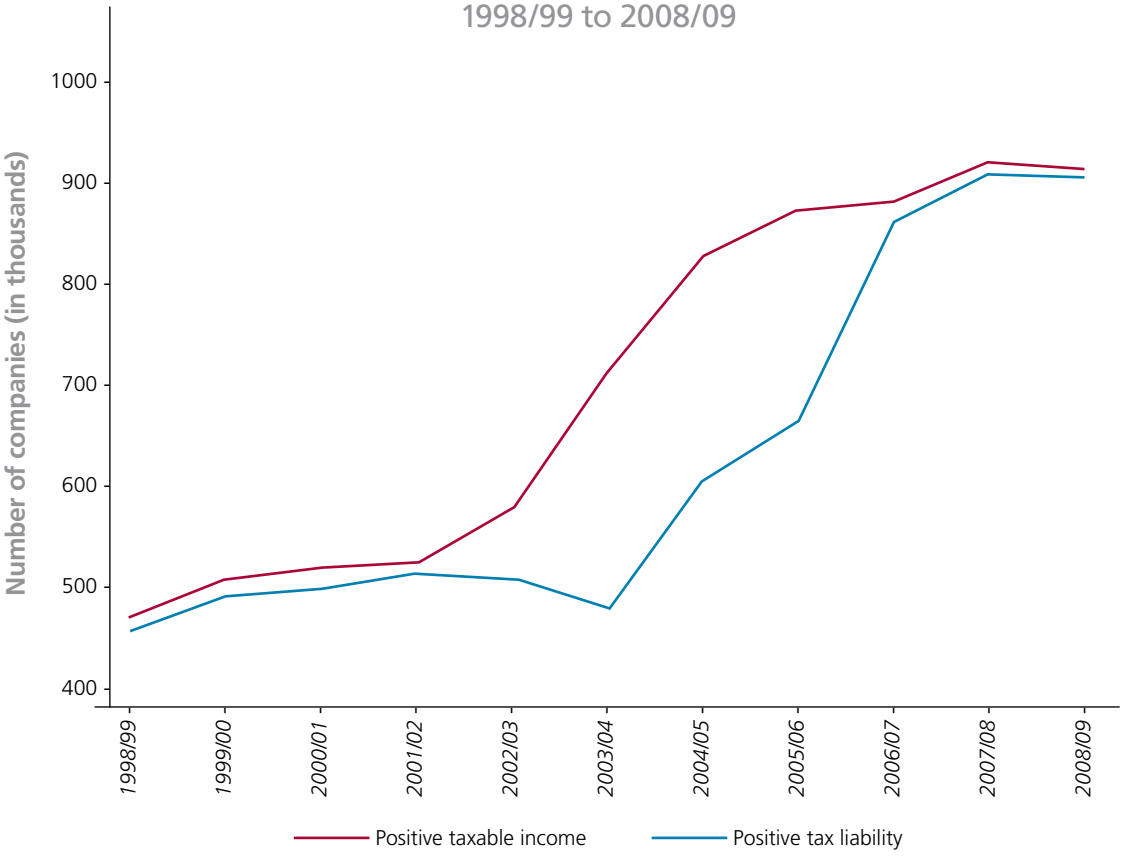


8 Figure 5 is based on data from Companies House.

9 The share of dormant companies remained constant at around 19 percent and so does not alter the relation between incorporations, dissolution and stock of corporations.

Figure 6 goes one step further and investigates the number of business that reported a positive taxable income or a positive tax liability in the period between 1998/99 and 2008/09.[10] Strikingly, the number of companies which have either positive taxable income or tax liabilities is significantly less than half of the registered businesses. While we can attribute about 20 percent of the difference to dormant companies, there remains a big gap between the number of registered companies and the number of companies with taxable profits. The number of companies with positive taxable income increased from around 450,000 in 1998/99 to over 920,000 in 2007/08, before falling back slightly in 2008/09. This trend is roughly in line with the doubling of companies on the register. Similarly the number of companies with positive tax liabilities doubled. However, this number did not follow the same linear trend, which can largely be explained through the changes in the taxation of small companies.

Figure 6: Number of companies with taxable income/tax liabilities 1998/99 to 2008/09



In 2002/03 the starting rate was reduced to zero. As a reaction the number of companies surged and at the same time the trends of companies with positive taxable income and companies with positive tax liabilities diverged. Following the restriction of the zero percent starting rate to retained earnings and distributions to corporate shareholders in 2004/05 the trend re-aligned. In 2006/07 the abolition of the zero percent starting rate led to a slower speed of incorporations and realigned the number of companies with positive taxable income and positive tax liabilities.

10 Figure 6 is based on information from HMRC, Table 11.3, available online at: http://www.hmrc.gov.uk/stats/corporate_tax/table11_3.xls. See also Table A.3.

2.5. HIGH CONCENTRATION AMONG TAXPAYERS

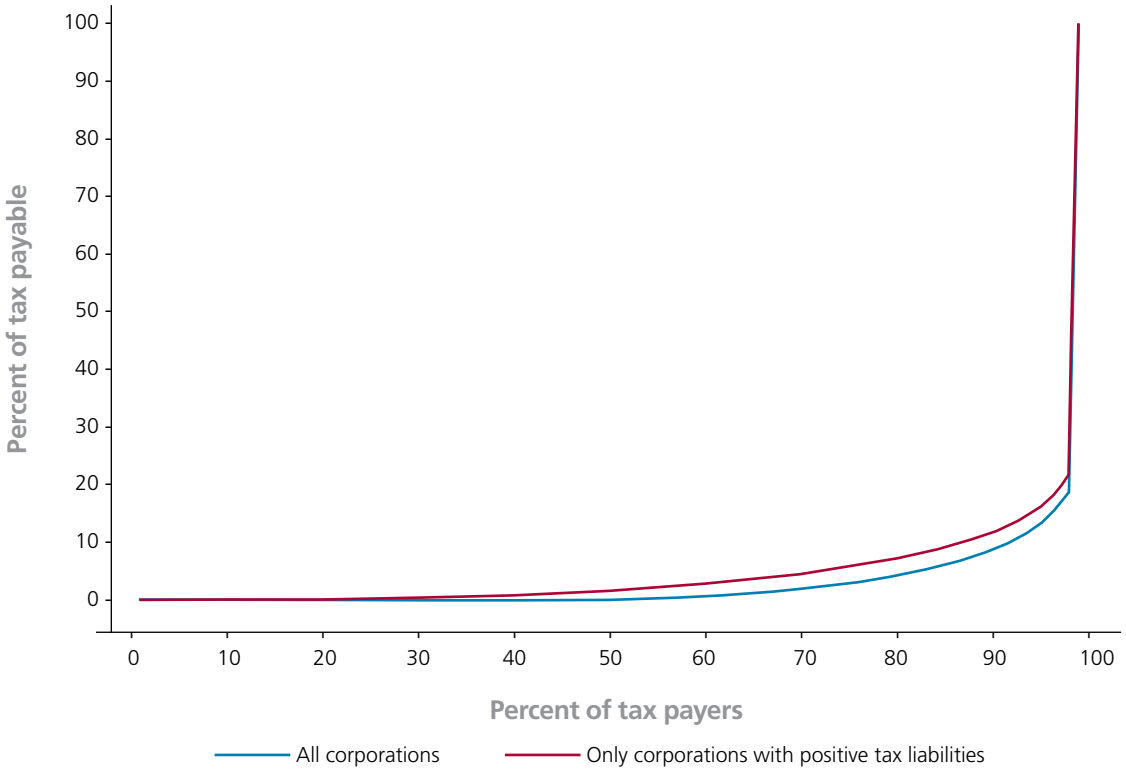
Given that there are substantial corporation tax revenues, yet also a large number of companies without positive tax liabilities, then who is paying these substantial tax revenues? In Table 2, we use data from the HMRC Datalab, described in more detail below, to address this.[11]

The first line in italics shows that the number of companies with zero tax liabilities rose from just over 460,000 in 2001/02 to over 700,000 in 2005/06, before declining again with the abolition of the zero percent starting rate. Even in 2007/08, however, still more than half a million individual companies had no tax liabilities.

The small number of companies with very large tax liabilities indicates that there is a large concentration of tax payments amongst UK corporation taxpayers. To illustrate this further we construct two Lorenz curves showing the distribution of tax payments for 2007/08. In Figure 7 we draw a Lorenz curve for all companies represented by the blue line and also an alternative Lorenz curve using only the companies with positive tax payments, depicted by the red line. Both of these two Lorenz curves show a very strong concentration among the UK corporation taxpayers. For example, even considering only the companies with a positive tax liability, the top 1 percent of the taxpayers contributes about 78 percent of the tax payable. Including all companies, the top 1 percent of companies contributes about 81 percent of the tax payable.

One important caveat needs to be borne in mind. The figures presented here relate to unconsolidated

Figure 7: Lorenz curves for fiscal year 2007/08 (HMRC data)



11 This table extends a very similar table published by HMRC at HMRC, Table 11.6, available online at: http://www.hmrc.gov.uk/stats/corporate_tax/table11_6.xls by including the number of companies that pay zero tax.

data from individual companies. However, a significant number of companies are part of a group. If we were able to aggregate corporation tax liabilities to the group level, we would almost certainly find an even greater concentration of corporation tax payments, and possibly a much greater concentration.

Table 2: HMRC Table 11.6. (reproduced with HMRC Datalab data)

Amount of tax payable (lower limit) £	2001/02		2002/03		2003/04		2004/05		2005/06		2006/07		2007/08	
	Numbers	Amount £000	Numbers	Amount £000	Numbers	Amount £000	Numbers	Amount £000	Numbers	Amount £000	Numbers	Amount £000	Numbers	Amount £000
No tax payable	*462,252*	*0*	*515,799*	*0*	*684,644*	*0*	*694,667*	*0*	*709,793*	*0*	*556,455*	*0*	*575,041*	*0*
1	78,289	3	79,464	3	26,497	1	41,495	1	34,852	1	94,627	3	76,511	3
100	78,789	22	74,097	19	37,679	10	54,889	15	51,286	14	100,201	27	87,797	24
500	55,288	41	34,474	25	31,403	23	41,630	31	44,258	33	63,373	46	60,075	44
1,000	126,599	347	122,539	336	146,172	404	188,810	524	212,612	592	247,045	681	268,607	744
5,000	73,751	534	77,358	561	92,346	669	112,197	814	131,681	956	156,284	1,128	174,901	1,263
10,000	115,309	2,421	122,153	2,583	143,387	3,009	168,126	3,528	190,679	3,986	218,109	4,520	242,976	4,972
50,000	15,690	1,055	16,492	1,109	18,654	1,259	21,198	1,420	23,674	1,582	25,300	1,683	28,928	1,938
100,000	13,596	2,891	14,521	3,051	15,651	3,284	17,744	3,679	19,192	4,018	21,365	4,450	22,707	4,770
500,000	2,164	1,521	2,196	1,535	2,400	1,678	2,731	1,905	2,850	1,987	3,156	2,210	3,313	2,304
1,000,000	2,078	4,341	2,091	4,330	2,164	4,506	2,294	4,805	2,566	5,374	2,796	5,829	2,964	6,106
5,000,000	310	2,145	321	2,211	346	2,421	394	2,716	400	2,783	455	3,244	463	3,250
10,000,000	263	5,428	280	5,544	301	6,026	342	6,882	377	7,774	439	8,979	447	9,302
50,000,000	38	2,654	47	3,211	38	2,631	41	2,822	48	3,311	45	3,207	58	3,997
100,000,000	24	5,373	20	3,803	25	4,680	33	6,501	49	10,624	41	8,298	40	8,799
All ranges	1,024,440	28,775	1,061,852	28,320	1,201,707	30,600	1,346,591	35,645	1,424,317	43,037	1,489,691	44,306	1,544,828	47,515

3. MORE DETAILED ANALYSIS

To better understand the driving forces behind the information presented in Section 2, we draw on more disaggregated data sources. In particular, we use two main sources of information.

The first is data from a pilot project to access confidential corporation tax returns in a new Datalab created by HMRC. The available data constitute a representative sample of 1,422,826 anonymised tax returns from 2001/02 to 2007/08. The dataset includes all the relevant entries from the company tax return form CT600.[12]

Some important limitations to this dataset should be noted. First, the individual tax returns are all on an unconsolidated basis and there is no ownership information available, which means that it is not possible to allocate individual companies to a group. Second, there is only limited data available on a number of key factors, such as the treatment of international income. Third, the dataset contains only information on the basic CT600 form. It therefore does not include any accounting information, such as a measure of accounting profit, or measures of size such as capital stock or employment. It does, however, include a measure of turnover, which is reported for survey purposes only. Among other things, the lack of any other data makes it impossible to make an assessment of a tax gap.

In order to overcome some of these limitations we also make extensive use of a second dataset: FAME, a company level dataset commercially provided by Bureau Van Dijk. This dataset includes financial information from company accounts for approximately all companies active in the United Kingdom and the Republic of Ireland.[13] In contrast to the HMRC dataset, FAME only includes the corporation tax liability as reported in the financial accounts. This may differ from the actual tax liability for several reasons, including deferred tax provisions or prior year adjustments. The accounting tax charge may also reflect factors which are not recorded clearly in the tax return data, such as loss carry forwards and group relief. However, the accounting data does allow us to compare the reported tax charge to measures of accounting profit. We can also identify the ownership patterns of companies and we have better measures of their size.

In this section, we begin with an analysis of the accounting data to identify some characteristics of corporation taxpayers, which is not possible from the corporation tax return data.

3.1. ANALYSIS OF TAXPAYERS

We use information from FAME from 411,088 unconsolidated companies, with a total of 1,595,400 observations between 1999 and 2009. (Appendix B2 gives a more detailed description of the coverage in FAME.) In total these companies report a combined tax liability over this period of more than £350 billion. In this subsection we dissect these reported tax liabilities according to ownership groups, relate them to the economic size of the corporation taxpayers and compare them across industries.

12 See Appendix B3 for a description of the HMRC dataset and Appendix A for a replication of the CT600 form.
13 Given the confidential nature of the CT600 data we cannot establish to which extent the two datasets overlap.

3.1.1. BY OWNERSHIP

We first consider the balance of corporation tax liabilities by companies depending on their ownership and whether they are part of a group. We divide the FAME sample into four broad ownership categories:

- ***Standalone companies***: companies that report neither an owner nor a subsidiary;
- ***Domestic groups***: companies that are part of a group that has all its legal entities resident in the UK;
- ***UK-owned multinationals***: companies that belong to a group which is active outside the UK, and where the ultimate corporate owner is a UK company; and
- ***Foreign-owned multinationals***: companies that belong to a group which is active outside the UK, and where the ultimate corporate owner is a foreign company.

Standalone companies make up by the far largest proportion of companies, with more than 1.1 million observations in 316,897 companies. However, multinationals companies tend to be much larger.

To get a first idea of the relative importance of the different ownership groups for corporation tax revenues, we simply add up the corporation tax liabilities as set out in the accounts. Table 3 reports the sum of the tax payments between 1999 and 2009 according to the ownership type.[14] Note that the annual total tax liabilities of this group of companies are between £30 and £43 billion. If anything, these are even higher than the official figures in the revenue statistics.

Table 3: Corporation tax in the accounts, in ownership groups
1999 – 2009 (FAME data) £000

Year	Standalone companies	Domestic groups	UK-owned multinationals	Foreign-owned multinationals	Total
1999	3,148	1,051	14,555	13,605	**32,359**
2000	3,390	1,131	17,499	14,694	**36,714**
2001	3,119	1,106	13,958	12,812	**30,994**
2002	3,316	1,179	13,770	13,279	**31,544**
2003	3,753	1,116	15,253	13,649	**33,771**
2004	4,336	1,170	13,060	16,119	**34,685**
2005	3,777	1,119	17,244	18,372	**40,512**
2006	4,538	1,311	17,232	20,809	**43,889**
2007	4,085	1,129	16,455	17,699	**39,369**
2008	3,443	568	9,783	17,975	**31,769**
Total	**37,302**	**10,926**	**149,032**	**159,274**	**356,535**

Note that our data include only few records in 2009, and we therefore do not show this year.

