Corporate Tax Policy and Incorporation in the EU

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Abstract:

In Europe, declining corporate tax rates have come along with rising tax-to-GDP ratios. This paper explores to what extent income shifting from the personal to the corporate tax base can explain these diverging developments. We exploit a panel of European data on legal form of business to analyze income shifting via incorporation. The results suggest that the effect is significant and large. It implies that the revenue effects of lower corporate tax rates – possibly induced by tax competition -- will partly show up in lower personal tax revenues rather than lower corporate tax revenues. Simulations suggest that between 12% and 21% of corporate tax revenue can be attributed to income shifting. Income shifting is found to have raised the corporate tax-to-GDP ratio by some 0.25%-points since the early 1990s.

Keywords: Corporate tax; Personal tax; Incorporation; Income shifting.

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1 Introduction

During the past two decades, statutory corporate tax rates in Europe have fallen considerably. This has induced fears of a race-to-the-bottom in the European Union.[1] This could ultimately erode corporate tax revenues and impose a threat to the financing of European welfare states. However, despite the reduction in corporate tax rates, corporate tax revenues have maintained remarkably stable over the past decades. A number of explanations have been put forward for these diverging developments. First, Devereux et al. (2002) and Griffith and Klemm (2004) show that corporate tax rate reductions have been accompanied by base broadening policies in many OECD countries, e.g. by means of reduced investment tax credits, loss offset rules, interest deductibility and fiscal depreciation. Second, Auerbach (2006) suggests that losses can partly explain the rise in the implicit tax rate on corporations in the United States. Third, Becker and Fuest (2007) argue that pre-tax profitability in the economy has increased in light of globalisation, thus causing higher profit shares and a broadening of the corporate tax base. Finally, Devereux et al. (2004) and Auerbach (2006) suggest that a rising share of the financial sector in the economy is a potential explanation for the growing share of corporate profits in the economy.

This paper explores another possible explanation for the combination of falling corporate tax rates and stable corporate tax revenues, namely the growth in the corporate share of total pre-tax profit in the economy. Some authors find that the corporate share of business income has indeed increased during the past decades in a number of countries (Weichenrieder (2005), Sørensen (2006)). An important question is whether this growth in the corporate share of business income has been caused by reductions in the corporate tax rate. Entrepreneurs face a choice between a (closely held) corporation and other legal forms of doing business, such as the (sole) proprietorship. Lower corporate tax rates may have induced them to switch to the corporate form, which then broadens the corporate tax base. If this is the case, the revenue consequences of tax competition in corporate tax rates will not show up in corporate tax revenues but in personal tax revenues. This will shed new light on the tax competition debate as the adverse revenue implications of tax competition can be more severe than when only corporate tax revenues are considered. Moreover, it suggests that tax competition undermines the fundamental reason for the existence of the corporate tax, which is to serve as a backstop for the personal income tax. It would imply that there *is* reason to

[1] See e.g. Nicodème (2006) for a review of the literature on tax competition.

worry about tax competition, since lower corporate tax rates do erode the financial basis of the public sector and of its redistributive policies in particular.

US evidence suggests that income shifting between personal and corporate tax bases is indeed significant (Gordon and Slemrod, 2000; Gordon and MacKie-Mason, 1994; MacKie-Mason and Gordon, 1997; Goolsbee, 1998; 2004). Fuest and Weichenrieder (2002) explore the share of corporate savings in total private savings in the OECD. For Europe, evidence is scarce. This paper contributes to the literature by empirically exploring income shifting in Europe through the choice of legal form. Moreover, most of the earlier studies rely on time series data where it appears difficult to identify the impact of taxes due to small variations. Instead, we use panel data with considerably more variation. For the share of the corporate sector in total business activity, we take data from Eurostat for 20 European countries, 60 sectors and a maximum coverage of six years between 1998 and 2003.

This paper is organized as follows. Section (2) formulates our predictions on income shifting between personal and corporate tax bases. Section (3) describes the data. Section (4) presents our empirical analysis and discusses the implications of income shifting for the corporate tax-to-GDP ratio. Finally, section (5) concludes.