14 We include each accounting record in the calendar year corresponding to its year end.

This suggests two factors: first, that FAME covers the large majority of relevant corporations in the period; and second, that the corporation tax numbers recorded in accounts exceed actual tax receipts. One possible reason for the latter is that the accounting charge includes deferred taxes.

Table 3 shows that the large number of standalone companies pays only just over 10 percent of corporation tax. Further, domestic groups are moderate both in number and in corporation tax payments. By contrast, the largest part of corporation tax is reported within multinational groups. Companies that are part of UK-owned and foreign-owned multinational groups contribute similar shares of total revenue, although there appears to have been a steeper drop for UK multinationals

Table 4: Tax and profit situation by ownership groups: number of observations (FAME data)

	Standalone companies			
	positive EBIT	Zero EBIT	negative EBIT	**Total**
positive TAX	844,504	1,463	15,960	**861,927**
zero TAX	117,655	32,129	35,654	**185,438**
negative TAX	21,570	947	47,442	**69,959**
Total	983,729	34,539	99,056	**1,117,324**

	UK-owned multinationals			
	positive EBIT	Zero EBIT	negative EBIT	**Total**
positive TAX	135,067	195	7,619	**142,881**
zero TAX	2,295	1,228	1,111	**4,634**
negative TAX	22,275	254	24,419	**46,948**
Total	159,637	1,677	33,149	**194,463**

	Domestic groups			
	positive EBIT	Zero EBIT	negative EBIT	**Total**
positive TAX	85,080	197	4,107	**89,384**
zero TAX	5,627	1,503	2,299	**9,429**
negative TAX	7,468	204	12,909	**20,581**
Total	98,175	1,904	19,315	**119,394**

	Foreign-owned multinationals			
	positive EBIT	Zero EBIT	negative EBIT	**Total**
positive TAX	110,386	135	9,119	**119,640**
zero TAX	2,877	1,022	1,356	**5,255**
negative TAX	17,545	147	21,632	**39,324**
Total	130,808	1,304	32,107	**164,219**

15 Unfortunately this is one of the shortcomings of the FAME dataset.

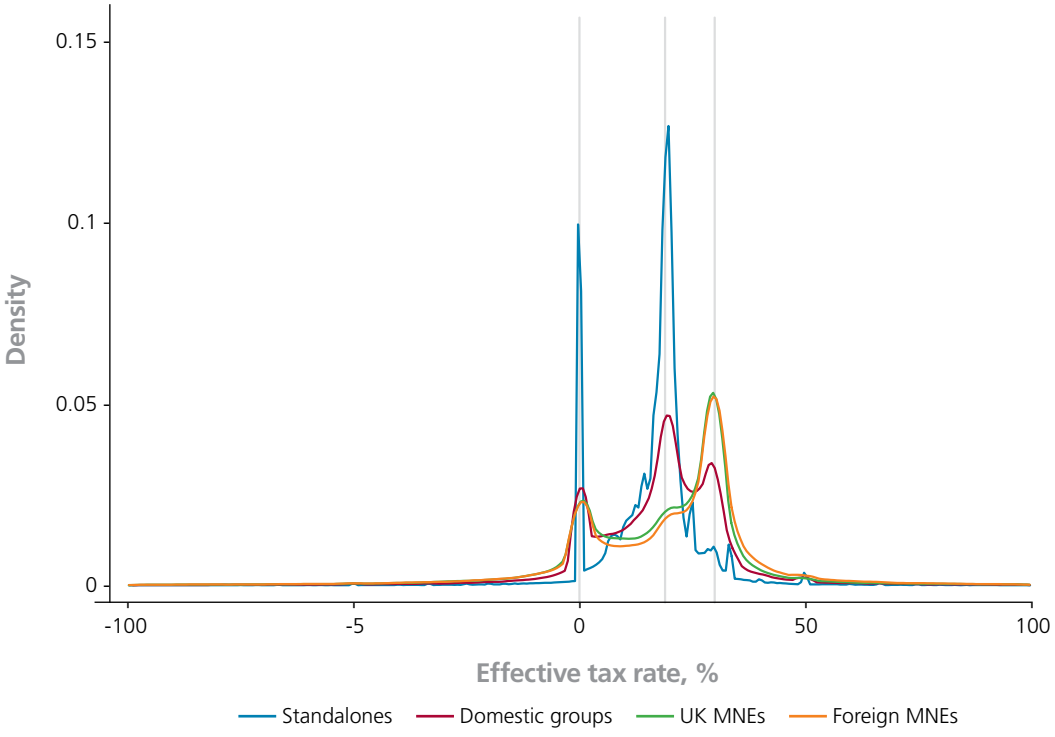
in 2008, probably reflecting the beginning of the financial crises and the losses arising in the UK financial sector.

To go beyond simply comparing revenue streams from the different groups, we also compare measures of effective tax rates. There are numerous ways of constructing measures of effective tax rates. Here we define the effective tax rate (ETR) as the tax charge as a percentage of profit as measured by earnings before interest and taxation (EBIT). EBIT clearly differs from taxable profit as it does not include financial flows. However, for a number of reasons we believe that this is a more reliable measure than the alternatives. For example, financial flows can include large intra-group transactions, which can produce misleading estimates if holding companies, or more generally, the unconsolidated accounts of the headquarter companies, are not included in the dataset.[15] Such flows can also be quite volatile, and they are not clearly measured in the FAME dataset.

One problem arising with this measure of the ETR is that it is undefined for zero profits. In addition, if EBIT is negative then a positive tax charge would generate a negative ETR, requiring a completely different interpretation. To avoid this problem, in the analysis below we include only observations with a positive EBIT.

However, before doing so, it is useful to consider the relative occurrence of a non positive tax charge and EBIT. Table 4 tabulates the number of observations with positive, zero or negative corporation taxation and EBIT. It also divides the FAME sample according to ownership groups. Some interesting factors can be observed.

Figure 8: Distribution of ETR according to ownership groups (FAME data)



First, the number of observations with positive EBIT is always larger than the number of companies with positive tax payments. This can of course be partly accounted for by financial losses and losses brought forward. The disparity is disproportionately large amongst the standalone companies, which is also very likely to be due to the zero percent starting rate which was in place for a significant part of the period.

Second, relative to all the other ownership groups, standalone companies report a negative tax charge substantially less often. The most obvious reasons for reporting a negative tax charge in an unconsolidated account are either a loss carry back or group relief. Obviously the latter is not available for standalone companies, which may therefore provide a simple explanation for this result. For other companies, a negative EBIT is most commonly associated with a negative tax charge, which may reflect the use of group relief. By contrast, in these cases, there are a small number of zero tax payments which are potentially cases where losses are instead carried forward. Considering only companies with a positive EBIT, the proportion of companies within each group that report a zero or negative tax charge is broadly similar across the four categories, ranging from 13 percent to 15 percent. We examine this issue further below using HMRC data.

Using all the observations where the ETR is well defined, i.e. all companies with positive EBIT, Figure 8 presents its distribution for each of the different ownership groups. To illustrate and compare the distribution of the ETR for the different types of ownership we estimate kernel density functions. The use of a kernel density plot rather than a simple frequency plot or histogram not only allows us to overlay the distributions but also implies that we need to interpret the scale slightly differently. The kernel density estimation treats the ETR as a continuous variable and smoothes the distribution. This implies that the peaks at zero and the statutory tax rates are likely to be somewhat underestimated and consequently the interpretation of the density as a percentage can be somewhat misleading. For example, Table 4 indicates that 117,655 out of 983,729 observations of the standalone companies have an ETR of zero. This equates to 13.7 percent which is somewhat above than the peak in of the blue line in Figure 8.[16]

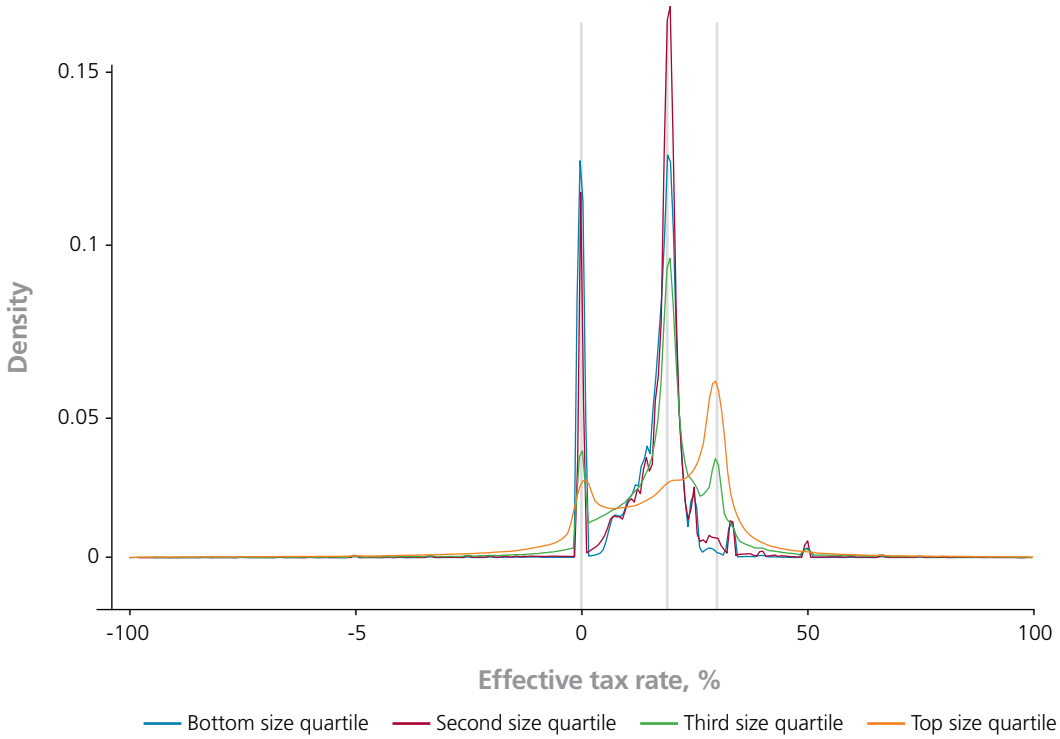
Comparing the different distributions in Figure 8 some striking differences between the different ownership groups can be seen. The most distinct distribution can be observed in the group of standalone companies. There are two very distinct peaks at zero and around the small company rate of 19 percent. The red line, which shows the distribution of the ETR for companies in domestic groups, indicates three distinct peaks at zero, 19 percent, and 30 percent, which correspond to the three key rates of corporation tax over this period. The distribution of the ETR within multinational groups peaks at zero and at 30 percent: the size of these companies implies that the small profits rate is not generally applied in these cases. As would be expected, given the information in Table 4, the peak at zero is highest for the standalone companies. There is very little difference in the distributions for UK-owned and foreign-owned multinationals.

3.1.2. BY SIZE

The previous subsection shows that companies within multinational groups are more likely to pay corporation tax at the main statutory rate of 30 percent. This could be due – at least partly – to pure size effects. To examine the impact of size more directly, we split the complete sample into quartiles

16 Note that we cut off the distribution at -100 and +100 percent, losing around 20,000 observations, implying that the share of zeros will be somewhat overstated.

Figure 9: Distribution of ETR according to company size (FAME data)

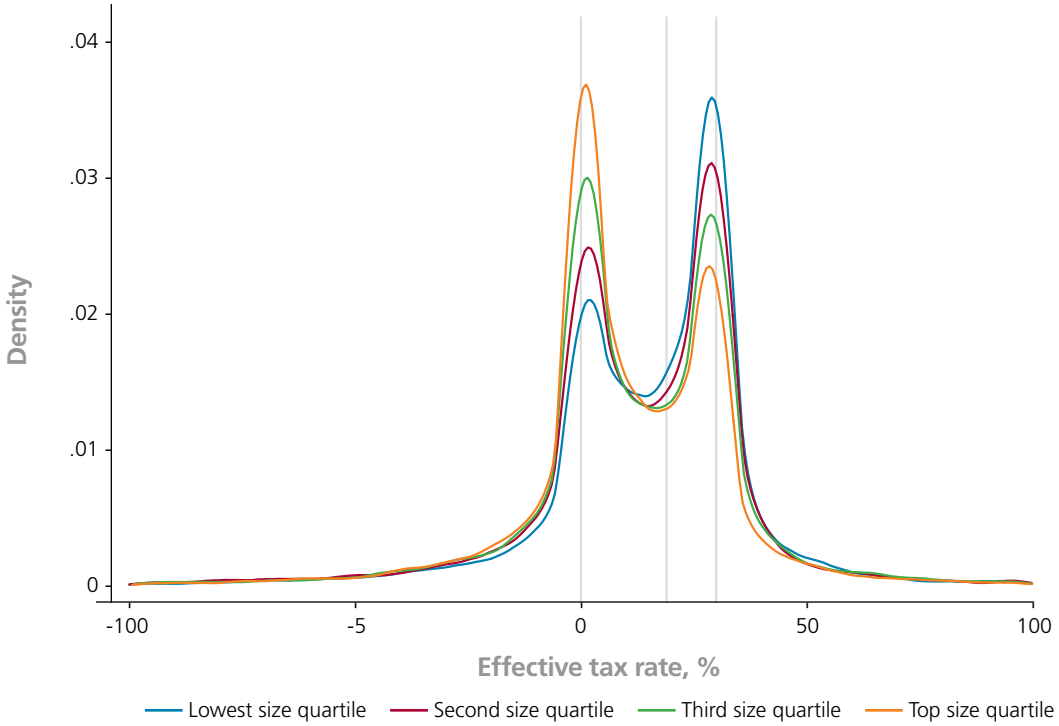


according to total assets. This implies that each of the distributions is based on roughly 338,000 companies. The bottom size quartile includes observations with total assets up to £40,000. Second and third size quartiles include observations with total assets up to £245,000, and £2,445,000 respectively.

This implies that the lowest and second-lowest quartiles represent accounting information for very small companies. We would therefore expect them to be liable for tax at the starting or the small profits tax rate. This is clearly visible in Figure 9 with the blue and red line depicting the distribution for the smaller half of the sample. Both distributions are clearly bimodal with peaks at zero and 19 percent. The peak for the second size quartile is higher around the small profits rate. The green line represents the distribution for the third size quartile. This distribution has three peaks, two smaller ones at zero and 30 percent and a larger one around the small profits tax rate at 19 percent. For the top size quartile the distribution is more dispersed, with a much smaller peak at zero and a larger peak at the main tax rate of 30 percent.

Given that this distribution is still based on a rather large number of observations, this Figure does not make clear whether the very largest companies have an ETR of approximately 30 percent. To further explore the relationship between company size and ETR we next concentrate on only very large companies. To this end we repeat the same exercise with the largest 5 percent of our sample. The threshold for total assets to be included in this subsample is around £41 million. This leaves us with 67,633 observations in 16,017 companies. Figure 10 divides this sample into four size quartiles.

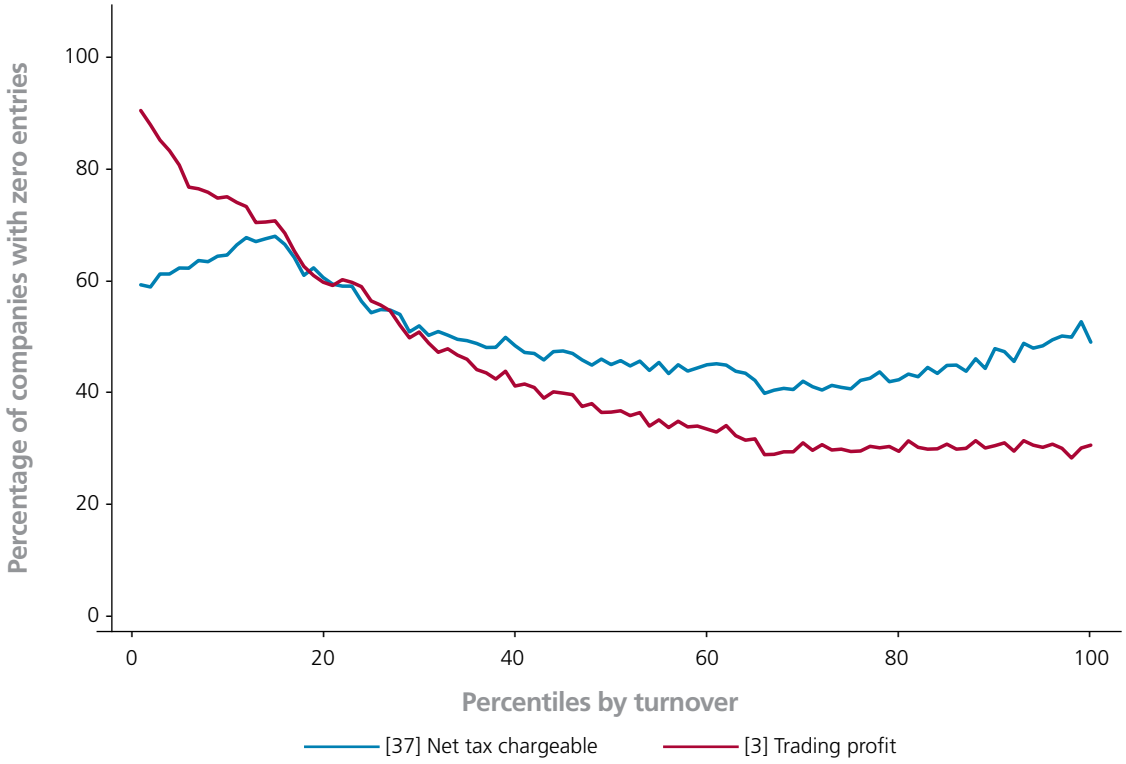
Figure 10: Distribution of ETR according to company size, top 5 percent only (FAME data)



All four size quartiles are clearly bimodal with peaks at zero and 30 percent. This suggests that large companies are more likely to pay around the main statutory rate at 30 percent or pay no tax at all. There is no peak around the small profits tax rate. Perhaps surprisingly, the very largest companies have the highest peak at zero and the lowest peak at 30 percent. While this superficially points to an ability of the very largest companies to pay minimal tax in the UK, some caution is in order. The analysis here is based on unconsolidated accounts, which unfortunately does not permit us to evaluate the overall position of a corporate group. Large corporate groups consist of a large number of legally independent subsidiaries that all file independent tax returns. The fact that one, or even several, of the subsidiaries report zero tax does not necessarily imply that the group overall pays less corporation tax. Take, for example a group where all tax and finance affairs are organised at the headquarter company, and in which subsidiaries yield their profits to the headquarter company that in turn pays taxes on the overall profit and that finances the activities in the subsidiaries. This would results in a small number of companies with tax payments at the statutory rate of 30 percent and a large number of companies without taxable profits and tax payments.

The HMRC Datalab dataset does not include a measure of accounting profit, and cannot therefore be used to construct a measure of the ETR. It is therefore not possible to repeat the same analysis with the information from actual tax returns. To get an idea about the tax liabilities in relation to the company size Figure 11 divides the HMRC observations into percentiles by turnover, and counts the non-positive entries for taxable profit and net tax payable for each percentile. Using only large companies that report positive turnover, each percentile represents 5093 observations.

Figure 11: Percentage of companies with zero profits and tax liabilities, by turnover percentiles (HMRC data)



The red line – representing the share of observations without positive trading profits - drops from about 90 percent in the first percentile to about 30 percent in the percentile with the highest turnover. In contrast the blue line - representing the share of observations with no net tax chargeable - starts at around 60 percent, drops to 40 percent and then slightly increases to about 50 percent for the observations with the highest turnover. The gap between the two lines represents observations where the tax return has a positive entry in only one of the two variables. For companies with a relatively small turnover there are more observations with a positive tax liability than observations with a positive trading profit. This implies that for companies with smaller turnover other forms of taxable income are more relevant. Starting at around the 30th percentile, a gap between trading profits and tax liabilities starts to open up indicating the link between trading profits and tax liabilities becomes weaker for the larger companies. There can, of course, be many reasons for this including, for example, more interest deductions or a higher occurrence of group relief.

3.1.3. BY SECTOR

We next investigate the extent to which corporation tax liabilities vary by sector. We begin by examining the FAME dataset. This provides an allocation of companies into industrial sectors using the SIC (2003) sector classification; we combine these into 23 categories.[17] The number of observations in each sector varies considerably, from 3,694 observations in the utilities (electricity and water) sector to 523,195 in the business services sector. More detail is provided in Table A.7, which also shows

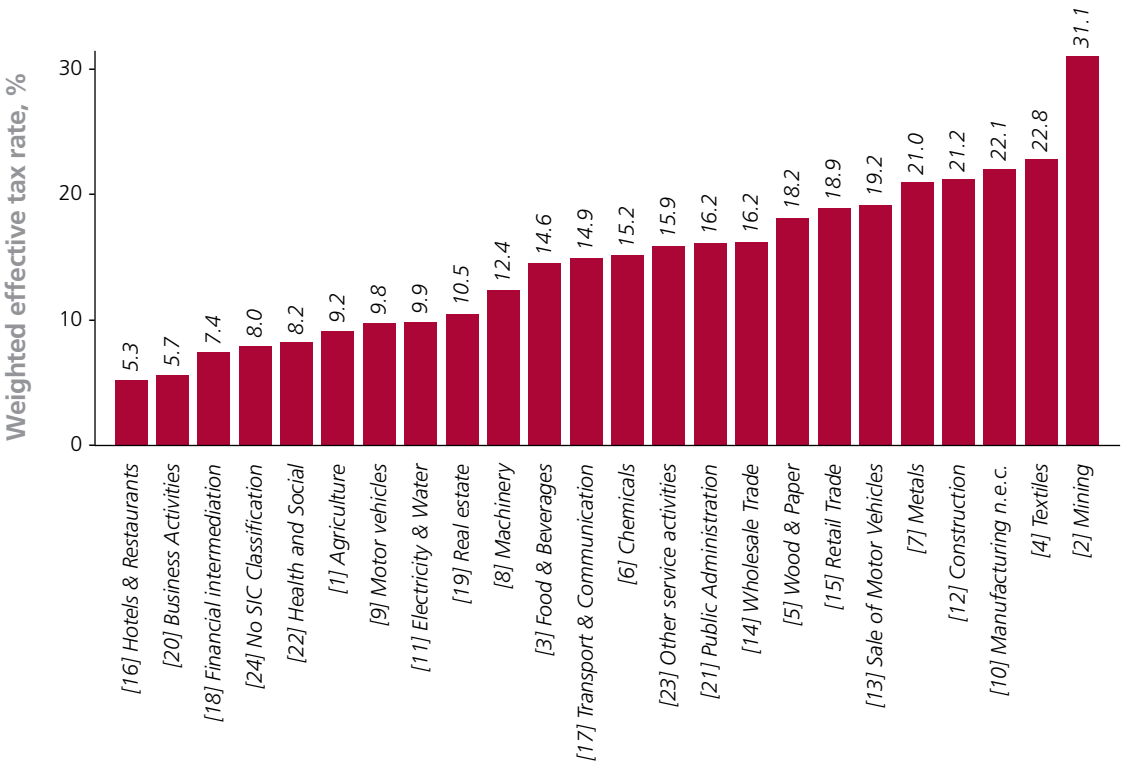
17 See Table A.6 for a description of our sector classification. Note that each company is allocated to exactly one sector: this does not adequately account for companies that span more than one sector.

the mean tax charge, EBIT and total assets by sector. Typically the presence of a large number of companies in a sector is also reflected in a lower share of companies being part of multinational group. The utility and chemical sectors are dominated by multinational companies, with a share above 50 percent, while in agricultural, retail and other service sectors the share is less than 20 percent.

Not surprisingly, Table A.7 indicates that companies with a higher proportion of multinational groups tend to have higher tax and EBIT on average. In Figure 12, though, we investigate the weighted average ETR for each sector, measured as the ratio of the mean tax to the mean EBIT. The Figure presents these sector-specific ETRs in ascending order. Values range from 5.3 percent for the hotels and restaurants sector to 31.1 percent for the mining sector. The latter however, is a clear outlier and is most likely to be due to additional sector-specific taxes, rather than just corporation tax.

In general one can observe that sectors with a large number of small companies tend to have a lower weighted ETR, while sectors dominated by a few larger companies tend to have a higher ETR – although there are some exceptions, such as the construction sector with a high ETR and the utilities and financial intermediation sectors with rather low ETR.

Figure 12: Weighted effective average tax rate by sector (FAME data)

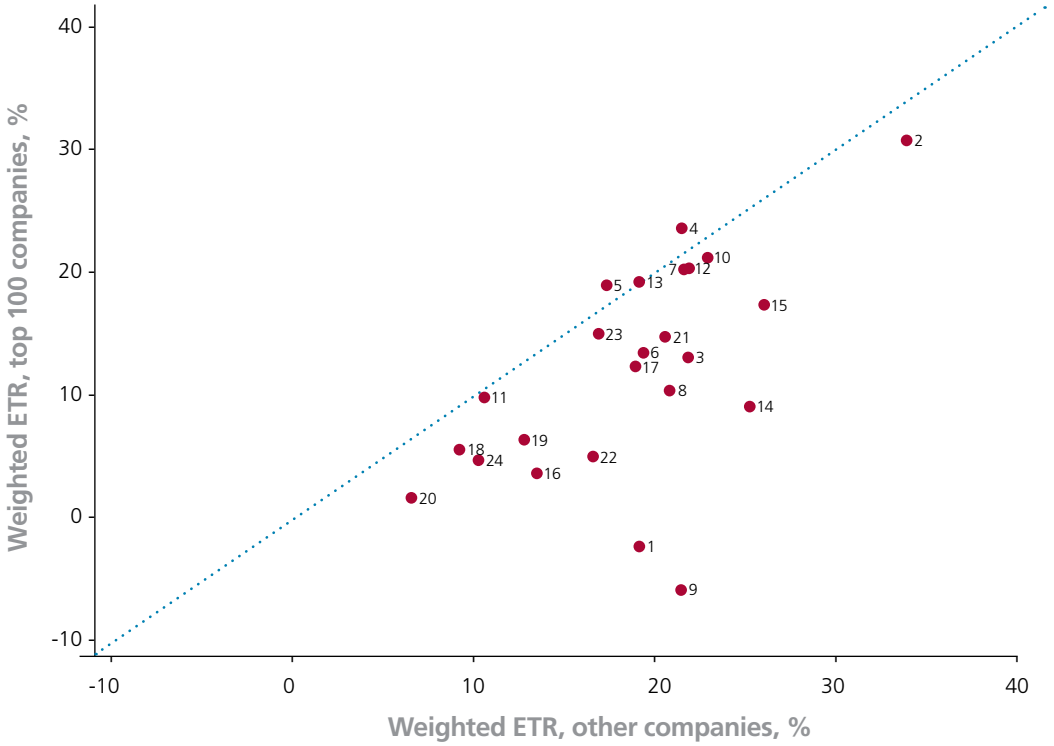


To investigate the impact of size more directly, we compare the weighted average ETR for the largest 100 companies in each sector with the weighted average ETR for all the other companies in that sector. This is shown in Figure 13, where the ETR for the largest 100 companies in each sector is on the vertical axis, and the ETR for all other companies is on the horizontal axis. Each dot in the Figure represents one sector: if the two groups had the same ETR, the dot would lie on the 45 degree line marked. All points below the 45 degrees line indicate that the largest companies have a lower average ETR, and all points above the line indicate that they have a higher average ETR. The numbers by the dots indicate the sector: see Table A.6.

The results of this exercise are clear. In only in two industries - textiles and wood, paper and publishing – do larger companies have a higher ETR than all other companies. In all other sectors, larger companies have a lower average ETR. The difference is most extreme for the agriculture and manufacturing of motor vehicles sectors - where the largest 100 companies have a negative average ETR, largely due to large negative tax in a few companies. The mining sector still stands out with the largest tax payments for both the largest and the smaller companies.

The tax return data from the HMRC Datalab also provides information about the sector of each company, namely the Standard Trade Classification (STC). We group these observations in 30 sector categories broadly consistent with the classification based on SIC for the FAME dataset.[18]

Figure 13: Weighted ETR by sector and size (FAME data)



18 See Table A.10 for a description of the STC classification and how we group them into our sector categories.

In Figure 14 we plot the unweighted average tax payable by sector in ascending order. This clearly reflects the average size of the companies in the sector. The sector averages range from as little as £39,200 in the agriculture sector to more than £6.2 million in the mining sector. Other industries with large average tax liabilities are the utilities, overseas activities managed in the UK and financial intermediation sectors. Not surprisingly, Table A.11 shows that these are also industries where the large companies are more dominant. These estimates are broadly in line with those taken from accounting data in Table A.7.

We cannot construct a good measure of the ETR using the tax return data, since there is no measure of accounting profit. To generate a similar measure, we instead scale the tax liability by trading profits, and consequently the resulting measure should be interpreted differently from our measure of the ETR.

Figure 15 takes the ratio of the average tax liabilities to average trading profits in each sector, and presents the results again in ascending order. The ratios vary from 6.7 percent (in post and communications) to 35.9 percent (in real estate). Some sectors with a high average tax liability in Figure 14 have a rather lower position based on this measure, such as the utilities and overseas

Figure 14: Average net tax payable by industry (HMRC data)

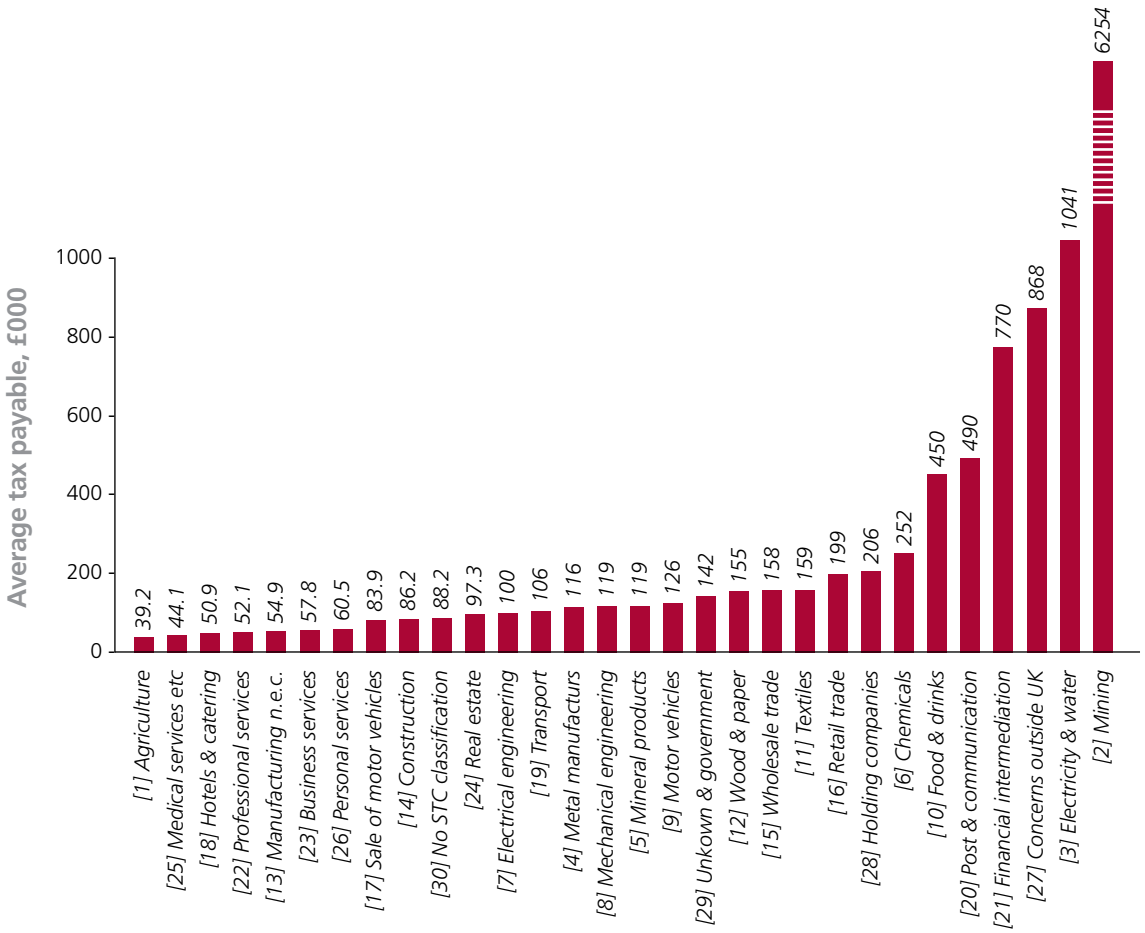
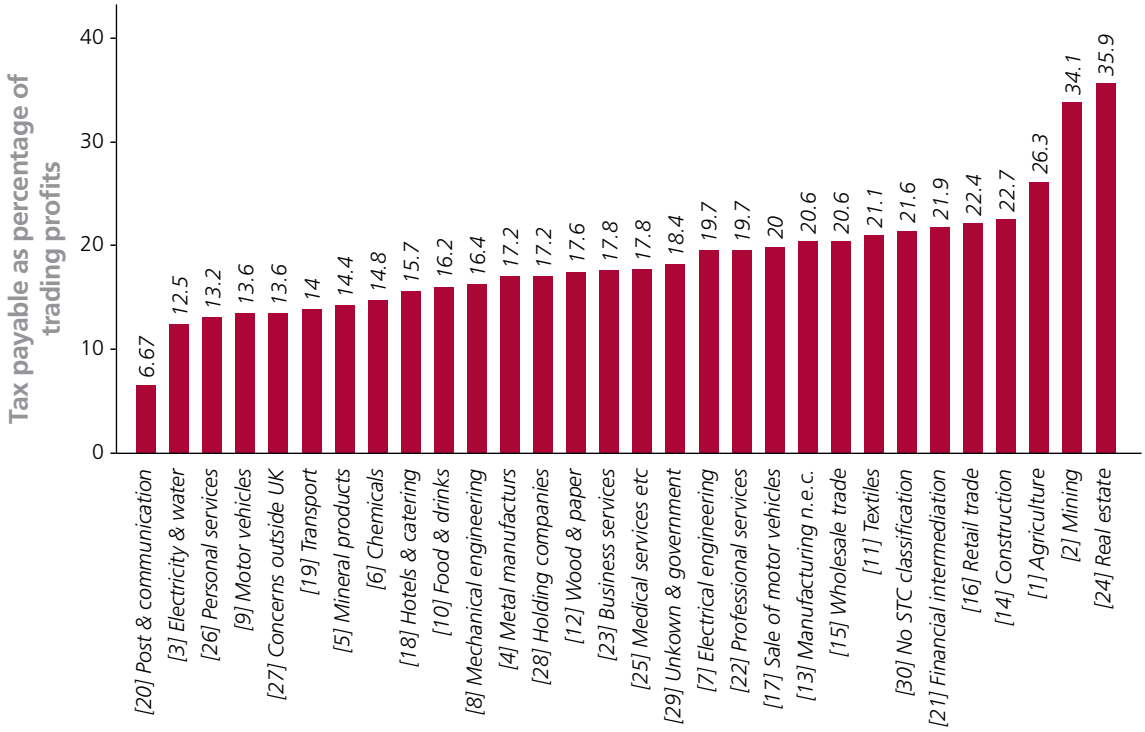