2. Corporate taxation and income shifting

MacKie-Mason and Gordon (1997) and Goolsbee (1998; 2004) propose a simple model for the choice between sole proprietorship and incorporation. The models suggest that the choice of legal form of an enterprise is determined by the net tax loss from incorporation compared to the net non-tax benefit from incorporation. Regarding taxation, sole proprietorships are subject to the personal income tax. Corporate firms are subject to the corporate income tax and the income tax that applies to either profit distributions or realized capital gains, thereby taking into account double-tax relief if appropriate. A business organized in the corporate form may also collect non-tax benefits. These can be related to the limited liability of incorporation, which reduces the individual risk of doing business. Indeed, limited liability means that the entrepreneur does not risk his individual assets or income when taking part in the firm, since he is only liable for the capital invested in the company. Moreover, corporate businesses may have an advantage in attracting capital due of the public trading of shares. Incorporation may also bring along non-tax costs related to capital requirements and legal obligations for companies in the corporate form. The net non-tax benefits from incorporation

may differ across firms. The models suggest that an entrepreneur will choose the corporate form as long as the non-tax benefits exceeds the net tax loss of the corporate form. Assuming a distribution for the non-tax benefit, the models derive an expression for the share of firms that will optimally choose the corporate form. In the empirical analysis, they estimate the following equation for the corporate share of business in the economy (*CORP*):

$$CORP = \beta_0 + \beta_1 (T_p - T_c) + \beta_2 X + \varepsilon \qquad (2.1)$$

where T_p and T_c represent, respectively, the personal and corporate income tax rates and X is a vector of control variables. We expect a positive sign for β_1.

Empirical research on (2.1) refers primarily to the United States. Gordon and MacKie-Mason (1994) use data on US firms between 1970 and 1986 to explore the importance of tax and non-tax factors in the choice of organisational form. They conclude that non-tax factors are considerably more important than taxes, implying that the efficiency cost of the tax distortion is relatively small. MacKie-Mason and Gordon (1997) use data on the corporate share of capital between 1959 and 1986 for the US and find that the tax differential between personal and corporate taxes exerts a significant effect on the corporate capital share, but only for firms that make positive profits. On aggregate, they find a very small effect. Thus, MacKie-Mason and Gordon (1997) conclude that non-tax factors are likely to be dominant in the choice of legal form by firms, rather than tax factors. Using time series data for the corporate share of capital between 1900 and 1939, Goolsbee (1998) reports a similar effect as Mackie-Mason and Gordon (1997).

Goolsbee (2004) argues that the earlier US studies might have problems in identifying the impact of taxes on organizational form since the time series variation in tax rates has been limited. Moreover, at the same time when tax rates were modified, other components of the tax system changed as well, which renders it difficult to identify the impact of the tax on organizational form. To allow for more variation in tax rates, Goolsbee (2004) adopts cross-section data for US States and industries in the retail trade sector in 1992. He explores several indicators for the size of the corporate sector, including the share of companies, the employment share and sales. The estimates suggest a much larger impact of corporate taxes on the rate of incorporation: raising the corporate tax rate by .1 reduces the corporate share of firms by 0.25 and the corporate share of sales and employment by 0.07 to 0.15.

Studies for Europe are scarce. An exception is Fuest and Weichenrieder (2002), who explore the impact of corporate and personal income taxes on the division of interest income between the corporate and non-corporate sector for 17 OECD countries between 1985 and 1997. They find that the difference in tax rates exerts a significant and strong effect on the share of corporate savings in total savings. They do not analyze the impact of corporate taxes on the corporate share of business. Alstadsæter (2003) explores income shifting under the Norwegian split model, which is part of the dual income tax system. She shows that the corporate organisational form serves as a tax shelter for high income entrepreneurs under the split model. While she provides time series evidence for Norway that is consistent with income shifting towards the corporate form, she does not explicitly estimate the impact of taxes on incorporation.

3. Data

This section demonstrates our data. The appendix provides more information on the precise data sources and definitions. The data come from Eurostat on business demography in Europe for 20 European countries, 6 years between 1998 and 2003 and 60 sectors (see Schrör, 2005, for a description). It provides information on the number of firms in three legal forms:

- Personally owned firms that have no limit to personal liability. It reflects the sole proprietorships (SP).
- Private or publicly quoted joint stock companies with limited liability (LL) for those owning shares. This category captures corporations.
- Partnerships (PA), which consists of personally owned limited and unlimited liability partnerships. Included are also other level forms such as co-operatives and associations.

To arrive at corporate shares, we divide the enterprises that are registered as limited liability (LL) companies by the sum of companies with limited liability (LL) and personal liability firms (SP), i.e. $CORP = \frac{LL}{LL + SP}$. Partnerships is a hybrid category of companies that can be taxed under either the corporate income tax regime or the personal income tax and we therefore exclude them in this definition.