Figure 15: Tax payable as percentage of trading profits (HMRC data)



activities sectors, which are positioned more to the left than in Figure 14. This is even more extreme for the post and telecommunication sector which is to the far left, despite having an average net tax payable of £490,000.

3.2. ANALYSIS OF CORPORATION TAX BASE

Effective tax rates depend on the tax base as well as the tax rate. The tax return data from the HMRC Datalab allow us for the first time to analyse the relative importance of the various determinants of the tax base.[19] We now turn to this issue.

3.2.1. RELATIVE IMPORTANCE OF MAIN INCOME SOURCES AND DEDUCTIONS

As a starting point we simply consider which forms of income constitute the largest share of the corporation tax base and which deductions are largest. Table 5 shows the mean and the number of observations for the most important items on the CT600 form. The first two columns report the overall number of observations and the mean based on all this observations. The last two columns report the number of positive observations and the mean of these observations, i.e. the mean conditional on having a positive entry.

A number of variables which have full coverage, indicated by the entry 1,422,826 in the third column have been "repaired" by HMRC statisticians, implying that they have been cleaned for obvious

19 Until now, the most important contributions to the analysis of the corporation tax base have been based on US data: see for example Auerbach and Poterba (1987), Poterba (1992) and Auerbach (2007).

20 For a complete description of the CT600 form see Table A.1. Unfortunately more information about the distribution of the values (e.g. medians, minima and maxima) cannot be reported because they may breach the confidentiality of the data.

Table 5: Descriptive statistics key variables HMRC Datalab dataset

	All observations		Non-zero observations	
Variable description	Mean £	Number of observations	Mean £	Number of observations
Trading turnover (in thousand £)	25,199	1,324,964	27,469	1,215,459
Trading profit	736,857	1,422,826	1,305,913	802,824
Losses brought forward	53,698	1,422,826	661,582	115,486
Net trading profit	683,158	1,422,826	1,325,024	733,583
Non-trading profit on loan relationships	674,758	678,743	678,157	675,341
Schedule D case III	336,876	17,612	386,242	15,361
Overseas income	11,100,000	27,895	11,900,000	26,140
Taxed income	345,180	15,941	402,289	13,678
Schedule A income	619,755	139,592	632,062	136,874
Schedule D case VI	25,974	1,422,826	1,635,948	22,590
Non-trade deficits on loan relationships brought forward	1,221,791	13,067	1,402,173	11,386
Management expenses	69,961	1,422,826	1,543,946	64,473
Schedule A losses	199,020	12,614	246,507	10,184
Non-trade deficits from loan relationships	1,687,416	40,539	1,742,077	39,267
Group relief	4,215,248	141,218	4,264,470	139,588
Profits chargeable	746,364	1,422,826	1,279,021	830,280
Double taxation relief	2,269,083	43,014	3,468,085	28,143
Net tax payable	152,616	1,422,826	298,713	726,939
Capital allowances plant and machinery	10,800,000	1,422,826	19,800,000	776,306
Balancing charges plant and machinery	230,770	1,422,826	18,600,000	17,639
Capital allowances for industrial buildings	9,205,217	93,127	9,253,309	92,643
Balancing charges for industrial buildings	82,700,000	5,297	91,700,000	4,777
Trading losses case I arising	1,220,657	1,422,826	4,771,591	363,984
Non-trade deficits on loan relationships arising	5,402,236	64,003	5,439,375	63,566

outliers and had missing values replaced with zeros where appropriate. In contrast other variables have fewer observations, implying that they are missing for many tax returns. However, given that in some cases many entries are zero, the number of non-zero observations as reported in the last column is more indicative of the importance of that variable than the overall number of observations. Around 56 percent of companies report positive trading profits, and around 25 percent report a Case 1 trading loss. For financial activities, this balance is rather different: around 47 percent of all companies report a non-trading profit on loan relationships, while less than 5 percent report a loss on the this activity. The other schedules of the UK income tax system affect substantially fewer companies, with only 9.6 percent of all companies reporting Schedule A income, 1.5 percent reporting Schedule D Case VI income, and 1 percent reporting Schedule D Case III income. One caveat to this simple comparison, though, is that corporations do have some discretion in allocating income to a particular category – and in particular, banks classify financial profits as trading profits.

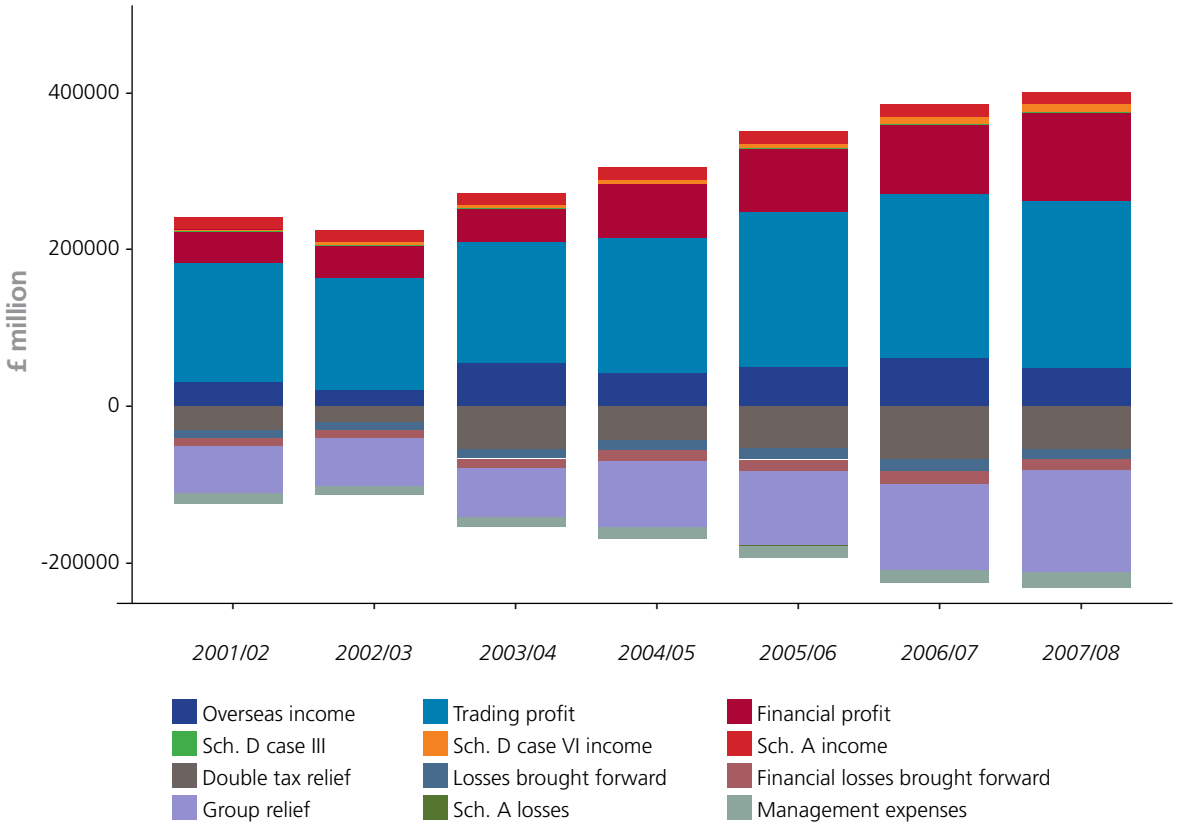
Of the main deductions, 55 percent of all companies claim positive capital allowances for investment in plant and machinery. This is much higher than for other deductions: for example, only 6.5 percent claim a capital allowance for investment in industrial buildings and only 4.5 percent claim a deduction for management expenses. However, it should be noted that, given the peculiarity of the UK tax return, capital allowances are deducted before the calculation of trading profits and it is therefore difficult to completely disentangle the two here. We will return to the role of capital allowances in the subsection evaluating recent reforms. Just under 10 percent of all companies claim group relief which exceeds the proportion, just over 8 percent, that have losses brought forward.

A relatively small number of companies have overseas income – just 1.8 percent, roughly the same as claim double tax relief. This represents approximately 4,000 companies a year. However, the size of both the overseas income and the double tax relief for these companies is substantial, resulting in an average of £11.9 million overseas income and £4.2 million double tax relief.[21]

To show the relative importance of the different forms of income and deductions, we aggregate each variable across all companies for each year. Figure 16 displays the main categories of taxable income and the main deductions from taxable income. Different forms of income are cumulated above the zero line, while different forms of deduction are cumulated below the zero line.

21 Double tax relief is slightly larger than overseas income in most years. This might be due to the fact that we assume that double tax relief is always deducted at the main statutory rate of 30 percent which implies that we divide the number by 0.3 to create a comparable value for the deduction. But given that overseas profits and double tax relief follow a very similar pattern it is possible that companies only report overseas profits if they have sufficient double tax relief to avoid additional taxation on the repatriated profits. We return to the debate about double tax relief in section 3.2.3.

Figure 16: Main categories of taxable income and deductions 2001/02 to 2007/08 (HMRC data)



Both taxable income and deductions have increased over the last seven years. The most significant increases were in trading profits and financial profits. Overseas income was more volatile, and other sources of income are comparatively small.

The largest increase in terms of deductions was in group relief, as losses brought forward and financial losses remained remarkably constant over this period. As might be expected, double tax relief was also volatile, mirroring the changes in overseas income. Further, there are hardly any Schedule A losses, which is rather less surprising given the boom phase in properties. Management expenses contribute a relatively stable proportion of the deductions.

To get an idea how much of the variation in the corporation tax base can be explained by the various forms of income and deduction we run simple pooled OLS regressions. Table 6 reports the regression coefficients and the R^2 for a number of regressions where we regress the taxable profits on the various income and deduction items, added in steps. Additionally the last row reports correlation coefficients between profits chargeable to corporation tax and the sum of the explanatory variables, which is technically equivalent to fixing the coefficient to one. The lower part of Table 6 repeats the same exercise but excludes large outliers. In particular it excludes all observations with values larger than 4 times the 99th percentile.

In general, we would expect coefficients to be close to one – conditional on other factors, a £1 rise in trading profit, for example, would raise taxable profit by £1. However, this is not the case in practice. One reason is that we have not included all the component parts of taxable profit. A rise in trading profit may also be correlated with changes in other omitted variables that also affect taxable profit. As would be expected, the coefficients rise towards one as more variables are included in the equation, leaving fewer omitted factors. In addition, we replace missing values with zero, which may bias the coefficients downwards; this is a form of measurement error.

In any case, we are more interested in the overall explanatory power of the variables, measured by the R^2 and the correlation coefficient, which describe the share of the variation in taxable profit explained by the variables included in each column. The variation itself depends very much on the distribution of the variables, which in our case is clearly dominated by a few very large companies. Therefore the values for R^2 for the full sample need to be interpreted with care because they can be largely driven by the largest corporations.

Table 6: Explaining variation in profit chargeable to corporation tax (HMRC dataset)

OLS regressions with [37] profit chargeable to corporation tax as independent variable: all 1,422,826 observations								
[3]	Trading Profit	0.586	0.587	0.769	0.750	0.745	0.743	0.749
[4]	Losses brought forward	-0.566	-0.566	-0.754	-0.734	-0.732	-0.730	-0.736
[36]	Group Relief		-0.002	-0.681	-0.652	-0.617	-0.610	-0.640
[6]	Financial Profits			0.843	0.688	0.633	0.615	0.655
[28]	Financial Deficits			-0.613	-0.664	-0.710	-0.710	-0.721
[20]	Financial Losses brought forward			-0.191	-0.518	-0.572	-0.649	-0.702
[9]	Overseas Income				0.992	0.993	0.990	0.993
[11]	Schedule A Income					1.090	0.964	1.161
[26]	Schedule A Losses					-0.284	-0.271	-0.302
[8]	Schedule D Case III						0.636	0.729
[15]	Schedule D Case VI						0.921	1.052
[24]	Management expenses							-0.263
	R^2	**0.0774**	**0.0774**	**0.1063**	**0.9526**	**0.955**	**0.9571**	**0.9575**
	Correlation	**0.2783**	**0.2198**	**0.3216**	**0.9716**	**0.9725**	**0.9735**	**0.9726**

OLS regressions with [37] profit chargeable to corporation tax as independent variable: without large outliers 1,394,704 observations								
[3]	Trading Profit	0.531	0.649	0.770	0.798	0.827	0.829	0.836
[4]	Losses brought forward	-0.565	-0.693	-0.800	-0.814	-0.831	-0.835	-0.844
[36]	Group Relief		-0.250	-0.545	-0.610	-0.654	-0.659	-0.668
[6]	Financial Profits			0.540	0.579	0.611	0.615	0.627
[28]	Financial Deficits			-0.101	-0.194	-0.605	-0.615	-0.623
[20]	Financial Losses brought forward			-0.165	-0.326	-0.462	-0.474	-0.479
[9]	Overseas Income				0.758	0.794	0.795	0.805
[11]	Schedule A Income					0.622	0.628	0.658
[26]	Schedule A Losses					-0.393	-0.394	-0.387
[8]	Schedule D Case III						0.532	0.553
[15]	Schedule D Case VI						-2.510	1.595
[24]	Management expenses							-0.551
	R^2	**0.4091**	**0.4783**	**0.6135**	**0.7438**	**0.7813**	**0.7840**	**0.7981**
	Correlation	**0.6396**	**0.5547**	**0.7206**	**0.8188**	**0.8646**	**0.8669**	**0.8685**

We try to account for this problem by running the regressions twice. The top half of Table 6 includes all corporations and the lower half excludes the 24,122 observations with the largest values. In the top half of Table 6 one can see that using only net trading profits we can explain only a small part of the variation in the corporation tax base. Adding group relief adds nothing to explaining the variation in the corporation tax base. Adding financial profits and losses does contribute a little. A much larger part of the variation is explained by overseas income. However, since overseas income is most affected by large outliers, it is important to compare this finding to the case where we exclude the largest outliers.

In the lower half of Table 6, about 40 percent of the variation in the corporation tax base can be explained through net trading profits. Adding group relief and financial profit increases this to about 60 percent of the variation. Overseas income remains a significant factor. Overall, however, the factors in the Table explain more 95 percent of the total variation, but only about 80 percent of the variation after excluding outliers. That this is less that 100 percent is attributable to two possible factors. First, other important variables (e.g. capital gains, or loss carry backs) are not included. And second, there may also be measurement error, as described above.

3.2.2. LOSSES AND GROUP RELIEF

The treatment of losses is a major factor in determining UK tax revenues. There are three basic ways in which losses can be relieved: carrying back the loss to set against profits in the previous year;[22] carrying forward losses indefinitely to set against future profits; and surrendering losses to other companies within the same group through group relief. However, there are restrictions on the use of each of these. We cannot describe the process of group relief in any detail, since we do not have information on group structures. We therefore simply analyse some aggregate statistics to evaluate broadly the magnitude of the amounts at stake.

Table 7: Losses arising and losses used (HMRC dataset)

		Mean, £	Number of observations	Total, £ million
[122]	Trading losses case I arising	4,771,591	363,984	1,736,783
[4]	Losses brought forward	661,582	115,486	76,403
[36]	Group relief	4,264,470	139,588	595,269
	Trading losses unused			**1,065,110**
[125]	Financial losses arising	5,439,375	63,566	345,759
[20]	Financial losses brought forward	1,402,173	11,386	15,965
	Financial losses unused			**329,794**

22 For losses of up to £50,000 this was extended to three years for a temporary period from November 2008 to November 2010.

Table 7 aggregates the trading and financial losses for the entire Datalab sample of tax returns. It also shows the aggregate of group relief claimed, and losses brought forward from earlier periods to set against current profits. We aggregate here over several years' data. Deducting losses brought forwards and group relief from total losses gives a very rough estimate of unused losses over the whole period.

It is clear from the Table that, in aggregate, group relief is much more significant than losses brought forward. In total 139,588 companies claimed group relief of almost £600 billion. Nevertheless, even with losses brought forward, these amounts fall substantially short of the total trading losses arising which amount to more than £1,736 billion. On top of that companies have accumulated unused financial losses of more than £329 billion. In total, this implies that unused losses have been at roughly £200 billion per year. Comparing this to the overall corporation tax base as depicted in Figure 16 this amounts to roughly half of gross taxable income, or roughly equal to net taxable income. Even if part of these unused losses expires because companies cease trading, this stock of losses might significantly affect the future corporation tax revenues.

3.2.3. SWITCH TOWARDS A MORE TERRITORIAL SYSTEM

Effective from July 2009 the UK changed its rules for the taxation of overseas income to a more territorial system. This means that most corporations are no longer liable for UK corporation tax on overseas income repatriated as dividends.[23] This reflects an international trend towards more territorial systems of corporation tax, with now the United States being the only significant capital-exporting country with a system of worldwide taxation with credit. We are not able to identify changes in behaviour triggered through this significant change in the tax system. However, we do have information that sheds light on the size of corporation tax revenue that might be foregone, though we are unable to provide a definitive estimate of this revenue cost.

Table 8: Estimated revenues from overseas income (HMRC dataset)

	Observations	Average overseas income, £000	Average double tax relief, £000	Estimated tax revenue, £ million
Overseas income non-positive, double tax relief non-positive	1,384,275	0	0	0
Overseas income non-positive, double tax relief positive	12,411	0	988,818	(-12,272)
Overseas income positive, less than double tax relief/0.3	3,199	19,442,625	6,091,019	(-4,342)
Overseas income positive, double tax relief non-positive	10,408	1,534,159	0	4,790
Overseas income positive more than double tax relief/0.3	12,533	19,442,625	5,253,725	7,257
Total	**1,422,286**	**11,117,341**	**2,269,083**	**12,048**

23 There are controlled foreign country (CFC) rules in place to counteract abuse of the system. In fact there is anecdotal evidence that the CFC rules raise more tax revenue than the Case V income historically did.

Table 8 splits the Datalab sample of tax returns into five subsamples according to the relative position of overseas income and double tax relief. The first row represents companies with neither overseas income nor double tax relief. These make up the large majority of observations, highlighting the fact that the treatment of overseas income is only relevant for a small number of large businesses.

The second row contains information on companies that claim double tax relief but do not have positive overseas income. The third row contains information on companies that declare overseas income which is smaller than double tax relief grossed up by the tax rate (at 30 percent).[24] Both these groups of companies appear to be in an excess credit position, in which they are not liable to UK corporation tax on their overseas income. The excess credits are in principle non-refundable; but if so, then the cases in the second row in particular appear to be counter-intuitive, because companies have foreign tax credits but no foreign taxable income. Under certain conditions, however, companies can use excess foreign credits as excess unutilized foreign taxation (EUFT) against foreign income in associated companies. Unfortunately, EUFT is dealt with outside the main CT600 form, and since we do not know the group structure, we cannot identify the extent to which these credits are usable in the same period. The negative numbers in the last column are shown in brackets to denote this uncertainty.

The fourth and fifth rows of Table 8 represent companies with positive overseas income which is not fully offset by double tax relief. These 22,941 observations over 7 years (reflecting an average of around 3,300 per year) appear to have contributed an estimated total of around £12 billion in revenue, or on average around £1.7 billion per year, roughly 4.6 percent of the net tax revenues in the period in question.[25] Unfortunately, this does not provide us with an estimate of the cost of the reform, because of the uncertainty regarding the use of excess credits under the EUFT.

24 Note that this implies that we expect all companies with overseas income to be taxable at the main corporation tax rate of 30 percent.

25 Note that this is a very rough estimate based on the averaged numbers.

4. EVALUATING TAX REFORMS

This section analyses three tax reforms in an attempt to analyse how the tax liabilities and behaviour of different types of companies were likely to have been affected. In particular we consider two aspects of corporation tax in the UK. First, we examine the lowering of the starting rate to zero percent and its subsequent abolition and we investigate why, and to what extent, this has caused bunching at kinks of the tax schedule. Second, we analyse the reforms corporation tax in 2008 and 2010. The 2008 reform reduce the main rate of corporation tax, increased the small companies' rate and also reduced capital allowances. The 2010 reform reduced both rates of tax, and also further reduced capital allowances. These reforms have differing effects on individual companies, depending on the level of their profit and investment.

4.1. ZERO PERCENT STARTING RATE

The largest reforms during the 2001/02 to 2007/08 period (for which we have access to data from the HMRC Datalab) concern the starting rate of tax. Introduced in 1999, the starting rate was lowered from 10 percent to zero in 2002/03. However after only three years it was abolished. These changes introduced and subsequently abolished a kink in the rate structure which could affect the behaviour of companies. There has been some empirical evidence of the effects of bunching at kinks in the personal income tax system, but little with respect to the corporation tax system.[26]

There are in fact two kinks evident from Table 1. For example, in 2002/03, due to the zero starting rate, adding £1 of taxable profit to £10,000 moved the marginal corporation tax rate from zero to 23.75 percent. Similarly, adding £1 of taxable profit to £300,000 moved the marginal corporation tax rate from 19 percent to 32.75 percent. These are big discrete changes in marginal tax rates. Corporations have some scope to arrange their taxable profit to fall below or at a certain threshold. Here we briefly consider two factors: switching between corporate and personal income, and limiting investment.

The first factor is that for a small company, an owner/manager has the option of remunerating herself in the form of corporate profit (and dividend), salary, or possibly self-employed income. The former is liable to corporation tax, plus dividend tax on the dividend paid (or possibly capital gains tax if the company is instead sold). Personal income is liable to personal income tax, and employee's and employer's national insurance (which differs according to whether the recipient is an employee or self-employed). The precise comparison which determines the lowest aggregate tax rate for an individual may depend on whether, and how much, other income is also received. In particular, it may be optimal to take some income in the form of corporate profit and some in the form of personal income. In this case, it is possible that the kinks in the tax rate schedule where the marginal tax rate increase markedly could induce the owner/manager to take corporate profit up to that point, and personal income above that point. At the same time, since there is an allowance for personal income tax which is untaxed, there is an incentive for the owner/manager to take at least this amount as personal income. These comparisons are spelt out more fully in Crawford and Freedman (2010).

A second factor relates to the value of capital allowances for investment. The value of such allowances

26 See Saez (2010) and Chetty (2009) for an empirical investigation of bunching at kinks in the US income tax schedule. Further Slemrod (2010) discusses the role of kinks and notches in tax schedules and provides an overview over the literature.

is equal to the permitted allowance rate multiplied by the marginal tax rate. For example, if the tax rate is zero, then the allowance has no value. More generally, the relief on £1 of investment is higher where the marginal tax rate is higher – typically just above the kinks identified above. Consequently, there is a greater incentive to undertake investment where taxable income is just above the kink than just below the kink. Since the investment itself generates capital allowances that reduce taxable profit, it is possible that a company will invest just up to the point at which the cost increases markedly – that is, at the kink. Similar reasoning applies for other expenses that can be set of against corporation tax, since their net cost increases as taxable profit falls below the kink.

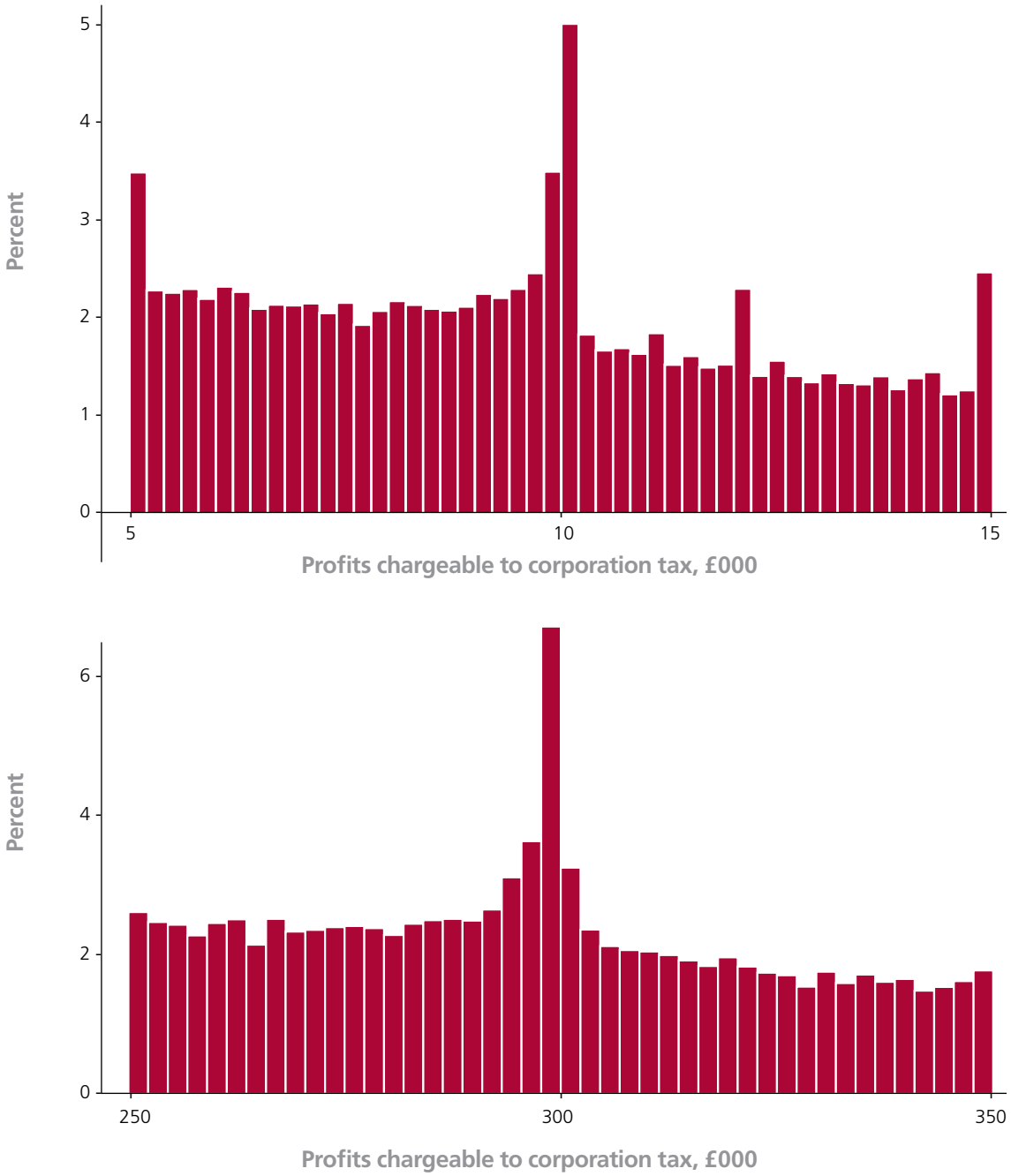
Either of these factors may induce companies to aim to have taxable profit at one of the two kinks identified: £10,000 or £300,000. At the same time there may be an incentive for an owner/manager to take remuneration in the form of personal income just up to the personal income tax allowance. To investigate the latter we consider information about directors' salary from the FAME dataset.

Figure 17 depicts the payouts as directors' salary up to £50,000 in independent companies. Each line represents the density for two years and apart from the first few years there is clear evidence of directors' salaries bunching around the thresholds for income tax and national insurance allowances. The timing of this increased bunching coincides with the introduction of the starting rate. This is consistent with directors taking the bulk of their remuneration in the form of corporate profit, especially given the low starting rate of tax, but keeping enough personal income to use up their personal income tax allowances. The concentration of directors' salaries around the thresholds increases even after the abolition of the starting rate. This would point towards individuals incorporating themselves when the starting rate was introduced and remaining incorporated and further optimizing their tax behaviour subsequently.

Figure 17: Director's salary of standalone companies (FAME data)

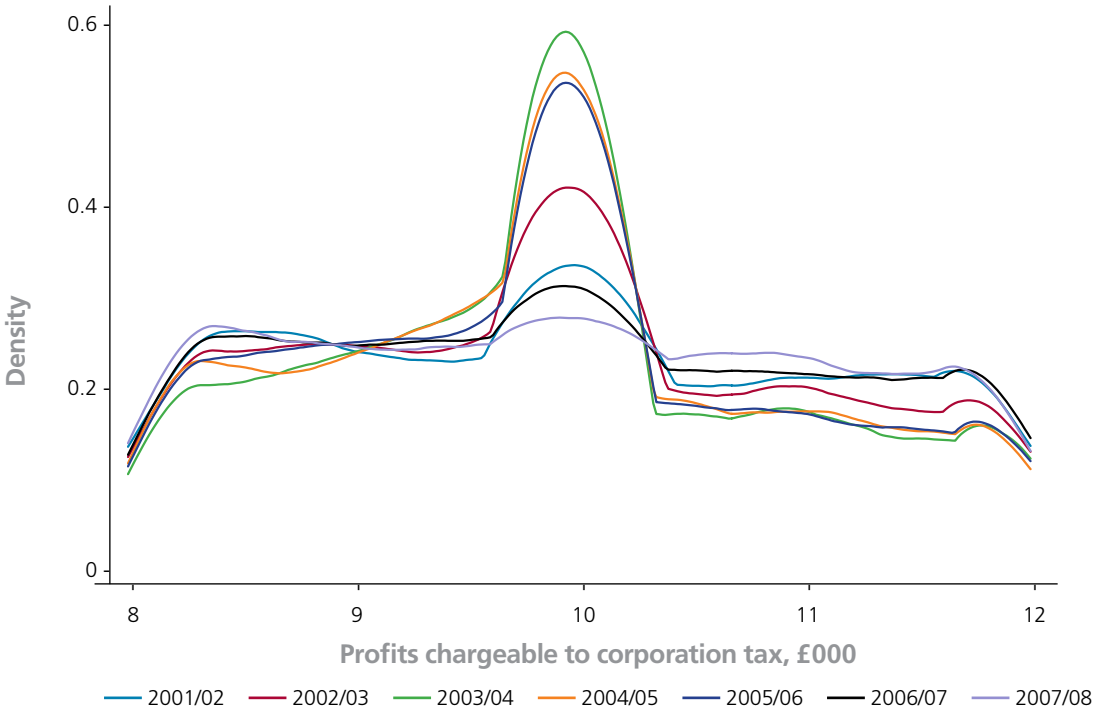
Figure 18 presents evidence on taxable profits from the HMRC database. In particular, it presents histograms which show the distribution of taxable profits around the two kinks in the corporation tax schedule. The upper part shows the distribution of taxable profits between £5,000 and £15,000 and the lower part for the range of taxable profits from £250,000 to £300,000. There is a clear bunching at the two kink points of the tax rate schedule: £10,000 and £300,000 respectively.