The data contain information on the number of both active firms and enterprise births. Moreover, apart from the number of firms, there are also data on employment in each of the

three legal forms, both for active and new firms. We therefore look at four indicators for the share of the corporate sector in the economy (*CORP*):

- The corporate share in the total number of active firms.
- The corporate share in the total number of new firms.
- The corporate employment share of active firms.
- The corporate employment share of new firms.

Table 3.1: Degree of incorporation per country (CORP).

	Number of firms		Employment	
	(1) New	(2) Active	(3) new	(4) active
Switzerland	54.4%	43.2%	67.3%	76.1%
Czech Republic	12.1%	13.1%	35.0%	62.9%
Denmark	22.1%	28.6%	35.1%	78.4%
Estonia [a]	72.3%	82.7%	93.8%	96.8%
Spain	33.8%	33.5%	51.9%	75.5%
Finland	28.8%	47.2%	52.6%	92.5%
United Kingdom	61.0%	56.9%	73.0%	89.5%
Hungary	23.0%	25.9%	48.7%	72.5%
Italy	19.9%	17.3%	31.3%	64.3%
Lithuania [b]	45.0%	46.6%	70.9%	80.7%
Luxembourg	76.2%	69.3%	84.0%	91.4%
Latvia [c]	49.9%	65.0%	79.3%	92.3%
Netherlands	28.8%	41.4%	43.1%	87.2%
Norway	29.7%	49.0%	48.3%	87.7%
Sweden	25.9%	46.3%	35.8%	87.3%
Slovenia [d]	26.1%	34.3%	37.9%	73.2%
Slovakia	18.0%	20.7%	45.7%	71.8%
Weighted average	36.8%	35.7%	58.6%	81.8%

The data are for 1998-2003 (except CZ, EE, HU, LT, LV, RO, SI, SK: 2000-2003; CH: 2003; DK: 1998-2001; NL: 1999-2003). The average is the average across sector and time dimensions for each country. The degree of incorporation is the ratio of new (or active) firms which are incorporated on the total number of new (or active) firms. Alternatively, the share of employment is the ratio of the number of people employed in new (or active) firms which are incorporated on the number of people employed in all new (or active) firms. Sole proprietorships are not included in the data for Portugal (from 2001) and Romania and are therefore eliminated from the table. [a] For Estonia, only sole proprietorships with at least 20 employees are included. [b] In Lithuania, self-employed entrepreneurs that do not have employee are not covered by the dataset. [c] For Latvia, the natural persons are included from 2002. [d] For Slovenia, additional forms of natural persons are included from 2002.

Table 3.1 reports the mean corporate share of business for the four indicators per country.[2] It shows that the corporate share in terms of the number of companies (36% for active and 37% for new firms) is substantially smaller than the corporate share measured in

terms of employment (82% for active firms and 59% for new firms). Hence, corporations on average employ more people than companies in the non-corporate form. This holds in particular for active enterprises. Across countries, the degree of incorporation differs widely. For instance, in terms of the number of active companies, it moves from 13% in the Czech Republic to 69% in Luxembourg. In most countries, the corporate share is somewhere between 20 and 50%. In terms of employment, the corporate share of active firms exceeds 60% in all countries and is even over 90% for Finland, and Luxembourg.

Table 3.2: Degree of incorporation per sector (CORP).

		Number of firms		Share of employment	
Sector	**NACE**	**New**	**Active**	**New**	**Active**
Mining	C	67.3%	66.6%	88.9%	94.9%
Manufacturing	D	40.6%	44.5%	77.5%	92.1%
Electricity, gas, water	E	69.0%	80.9%	91.0%	99.6%
Construction	F	29.4%	31.1%	51.4%	71.3%
Retail	G	31.9%	31.0%	50.2%	76.3%
Hotels and restaurants	H	26.2%	24.8%	46.2%	69.3%
Storage and comm..	I	30.9%	26.9%	56.8%	86.2%
Financial	J	38.6%	41.3%	69.5%	94.5%
Estate and business	K (excp. K7415)	49.2%	46.5%	66.4%	81.0%
Education	M	26.8%	35.9%	46.7%	90.7%
Health and social	N	20.6%	18.5%	53.2%	77.8%
Other social activities	O	31.0%	33.2%	56.6%	76.4%
Weighted average		36.8%	35.7%	58.6%	81.8%

See notes for Table 3.1.