Figure 18: Histograms of profits chargeable to taxation (HMRC data)



The number of observations represented in these two histograms is not negligible: a total of 124,453 companies report taxable profits between £5,000 and £15,000, and 28,849 report taxable profit in the range between £250,000 and £300,000. The peak at the bunching point at £10,000 is about 5 percent. This translates into around 1,500 observations; but since this is a 10 percent sample, this represents approximately 15,000 companies.

Figure 19: Density of taxable profits over time (HMRC data)



While the incentives for bunching at the small company tax rate threshold of £300,000 were unchanged throughout the whole sample period, the lowering and the subsequent abolition of the zero percent starting rate did change the incentive for bunching at £10,000. Figure 19 presents the densities of profits chargeable to corporation tax for each year.

The results are very much in line with our expectations. Before the lowering of the starting rate there was very little bunching around the £10,000 threshold. Soon after the introduction of the zero percent starting rate bunching at the threshold is observable. It increases until the abolition of the starting rate in 2006/07 when it drops significantly.

4.2. CORPORATION TAX REFORMS OF 2008 AND 2010

We now evaluate recent changes in the UK corporation tax system concerning capital allowances and the corporation tax rates. The aim here is not to make a precise assessment of the effects of each reform. Especially for the 2010 reform, that would involve forecasting profit and investment for each

individual company and then applying the old and revised tax systems to that forecast. Instead we simulate the effects of different tax systems for each year of the HMRC dataset, estimating what the tax liabilities of each company would have been under alternative tax regimes. As a result, the total simulated costs of the reforms differ to some extent from those predicted by the government.

Nevertheless, this should give a realistic estimate of the proportion of companies that are likely to benefit or lose under each reform. As Egger and Loretz (2010) have recently stressed, reforms of this kind can have different impacts on different types of company. So not only is the overall impact on the corporation tax revenues of interest, but also the impact on individual companies.

More specifically, in Table 9 we use 2007/08 as a benchmark to simulate tax liabilities using HMRC tax return data. For each company in the HMRC dataset, we sum net trading profits, financial profits and Schedule A income and deduct trading and financial losses brought forward into the period. We then apply the tax law in 2007/08 to this taxable income. We take into account the small profits rate, marginal rate relief and the main statutory rate.

We then model the following changes based on the 2008 tax reform. These include
- a reduction in the headline statutory tax rate from 30 percent to 28 percent;
- an increase in the small profits rate from 20 percent to 21 percent;
- a reduction in the declining balance rate for plant and machinery from 25 percent to 20 percent; and
- phasing out of the industrial buildings allowance from 4 percent to zero by 2011/12 (the simulation is based on the 2008/09 rate of 3 percent).

We model the June 2010 reform as
- a further progressive reduction in the headline statutory tax rate from 28 percent to 24 percent (by 2014/15; the simulation is based on 24 percent);
- a reduction in the small profits rate to 20 per cent (instead of the planned increase to 22 percent); and
- a further reduction in the declining balance rate for plant and machinery from 20 percent to 18 percent.

We do not include overseas income or double tax relief in our simulations. This is partly because we do not have detailed information on overseas income and double tax relief, as discussed above. Partly, at least for the 2010 reform, foreign source dividends are no longer subject to tax in the UK, and so changes in the rate as it applies to foreign income are generally no longer relevant. In any case, very few companies are affected by overseas income and double tax relief and so the distributional effects presented below would not be substantially affected. The changes in capital allowances are applied to capital allowances net of balancing charges.[27] We then add the difference in net capital allowances to the tax base. In doing so, we also take into account whether each company reported excess unused losses in the period in question. In consequence, the change in capital allowances only increases the tax base if it is larger than the losses arising in the same period.

Table 9 presents a summary of the results of the simulations. Note that we count the sampled small companies ten times in order to simulate the effect on the population of the companies. The

27 Note that in some cases balancing charges exceed capital allowances, which implies that a reduction of capital allowances would reduce the tax base. However, this applies only in a small number of cases. As we exclude outliers, these do not drive our results. In total we exclude 681 observations which report either capital allowances or balancing charges for buildings or plant or machinery of more than £100 million. This leaves us with a sample of 1,422,145 observations.

first three columns present the average net liabilities, split by sector. The overall averages reported in the last row provide an overall estimate of the revenue impact of the tax reforms. Under the 2007/08 system we simulate an average net tax liability of £28,562 for the population of 9,092,755 companies over seven years, representing an annual total of net tax liabilities of £37.1 billion per annum. The 2008 tax reform slightly reduces this by approximately 0.44 percent to £28,438 per observation on average or £36.9 billion per annum. In our simulation, the 2010 tax reform reduces the average tax liability by almost 10.6 percent to £25,533, or a total of £33.2 billion per annum.

In both cases the reduction in the tax burden is unevenly distributed. Differences across sectors can be seen in the changes in the sector averages in Columns 2 and 3. The sectors with the highest tax liabilities on average, e.g. mining and quarrying, overseas operations and the financial sector, tend to benefit most. One notable exception here is the electricity, gas and water provision, which has high average tax liabilities which are only reduced slightly. This is directly attributable to the reduction in capital allowances, since this sector is particularly capital intensive. Some sectors which are less profitable or are dominated by small companies - for example, the agricultural sector, hotels and catering or the recreational and personal services - would on average face higher tax liabilities under the 2008 reform.

The uneven distribution of both reforms can be seen even more clearly in the percentages of companies whose tax charge increases or decreases within each sector. Columns 4 to 6 show the percentage of companies which face an increased, unchanged, or reduced tax burden under the 2008 reform. Columns 7 to 9 show the same information for the 2010 reform.

The most striking feature for the 2008 tax reform is that even with an overall reduction in the tax burden, only 1 percent of the tax returns lead to a reduced tax burden. 71 percent of taxpayers pay more tax either because of the increase in the small profits rate or reduced capital allowances. The middle column represents companies which are unaffected by the simulated tax change. These 28 percent of companies are typically in a loss position, which is not changed by the reduction in the capital allowances. The largest share of gainers can be found in the mining sector and in the financial sector.

For the 2010 reform, the overall reduction in the tax burden is more pronounced and consequently the share of companies benefiting from a reduced tax liability increases substantially. A large share of the 64 percent of the companies with a reduced tax liability is due to the reduction in the small profits rate. However, even under 2010 reform, 9 percent of the tax returns result in a higher tax liability due to the reduction in the capital allowances. As for the 2008 reform, about 27 percent have an unchanged tax burden due to tax losses.

Table 9: Estimated impact of recent corporation tax reforms (HMRC dataset)

	Estimated average tax liabilities, £			2008 change in tax liabilities			2010 change in tax liabilities		
Sector	2007/08	2008 reform	2010 reform	Increased	Unchanged	Decreased	Increased	Unchanged	Decreased
Agriculture, forestry and fishing	8,421	9,188	8,764	75%	24%	1%	20%	24%	56%
Mining, quarrying and fuel production	1,173,880	1,127,193	979,931	66%	27%	7%	13%	27%	61%
Electricity, gas and water supply	335,244	352,284	325,953	65%	31%	4%	14%	31%	56%
Manufacturing of metals and metal goods	30,484	31,650	29,343	77%	21%	2%	17%	21%	62%
Manufacture of non-metallic mineral products	30,300	32,353	30,523	75%	23%	2%	18%	23%	59%
Chemical industry, rubber and plastics	87,992	89,526	81,298	73%	24%	4%	18%	23%	59%
Mechanical engineering	26,409	27,124	24,946	79%	20%	2%	17%	19%	63%
Electrical, electronic, instrument engineering	32,373	33,319	30,390	75%	23%	2%	12%	23%	65%
Motor vehicles & transport equipment	32,982	34,038	31,606	72%	26%	2%	13%	26%	62%
Food, drink and tobacco industry	134,414	139,506	129,770	70%	27%	4%	22%	26%	52%
Textiles, leather, footwear and clothing	38,147	37,975	34,066	68%	29%	2%	12%	29%	59%
Timber, wood, paper, printing publishing.	35,011	35,544	32,257	70%	28%	2%	18%	27%	55%
Other manufacturing industries and recycling	14,619	15,793	15,071	80%	19%	1%	17%	18%	65%
Construction	20,133	20,370	18,598	82%	16%	2%	10%	16%	74%
Wholesale distribution	39,451	39,777	36,011	71%	26%	3%	13%	25%	62%
Retail distribution	27,082	27,577	24,961	75%	23%	1%	11%	23%	65%
Distribution of motor vehicles, filling stations	21,113	21,707	19,942	77%	22%	1%	15%	21%	64%
Hotels and catering	10,692	11,681	11,443	73%	27%	1%	14%	26%	60%
Transport and storage	22,175	24,087	23,346	74%	25%	1%	19%	25%	57%
Postal & telecommunication services	46,479	45,908	40,773	73%	25%	2%	9%	25%	66%
Financial intermediation	258,792	247,057	214,460	59%	35%	6%	6%	35%	59%
Professional services	13,619	13,987	12,901	83%	16%	1%	7%	16%	77%
Business services	12,582	13,024	11,992	76%	23%	1%	7%	23%	71%
Owning and dealing in real estate	13,103	12,885	11,579	62%	37%	1%	5%	37%	58%
Medical and social services	11,453	11,805	10,917	74%	25%	1%	8%	25%	67%
Recreational and personal services	13,322	13,862	12,769	74%	25%	1%	10%	25%	64%
Concerns outside UK, managed in UK	527,038	502,820	435,718	61%	32%	6%	4%	32%	63%
Holding companies (more than one activities)	82,358	78,938	68,902	43%	54%	3%	6%	54%	40%
Government services, defence, unknown	32,956	33,037	29,768	69%	29%	2%	10%	29%	61%
No industry classification	18,595	18,360	16,431	65%	34%	1%	6%	34%	60%
	28,562	28,438	25,533	71%	27%	1%	9%	27%	64%
Total	**28,562**	**28,438**	**25,533**	**71%**	**27%**	**1%**	**9%**	**27%**	**64%**

5. CONCLUSIONS

This report presents detailed information on the anatomy of corporation tax liabilities and payments in the United Kingdom, using two complementary company-level data sources. Each data source has advantages and disadvantages.

Accounting data from FAME permits an assessment of the accounting tax charge in the light of other financial information: for example, we are able to construct a measure of an effective tax rate for each company and accounting period, and we have reasonable measures of company size. The data also allow us to identify whether individual companies are part of a group, and whether they are part of a multinational group; we are therefore able to compare tax positions across these different types of companies. However, these data provide little detailed information about the tax position of the company.

By contrast, the data from the CT600 tax return form, available on a confidential and anonymised basis from HMRC, provides considerable detail about the composition and generation of taxable profit and the tax liability. However, it too has disadvantages. We only have data included in the main part of the CT600 form. This excludes some key elements of interest, such as the extent to which taxable profit is reduced by interest payments and details about the level and treatment of foreign income. The dataset does not contain information on ownership, and so we do not know (other than indirectly in some cases, by observing group relief) whether a company is part of a group or a multinational company. This is particularly important in identifying the role of losses, since we are not able to observe a company surrendering losses to another company for group relief. Since data is limited to the CT 600 form, we also have limited information about other financial information. We are not able to construct a good measure of an effective tax rate, and the only variable we can use to measure size is turnover.

Nevertheless, combining these two sources of data enables us to identify several characteristics of the distribution of UK corporation tax liabilities and payments. These characteristics are summarised in the Executive Summary.

APPENDICES

Table A.1: Company tax return form CT600 (2008 version)

[Nr]	Description	Definition/Comment
Company tax calculation		
	Turnover	
[1]	Total turnover from trade or profession	
[2]	Bank, building companies, insurance companies and other financial concerns	Indicator
	Income	
[3]	Trading and professional profits	
[4]	Trading losses brought forward claimed against profits	
[5]	Net trading and professional profits	[3]-[4]
[6]	Bank, building society or other interest, and profits and gains from non-trading loan relationships	
[7]	Box [6] is net of carrying back a deficit	Indicator
[8]	Annuities, annual payments and discounts not arising from loan relationship and from which income tax has not been deducted	
[9]	Overseas income within Sch D Case V	
[10]	Income from which income tax has been deducted	
[11]	Income from UK land and buildings	
[12]	Non-trading gains on intangibles fixed assets	
[13]	Tonnage tax profits	
[14]	Annual profits and gains not falling under any other heading	
[15]	Income within Sch D Case VI	[12]+[13]+[14]
	Chargeable gains	
[16]	Gross chargeable gains	
[17]	Allowable losses including losses brought forward	
[18]	Net chargeable gains	[16]-[17]
[19]	Losses brought forward against certain investment income	
[20]	Non-trade deficits on loan relationships (including interest) and derivative contracts (financial instruments) brought forward	
[21]	Profits before other deductions and reliefs	[5]+[6]+[8]+[9]+[10]+[11]+[15]+[18]-[19]-[20]
	Deductions and reliefs	
[22]	CVS loss relief, and losses on unquoted shares under S573 ICTA 1988	
[23]	Box [22] includes CVS relief	Indicator
[24]	Management expenses under S75 ICTA 1988	
[25]	Interest distributions under S468L ICTA	

[Nr]	Description	Definition/Comment
[26]	Schedule A losses for this or previous accounting period under S392A ICTA 1988	
[27]	Capital allowances for the purpose of management of the business	
[28]	Non-trade deficits for this accounting period from loan relationships and derivative contracts (financial instruments)	
[29]	Non-trading losses and intangible fixed assets	
[30]	Trading losses of this or a later accounting period under S393A ICTA 1988	
[31]	Box [30] includes carry backs Indicator	
[32]	Non-trade capital allowances	
[33]	Total of deductions and reliefs	[22]+[24]+[25]+[26]+ [27]+[28]+[29]+[30]+[32]
[34]	Profits before charges and group relief	[21]-[33]
[35]	Charges paid	
[36]	Group relief	
[37]	Profits chargeable to corporation tax	[34]-[35]-[36]
[169]	Ring fence profits included	

	Tax calculation				
[38]	Franked Investment income				
[39]	Number of associated companies in this period				
[40]	Number of associated companies in first financial year				
[41]	Number of associated companies in second financial year				
[42]	Indicator, whether company is taxed at starting rate, small company rate or claims marginal rate relief				Indicator
[43]	Financial year	Amount profit	Rate of tax	Tax	
		[44]	[45]	[46]	[46]=[44]x[45]
		[47]	[48]	[49]	[49]=[47]x[48]
		[50]	[51]	[52]	[52]=[50]x[51]
[53]	Financial year	[54]	[55]	[56]	[56]=[54]x[55]
		[57]	[58]	[59]	[59]=[57]x[58]
		[60]	[61]	[62]	[62]=[60]x[61]
[63]	Corporation tax				[46]+[49]+[52] + [56]+[59]+[62]
[64]	Marginal rate relief				
[65]	Corporation tax net of marginal rate relief				
[66]	Underlying rate of corporation tax				
[67]	Profits matched with non-corporate distribution				
[68]	Tax at non-corporate distributions rate				
[69]	Tax at underlying rate on remaining profits				
[70]	Corporation tax chargeable				

[Nr]	Description	Definition/Comment
	Reliefs and deductions in terms of tax	
[71]	CVS investment relief	
[72]	Community investment relief	
[73]	Double taxation relief	
[74]	Box [73] includes underlying rate relief	Indicator
[75]	Box [73] includes amounts carried back	Indicator
[76]	Advance corporation tax	
[77]	Total reliefs and deductions in terms of tax	[71]+[72]+ [73]+[76]
	Calculation of tax outstanding or overpaid	
[78]	Net corporation tax liability	[70]+[77]
[79]	Tax payable under S419 ICTA 1988	
[80]	Completed box A11 in CT600A	Indicator
[81]	Tax payable under S747 ICTA 1988	
[82]	Tax payable under S501A ICTA 1988	
[83]	Tax chargeable	[78]+[79]+[81]+[82]
[84]	Income tax deducted from gross income included in profits	
[85]	Income tax repayable to the company	
[86]	Tax payable - this is your self-assessment of tax payable	[83]-[84]
	Tax reconciliation	
[87]	Research and Development tax credit, including any vaccines tax credit or film tax credit	
[88]	Land remediation or life assurance company tax credit	
[170]	Capital allowances first-year tax credit	
[89]	Research and Development tax credit payable, including vaccines tax credit, or film tax credit payable	[87]-[86]
[90]	Land remediation or life assurance company tax credit payable	[87]+[88]-[86]-[89]
[171]	Capital allowances first-year tax credit payable	[87]+[88]+[170]-[86]-[89]-[90]
[161]	Ring fence corporation tax included	
[166]	Tax under S510A ICTA 1988 included	
[91]	Tax already paid (and not already repaid)	
[92]	Tax outstanding	[86]-[87]-[88]- [170]-[91]
[93]	Tax overpaid	[87]+[88]+[170]+[91]-[86]
[94]	Tax refunds surrendered to the company under S102 FA 1989	
	Indicators	
[95]	Company should have made instalment payments	Indicator
[96]	Company is within a group payment arrangement	Indicator
[97]	Company has written down or sold intangible assets	Indicator

[Nr]	Description	Definition/Comment
[98]	Company has made cross-border royalty payments	Indicator

Information about enhanced expenditure		
	Research and Development (R & D) or films enhanced expenditure	
[167]	Claim is for films expenditure	Indicator
[99]	Claim is made by a small or medium sized enterprise	Indicator
[100]	Claim is made by a large company	Indicator
[101]	R & D or films enhanced expenditure	
[102]	R & D enhanced expenditure of a SME on work sub-contracted to it by a large company	
[103]	Vaccines research expenditure	
	Land remediation enhanced expenditure	
[104]	Enter amount equal to 150% of actual expenditure	

Information about capital allowances and balancing charges			
	Charges and allowances included in calculation of trading profits/losses		
[172]	Annual investment allowances		
	Machinery and plant - special rate pool:		
	[105] Capital Allowances	[106] Balancing Charges	
	Machinery and plant - main pool:		
	[107] Capital Allowances	[108] Balancing Charges	
	Cars:		
	[109] Capital Allowances	[110] Balancing Charges	
	Industrial buildings and structures:		
	[111] Capital Allowances	[112] Balancing Charges	
	Business premises renovation:		
	[162] Capital Allowances	[163] Balancing Charges	
	Other charges and allowances:		
	[113] Capital Allowances	[114] Balancing Charges	
	Charges and allowances not included in calculation of trading profits/losses		
[173]	Annual investment allowances		
	Business premises renovation:		
	[164] Capital Allowances	[165] Balancing Charges	
	Other non-trading charges and allowances		
	[115] Capital Allowances	[116] Balancing Charges	
[117]	Box [115] includes flat conversion allowances		Indicator
	Qualifying expenditure		

[Nr]	Description		Definition/Comment
[118]	Machinery and plant on which first year allowances is claimed		
[174]	Designated environmentally friendly machinery and plant		
[120]	Machinery and plant on long-life assets and integral features		
[121]	Other machinery and plant		
Losses, deficits and excess amounts			
	Trading losses Case I:		
	[122] Arising	[123] Group relief	
[124]	Trading losses Case V: Arising		
	Non-trade deficits on loan relationships and derivative contracts:		
	[125] Arising	[126] Group relief	
	Schedule A losses:		
	[127] Arising	[128] Group relief	
[129]	Overseas property business losses Case V: Arising		
[130]	Losses Case VI: Arising		
[131]	Capital losses: Arising		
	Non-trading losses on intangible fixed assets:		
	[132] Arising	[133] Group relief	
[134]	Excess non-trade capital allowances: Group relief		
[135]	Excess charges: Group relief		
	Excess management expenses:		
	[136] Arising	[137] Group relief	
[138]	Excess interest distributions: Group relief		

B. DATA

B.1. AGGREGATE HMRC STATISTICS

HMRC reports aggregate statistics about the main tax categories on the HMRC website. The corporation tax statistics are available online at: http://www.hmrc.gov.uk/stats/corporate_tax/menu.htm. HMRC keeps the statistics up to date and replaces the tables each year. Some of the tables and information we use in this report are based on previous, as well as current, statistics. Below we reproduce two tables used in our analysis.

Table A.2: HMRC T11.1 Corporation tax accruals 1997 to 2007 and net receipts 1997/98 to 2008/09

Corporation tax accruals (After ACT set off)	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	
Onshore companies												
Industrial and commercial	13,822	15,105	16,249	17,630	17,545	18,142	18,470	22,052	23,827	26,990	28,733	
Financial excluding life assurance	5,649	6,035	7,205	7,436	6,518	6,014	6,442	6,932	8,861	9,679	10,999	
Life assurance	1,105	1,755	2,131	3,312	869	1,211	1,084	1,818	2,676	1,710	1,933	
Total	20,576	22,895	25,585	28,378	24,932	25,367	25,996	30,802	35,364	38,379	41,665	
North Sea companies	950	1,040	1,258	3,180	3,080	2,860	3,890	4,340	7,530	5,210	5,720	
Total accruals of corporation tax (after ACT set off)	**21,526**	**23,935**	**26,843**	**31,558**	**28,012**	**28,227**	**29,886**	**35,142**	**42,894**	**43,589**	**47,385**	
Corporation tax net receipts	**1997/98**	**1998/99**	**1999/00**	**2000/01**	**2001/02**	**2002/03**	**2003/04**	**2004/05**	**2005/06**	**2006/07**	**2007/08**	**2008/09**
Onshore companies - net receipts excluding ACT												
By type of payment:												
Mainstream corporation tax	17,977	18,024	19,448	-208	-1,766	-1,574	-1,430	-872	-595	-380	230	-71
Large company quarterly instalments and balancing payments	..	54	11,989	26,316	24,765	20,943	19,627	22,680	26,005	27,755	28,205	20,795
Small company payments	..	..	..	4,433	5,716	6,416	6,894	7,967	9,196	10,228	11,854	12,003
Total	**17,977**	**18,078**	**31,437**	**30,541**	**28,715**	**25,785**	**25,091**	**29,775**	**34,606**	**37,603**	**40,289**	**32,727**
By industrial sector:												
Manufacturing	..	..	..	5,529	5,077	4,220	3,664	4,646	4,822	4,587	4,435	3,734
Distribution	..	..	..	3,942	3,976	4,461	4,559	4,475	4,279	5,098	5,702	4,904
Other industrial and commercial (2)	..	..	..	9,769	9,146	9,906	9,855	11,732	14,300	15,741	17,763	16,432
Financial excluding life assurance	..	..	..	8,445	8,094	6,409	5,844	7,282	9,543	10,733	10,293	6,956
Life assurance	..	..	..	2,856	2,422	789	1,169	1,640	1,662	1,444	2,097	701
Total	**17,977**	**18,078**	**31,437**	**30,541**	**28,715**	**25,785**	**25,091**	**29,775**	**34,606**	**37,603**	**40,289**	**32,727**
North Sea companies - net receipts excluding ACT												
Mainstream corporation tax	958	950	578	-65	92	-5	-69	-60	-53	-39	4	-16
Quarterly instalments and balancing payments	..	..	570	2,394	3,423	3,667	3,126	3,891	7,360	6,748	6,091	10,374
Total	**958**	**950**	**1,148**	**2,329**	**3,515**	**3,662**	**3,057**	**3,831**	**7,307**	**6,709**	**6,095**	**10,358**
Advance corporation tax - net receipts	11,502	11,004	1,737	-449	-189	-179	-71	-33	-84	-4	-1	-8
Total net receipts of corporation tax	**30,437**	**30,032**	**34,322**	**32,421**	**32,041**	**29,268**	**28,077**	**33,573**	**41,829**	**44,308**	**46,383**	**43,077**

Table A.3: HMRC T11.3 number, income, allowances, tax liability, and deductions

	2000/01		2001/02		2002/03		2003/04	
	Number	Amount £million	Number	Amount £million	Number	Amount £million	Number	Amount £million
Gross trading profit	541,642	191,396	558,804	190,999	593,338	197,362	705,734	211,220
Capital allowances	522,097	66,631	535,725	66,868	543,607	72,111	585,527	73,197
Net trading profits	494,234	141,270	509,030	141,130	543,824	141,825	662,424	154,382
Other income & gains	394,640	108,126	405,392	99,330	424,614	88,304	520,127	122,998
Deductions allowed	285,657	96,724	291,436	106,101	280,599	107,266	290,781	112,554
Total chargeable profits	518,971	152,672	526,200	134,359	577,662	122,863	713,063	164,826
Rates at which profits charged:								
Main rate:	34,046	113,093	32,213	106,278	33,669	90,591	37,775	129,166
Marginal small company rate:	167,672	9,399	22,918	6,742	25,671	7,604	28,378	8,599
Small companies' rate:	317,253	30,180	158,422	17,086	156,195	19,768	213,225	21,494
Marginal starting rate:			156,926	3,600	180,016	4,053	205,528	4,588
Starting rate			155,721	653	182,111	847	228,157	979
Total tax charge	518,971	42,588	526,200	38,124	577,662	34,554	713,063	47,218
Double tax relief	5,414	9,659	5,578	8,895	5,654	5,921	5,777	16,444
Act set-off	8,487	706	4,348	248	2,254	113	1,250	94
Income tax set-off	37,666	696	34,669	205	28,577	170	20,383	181
Other reliefs	171,008	320	183,429	389	207,671	551	232,794	627
Corporation tax payable	497,461	31,207	511,709	28,387	508,317	27,799	479,905	29,872

	2004/05		2005/06		2006/07		2007/08	
	Number	Amount £million	Number	Amount £million	Number	Amount £million	Number	Amount £million
Gross trading profit	817,787	225,725	860,067	248,347	914,027	270,563	974,817	276,272
Capital allowances	643,793	70,774	693,120	66,777	787,035	80,381	863,031	80,675
Net trading profits	774,127	171,377	814,567	198,081	855,420	209,668	909,268	216,816
Other income & gains	605,410	140,725	660,550	165,549	698,547	193,202	754,088	210,115
Deductions allowed	319,639	139,073	341,948	155,834	397,588	178,521	415,486	201,026
Total chargeable profits	829,286	173,029	875,317	207,796	886,664	224,349	941,840	225,905
Rates at which profits charged:								
Main rate:	39,644	128,558	43,795	156,225	46,589	171,422	47,547	166,042
Marginal small company rate:	33,383	10,304	35,117	11,135	37,893	12,207	40,518	13,896
Small companies' rate:	223,010	27,056	295,381	33,551	802,182	40,720	853,775	45,967
Marginal starting rate:	263,079	6,013	248,980	5,880				
Starting rate	270,170	1,098	252,044	1,005				
Total tax charge	829,286	49,213	875,317	59,874	886,664	65,139	941,840	65,461
Double tax relief	6,204	13,036	6,743	16,181	7,387	20,456	7,959	16,764
ACT set-off	1,086	120	767	75	637	92	464	147
Income tax set-off	23,687	146	24,224	359	31,857	333	32,730	417
Other reliefs	293,491	738	280,554	655	242,476	536	42,535	402
Corporation tax payable	603,492	35,173	668,906	42,604	868,016	43,722	931,269	47,731

B.2. FAME PROVIDED BY BUREAU VAN DIJK

Bureau Van Dijk claims to include the universe of companies in the United Kingdom, the Republic of Ireland, and some of the British Overseas Territories in its FAME database. For this report we use a download from February 2010 which leaves us with financial accounts of about 2.8 million companies. Excluding all companies from the Republic of Ireland and the British Overseas Territories our FAME dataset includes 2,566,937 companies. Table A.4 splits the FAME dataset into three broad categories of legal status and further distinguishes between consolidated and non- consolidated accounts.[28] Additionally, we also list the number of companies by their respective incorporation date. The majority of more than the 2.3 million companies in FAME are private limited companies. Roughly three quarters of these 2.3 million companies are less than ten years old and about one in seven of the private limited companies were incorporated as recently as 2009. This number is roughly in line with the 330,100 newly registered companies depicted in Figure 5. In contrast, public companies tend to be substantially older, with roughly one half of the companies being older than ten years. Amongst consolidated companies, the share of older companies is larger.

For the purpose of this study we exclude all consolidated accounts to avoid double counting. Further, we exclude all companies with a legal status different from private limited or public companies. This leaves us with 2,380,167 unconsolidated financial accounts of 2,373,626 private limited and 6,541 public companies. For these companies there are in theory accounts for the last ten years, i.e. from 1999 to 2009. However, a large number of these companies did not exist over the whole period. Furthermore, a lot of these companies are too small to fully report the necessary information.

28 There is a non-negligible number of financial accounts which are neither classified as consolidated or unconsolidated. For the purpose of this report we treat these as unconsolidated accounts and include them in our analysis.

Table A.4: FAME coverage by legal form and consolidation

	Other legal forms		Private limited		Public companies		Total	
Year of incorporation	not consolidated	consolidated	not consolidated	consolidated	not consolidated	consolidated	not consolidated	consolidated
pre 2000	50,851	1,833	577,653	5,932	3,257	1,807	631,761	9572
2000	4,477	98	69,920	524	292	173	74,689	795
2001	5,365	110	73,751	451	177	121	79,293	682
2002	6,643	99	118,729	510	170	96	125,542	705
2003	8,026	113	161,941	589	297	114	170,264	816
2004	10,165	116	134,916	663	279	220	145,360	999
2005	11,526	102	159,971	735	317	220	171,814	1,057
2006	13,915	104	202,514	819	426	162	216,855	1,085
2007	16,406	71	260,908	839	368	110	277,682	1,020
2008	21,106	30	274,497	271	449	25	296,052	326
2009	21,229	1	338,826	2	509	1	360,564	4
Total	**169,709**	**2,677**	**2,373,626**	**11,335**	**6,541**	**3,049**	**2,549,876**	**17,061**

Keeping only the accounts which report total assets in the balance sheet and earnings before interest and taxation (EBIT) and taxation in the profit and loss account leaves us with 1,595,400 observations from 411,088 different companies. The coverage of these companies over time is shown in Table A.5. Please note that we allocate an account to a particular calendar year using the cut off point of 31st March. This implies that a financial account with the closing date between January and March is allocated to the previous calendar year.

Further, Table A.5 splits the observations according to their ownership status. To obtain the ownership status we first use the ownership information about global and immediate owner provided in FAME. However, to correctly distinguish between purely domestic groups and multinational groups we also exploit the ownership information of a previous download from ORBIS also provided by Bureau Van Dijk.[29]

Table A.5: Number of companies by year and according to ownership type

Year	Standalone companies	Domestic groups	UK-owned multinationals	Foreign-owned multinationals	Total
1999	78,836	10,433	15,040	12,934	117,243
2000	96,795	12,119	17,121	14,509	140,544
2001	102,519	12,555	17,928	15,345	148,347
2002	103,213	13,030	19,084	16,424	151,751
2003	101,568	12,725	19,658	16,691	150,642
2004	108,743	11,855	20,256	16,849	157,703
2005	114,046	11,640	20,841	17,359	163,886
2006	133,885	12,107	21,873	17,973	185,838
2007	141,421	11,973	22,157	18,578	194,129
2008	121,600	10,056	19,214	16,926	167,796
2009	14,698	901	1,291	631	17,521
Total	1,117,324	119,394	194,463	164,219	1,595,400
Number of companies	316,897	27,953	36,202	30,036	411,088

A company is considered to be a standalone company if neither the current FAME dataset nor the previous ORBIS dataset reports a corporate majority owner or subsidiary. Domestic groups are companies that report a UK subsidiary and/or a UK parent, but have no foreign subsidiaries or owner. In contrast, the column 'UK multinationals' reports companies with at least one foreign subsidiary

29 The previous download dates back to April 2009 and includes approximately 1.1 million companies worldwide.

within a corporate group which has a global owner located in the United Kingdom. The fourth group comprises companies that are within a corporate group which is ultimately owned by a foreign corporation. Therefore they are by our definition automatically multinationals. The large majority of observations, 1.1 million out of about 1.6 million, are classified as standalone companies, which reflects the economic reality that the UK economy is characterised through a large number of small and medium sized enterprises. Dividing the number of observations (1,117,324) by the number of distinct companies (316,897) shows that the average company is included in the dataset for about 3.5 years. This rather short period of time coverage can be directly linked back to the large number of very young companies as reported in Table A.4.

For the 27,953 companies with purely domestic groups, information for 4.27 years on average is available resulting in 119,324 observations. Both for UK-owned and foreign-owned multinationals more than five years' data are available: totalling 194,463 observations of 36,202 companies, and 164,219 observations of 30,036 companies, respectively.

Table A.6: Sector classification in FAME (SIC 2003)

Our sector classification	SIC 2003 description	SIC 2003 (2 digit)
[1]	**Agriculture**, hunting and related service activities	01
	Forestry, logging and related service activities	02
	Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing	05
[2]	**Mining** of coal and lignite; extraction of peat	10
	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying	11
	Mining of uranium and thorium ores	12
	Mining of metal ores	13
	Other mining and quarrying	14
	Manufacture of coke, refined petroleum products and nuclear fuel	23
[3]	Manufacture of **food** products **and beverages**	15
	Manufacture of tobacco products	16
[4]	Manufacture of **textiles**	17
	Manufacture of wearing apparel; dressing and dyeing of fur	18
	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	19
[5]	Manufacture of **wood** and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	20
	Manufacture of pulp, **paper** and paper products; publishing and printing	21
	Publishing, printing and reproduction of recorded media	22
[6]	Manufacture of **chemicals** and chemical products	24
	Manufacture of rubber and plastic products	25

Our sector classification	SIC 2003 description	SIC 2003 (2 digit)
	Manufacture of other non-metallic mineral products	26
[7]	Manufacture of basic **metals**	27
	Manufacture of fabricated metal products, except machinery and equipment	28
	Manufacture of machinery and equipment not elsewhere classified	29
[8]	Manufacture of **office machinery** and computers	30
	Manufacture of electrical machinery and apparatus not elsewhere classified	31
	Manufacture of radio, television and communication equipment and apparatus	32
	Manufacture of medical, precision and optical instruments, watches and clocks	33
[9]	Manufacture of **motor vehicles**, trailers and semi-trailers	34
	Manufacture of other transport equipment	35
[10]	Manufacture of furniture; manufacturing not elsewhere classified	36
	Recycling	37
[11]	Electricity, gas, steam and hot water supply	40
	Collection, purification and distribution of water	41
[12]	Construction	45
[13]	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	50
[14]	Wholesale trade and commission trade, except of motor vehicles and motorcycles	51
[15]	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	52
[16]	Hotels and restaurants	55
[17]	Land transport; transport via pipelines	60
	Water transport	61
	Air transport	62
	Supporting and auxiliary transport activities; activities of travel agencies	63
	Post and telecommunications	64
[18]	Financial intermediation, except insurance and pension funding	65
	Insurance and pension funding, except compulsory social security	66
	Activities auxiliary to financial intermediation	67
[19]	Real estate activities	70
[20]	Renting of machinery and equipment without operator and of personal and household goods	71
	Computer and related activities	72

Our sector classification	SIC 2003 description	SIC 2003 (2 digit)
	Research and development	73
	Other business activities	74
[21]	Public administration and defence; compulsory social security	75
	Education	80
[22]	Health and social work	85
[23]	Sewage and refuge disposal, sanitation and similar activities	90
	Activities of membership organisations not elsewhere classified	91
	Recreational, cultural and sporting activities	92
	Other service activities	93
	Private households with employed persons	95
	Undifferentiated goods producing activities of private households for own use	96
	Undifferentiated services producing activities of private households for own use	97
	Residents property management	98
	Extra-territorial organisations and bodies	99
[24]	No SIC classification	N.A.

Table A.7: Sector coverage and averages in FAME

Sector	Description	Observations	Share of multinationals	Taxation (average), £000	EBIT (average), £000	Total assets (average), £000
[1]	Agriculture	16,135	11.2%	18	191	3,750
[2]	Mining	8,171	49.0%	9,222	29,655	203,281
[3]	Food & beverages	11,543	49.4%	1,085	7,454	84,123
[4]	Textiles	7,394	27.2%	120	525	8,751
[5]	Wood & paper	30,735	28.8%	215	1,181	24,669
[6]	Chemicals	20,803	54.3%	750	4,946	63,180
[7]	Metals	39,977	34.6%	213	1,013	19,936
[8]	Machinery	19,512	45.8%	435	3,511	38,675
[9]	Motor vehicles	5,793	47.4%	79	808	50,525
[10]	Manufacturing n.e.c.	18,300	30.0%	153	690	8,784
[11]	Electricity & water	3,694	67.4%	3,447	34,890	503,647
[12]	Construction	146,362	12.4%	100	472	5,793
[13]	Sale of motor vehicles	35,050	19.5%	113	586	9,193
[14]	Wholesale trade	94,088	31.7%	206	1,271	21,076
[15]	Retail trade	58,488	12.3%	370	1,956	19,427
[16]	Hotels & restaurants	33,725	18.8%	119	2,255	29,801
[17]	Transport & communication	56,856	29.7%	233	1,559	38,952
[18]	Financial intermediation	83,200	45.1%	730	9,818	391,918
[19]	Real estate	160,480	19.1%	86	824	13,178
[20]	Business activities	523,195	18.0%	80	1,409	46,597
[21]	Public administration	12,087	13.6%	58	360	4,540
[22]	Health and social	23,023	19.4%	74	899	9,717
[23]	Other service activities	146,679	13.1%	76	476	7,355
[24]	No SIC classification	40,110	46.1%	135	1,700	34,937
Total		**1,595,400**	**22.5%**	**223**	**1,923**	**48,931**

B.3. HMRC TAX RETURN DATA

The HMRC Datalab includes the CT600 returns for a large sample of UK companies. In particular it has full coverage for large companies and 10 percent sampling for small companies. To this end a company is considered to be large if one of the following criteria is fulfilled:

Table A.8: Sampling criteria HMRC dataset

Criteria	Threshold
Trading profit	£ 500,000
Other income	£ 1,000,000
Net amount chargeable	£ 2,000,000
Trading loss	£ 500,000
Balancing charges	£ 500,000
Capital allowances	£ 500,000
Gross gains	£ 1,000,000
Turnover	£ 10,000,000
Tax paid	£ 660,000

Note, that once a company is assigned the 'large' status, it will remain large for the subsequent periods.

This leads to a sample of 1,422,826 tax returns, out of which 570,536 are from large companies and a further 852,290 are small companies. This in total represents more than 9 million tax returns. The number of distinct companies is 336,920. Table A.9 shows the coverage over time.

Table A.9: Coverage and sampling in HMRC dataset

Fiscal year	Large companies	Small companies	Total sample	Companies represented
2001/02	60,170	96,427	156,597	1,024,440
2002/03	66,892	99,496	166,388	1,061,852
2003/04	73,547	112,816	186,363	1,201,707
2004/05	81,191	126,540	207,731	1,346,591
2005/06	88,937	133,538	222,475	1,424,317
2006/07	97,281	139,242	236,523	1,489,701
2007/08	102,518	144,231	246,749	1,544,828
Total	**570,536**	**852,290**	**1,422,826**	**9,093,436**

Further, the data in the HMRC Datalab dataset includes the standard trade classifications (STC) which we reclassify into 30 broad sector groups are presented in Table A.10. Sector classification in HMRC datalab. Further, Table A.11 shows an sector breakdown according to size and over time.

Table A.10: Industry classification in HMRC datalab (STC)

Our industry classification	STC classification	STC codes (4 digit)
[1]	**Agriculture** & Horticulture	0-399
	Forestry	
	Fishing	
[2]	Coal Extraction & Manufacture of Solid Fuels	400-799, 1000-1099
	Extraction of Mineral Oil & Natural Gas	
	Mineral Oil Processing	
	Nuclear Fuel Production	
	Mining & Quarrying (other than fuels)	
[3]	Production & Distribution of **Electricity**, Town Gas and Other Forms of Energy	800-999
	Water Supply Industry	
[4]	**Metal Manufacture**	1100-1199, 1900-1999
	Manufacture of Metal Goods not elsewhere specified	
[5]	Manufacture of Non-metallic **Mineral Products**	1200-1299
[6]	**Chemical** Industry	1300-1399, 2800-2899
	Processing of Rubber and Plastics	
[7]	**Mechanical Engineering** (except motor vehicle manufacture)	1400-1499
[8]	Electrical & Electronic Engineering	1500-1599, 1800-1899
	Instrument Engineering	
[9]	Manufacture of **Motor Vehicles** and Parts	1600-1799
	Manufacture of Other Transport Equipment	
[10]	**Food** Processing Industry	2000-2299
	Drink Industry	
	Tobacco Industry	
[11]	**Textile** Industry	2300-2599
	Manufacture of Leather and Leather Goods	
	Footwear and Clothing Industry	
[12]	Timber and **Wooden** Furniture Industries	2600-2799
	Manufacture of **Paper** and Paper Products, Printing and Publishing	
[13]	**Other Manufacturing** Industries and Recycling	2900-2999
[14]	**Construction**	3000-3499

Our industry classification	STC classification	STC codes (4 digit)
[15]	**Wholesale** Distribution	3500-3599
[16]	**Retail** Distribution	3600-3699
[17]	**Distribution** and Repair of **Motor Vehicles**, Parts and Accessories, Filling Stations	3700-3799
[18]	**Hotels** and **Catering**	3800-3999
[19]	Road Haulage	4000-4299
	Sea **Transport**	
	Other Transport and Storage	
[20]	**Postal** & **Telecommunication** Services	4300-4999
[21]	UK Banks	5000-5999
	UK Branches of Foreign Banks	
	Building Societies	
	Other Businesses Provding Credit	
	Unit and Investment Trusts	
	Other **Financial Activities**	
	Insurance	
	Llyods Underwriters	
[22]	Solicitors	6000-6599
	Barristers	
	Accountants: Chartered or Incorporated only	
	Architects	
	Consulting Engineers	
	Other **Professional** and Technical **Services**	
[23]	**Business Services**	6600-7199
	Hiring out of Moveables (except television sets)	
	Hiring out of Television sets	
[24]	Owning and Dealing in **Real Estate**	7200-7499
[25]	Medical Practioneers	7500-7999
	Dentists	
	Medical and Educational Services	
	Social **Services** etc	
	Trade Protection Associations	
[26]	Recreational Services	8000-8499
	Hairdressing and Beauty Parlours	
	Other Personal Services	

Our industry classification	STC classification	STC codes (4 digit)
Concerns Operating Mainly Outside the UK (Controlled in the UK)		
[27]	Oil Production, Refining and Distribution	8500-8799
	Financial Concerns	
	Other Concerns OUK	
[28]	**Holding Companies** with major activities in more than one broad sector	8900-8999
[29]	**Unknown**	8800-8899, 9000-9999
	National & Local **Government** Services	
	National Defence Forces	
	Occupational Pensions	
	Domestic Services	
	Foreign Government & International Organisation Service	
	Companies Incorporated in the UK before 1988, but not resident because of overseas management and control	
[30]	No Industry classification	n.a.

Table A.11: Industry coverage by size categories 2001/02 to 2007/08 (HMRC Datalab data)

	2001/02		2002/03		2003/04		2004/05		2005/06		2006/07		2007/08		
Industry	**large**	**small**	**large**	**small**	**large**	**small**	**large**	**small**	**large**	**small**	**large**	**small**	**large**	**small**	
[1]	404	1,092	470	1,096	510	1,241	552	1,329	593	1,319	642	1,348	724	1,369	**12,689**
[2]	379	131	426	121	445	142	464	143	476	143	516	177	539	200	**4,302**
[3]	191	68	203	84	222	95	232	97	256	113	282	108	278	127	**2,356**
[4]	771	766	803	734	860	745	889	749	936	733	989	712	1,012	702	**11,401**
[5]	250	250	273	254	296	282	327	305	356	298	367	302	357	290	**4,207**
[6]	1,110	576	1,139	566	1,177	576	1,273	586	1,303	581	1,325	578	1,347	529	**12,666**
[7]	1,237	1,453	1,304	1,428	1,394	1,472	1,478	1,509	1,559	1,475	1,634	1,502	1,702	1,452	**20,599**
[8]	1,662	1,391	1,737	1,396	1,812	1,455	1,917	1,458	1,973	1,451	2,062	1,455	2,116	1,444	**23,329**
[9]	493	418	503	407	523	458	575	459	578	466	594	484	605	520	**7,083**
[10]	717	261	766	269	801	287	827	306	867	294	908	285	879	290	**7,757**
[11]	645	604	658	584	711	581	738	585	753	539	770	532	787	497	**8,984**
[12]	1,263	1,253	1,317	1,232	1,390	1,291	1,450	1,292	1,516	1,243	1,553	1,245	1,510	1,183	**18,738**
[13]	287	408	311	441	325	491	334	547	379	563	394	584	406	578	**6,048**
[14]	2,761	6,212	3,210	6,336	3,678	7,677	4,123	8,708	4,637	8,824	5,196	9,263	5,634	9,532	**85,791**
[15]	3,821	3,758	4,098	3,243	4,321	3,252	4,615	3,107	4,892	3,021	5,128	3,018	5,148	2,900	**54,322**
[16]	2,553	4,357	2,833	4,393	3,041	5,015	3,235	5,373	3,427	5,369	3,665	5,449	3,733	5,403	**57,846**
[17]	1,606	1,401	1,743	1,411	1,872	1,603	1,945	1,724	1,988	1,719	2,029	1,757	2,024	1,774	**24,596**
[18]	824	2,155	943	2,273	1,066	2,602	1,145	2,840	1,252	2,824	1,378	3,026	1,450	3,018	**26,796**
[19]	1,959	1,965	2,071	2,051	2,238	2,300	2,409	2,550	2,554	2,661	2,667	2,904	2,796	2,949	**34,074**
[20]	222	201	253	192	286	201	292	190	318	208	303	222	299	211	**3,398**
[21]	5,522	2,470	5,954	2,467	6,143	2,499	6,470	2,421	6,776	2,362	7,099	2,333	7,141	2,224	**61,881**
[22]	1,341	4,192	1,429	4,185	1,595	4,713	1,769	4,976	2,019	4,896	2,198	5,055	2,376	5,376	**46,120**
[23]	7,526	18,214	8,249	19,030	9,082	22,175	10,122	26,971	11,270	29,739	12,494	30,683	13,379	32,551	**251,485**
[24]	3,425	6,267	4,088	6,426	4,712	6,856	5,417	7,125	6,052	7,127	6,810	7,366	7,160	7,418	**86,249**
[25]	688	1,905	796	2,029	937	2,434	1,112	2,683	1,261	2,704	1,443	2,931	1,582	2,987	**25,492**
[26]	2,061	4,322	2,339	4,320	2,531	4,811	2,699	5,116	2,857	5,027	2,996	5,147	3,107	5,352	**52,685**
[27]	344	127	340	113	358	105	368	112	384	107	385	107	370	125	**3,345**
[28]	1,352	787	1,465	774	1,579	742	1,709	702	1,747	697	1,888	676	1,904	679	**16,701**
[29]	7,737	8,887	8,410	8,700	9,060	9,077	9,721	9,415	10,247	8,903	10,638	8,167	10,581	7,564	**127,107**
[30]	7,019	20,536	8,761	22,941	10,582	27,638	12,984	33,162	15,711	38,132	18,928	41,826	21,572	44,987	**324,779**
Total	**60,170**	**96,427**	**66,892**	**99,496**	**73,547**	**112,816**	**81,191**	**126,540**	**88,937**	**133,538**	**97,281**	**139,242**	**102,518**	**144,231**	**1,422,826**

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