Table 3.2 presents the mean of the four measures for the degree of incorporation per sector. In general, we observe that the incorporation rate in terms of company numbers is relatively high in mining (67% of active firms) and in utilities (81%). It is small in construction and many service sectors (Hotels and restaurants, Health and social work, Social activities, Retail). In terms of employment, some of the service sectors show a higher corporate share, e.g. in education and financial.

To see how partnerships influence our results, we will also consider two alternative shares for the decree of incorporation, namely a share that allocates partnerships to either non-corporate or corporate firms, i.e.

$$CORP2 = \frac{LL}{LL + SP + PA}$$

[2] Portugal and Romania do not report sole proprietorships and are thus eliminated from the sample. For Estonia, Latvia and Slovenia, the data contain a structural break in 2001 due to a different way of data collection. We control for this via dummy variables in the regressions.

or

$$CORP3 = \frac{LL + PA}{LL + SP + PA}.$$

Table 3.3 shows the values of these alternative measures of the degree of incorporation for existing firms per country and per sector. The measure of incorporation is most affected by partnerships in the countries and sectors where its share is the highest such as the Netherlands, Hungary, Italy, Sweden UK, and Denmark, as well as utilities and hotels and restaurants. Although this may affect levels, a correlation analysis shows that the correlation between CORP1 and CORP2 is 93.6% and 91.5% for new and active firms respectively (both significant at 1%-level). The respective correlations between CORP1 and CORP3 are 96.9% and 96.4% (both also significant at 1%-level).

Table 3.3: Alternative measures of degree of incorporation of existing firms.

Country/sector	CORP1	CORP2	CORP3	Share partnerships
Switzerland	43.2%	40.4%	46.9%	6.5%
Czech Republic	13.1%	13.0%	13.7%	0.7%
Denmark	28.6%	23.5%	41.5%	18.0%
Estonia	82.7%	81.1%	83.0%	2.0%
Spain	33.5%	30.9%	38.8%	7.9%
Finland	47.2%	38.9%	56.4%	17.4%
United Kingdom	56.9%	46.7%	64.6%	17.9%
Hungary	25.9%	19.4%	44.4%	24.9%
Italy	17.3%	13.7%	34.5%	20.9%
Lithuania	46.6%	45.0%	48.5%	3.6%
Luxembourg	69.3%	64.9%	71.2%	6.3%
Latvia	65.0%	62.0%	66.6%	4.5%
Netherlands	41.4%	31.0%	56.1%	25.1%
Norway	49.0%	44.2%	54.0%	9.8%
Sweden	46.3%	37.8%	56.2%	18.4%
Slovenia	34.3%	32.8%	37.2%	4.4%
Slovakia	20.7%	20.5%	21.5%	1.0%
Mining	66.6%	54.6%	72.6%	18.0%
Manufacturing	44.5%	37.3%	53.4%	16.1%
Electricity, gas, water	80.9%	52.3%	87.6%	35.3%
Construction	31.1%	26.8%	40.6%	13.8%
Retail	31.0%	26.0%	42.0%	15.9%
Hotels and restaurants	24.8%	18.7%	43.3%	24.7%
Storage and comm..	26.9%	24.1%	34.4%	10.2%
Financial	41.3%	37.2%	47.1%	9.9%
Estate and business	46.5%	40.4%	53.6%	13.3%
Education	35.9%	28.9%	48.4%	19.5%
Health and social	18.5%	15.8%	30.6%	14.8%
Other social activities	33.2%	27.4%	44.9%	17.5%
Weighted average	35.7%	30.2%	45.5%	15.3%

See notes for Table 3.1.

Tax variables

The choice regarding legal form primarily applies to small firms. For most of these firms, the choice involves a discrete decision. Therefore, not the marginal tax on business, but the average effective tax burden will matter. As argued by Mackie-Mason and Gordon (1997), the statutory corporate tax on small business is a good approximation for the average tax burden if profits are large. As the income from entrepreneurial effort and the labour that an entrepreneur supplies to his company is generally included in the business income, profitability indeed tends to be high. Hence, the statutory corporate tax rate is likely to be a good approximation of the average effective tax burden on the income of small businesses.

Table 3.4: Tax rates per country in 2003.

	(1) CT for small businesses	(2) Dividend relief system	(3) Dividend tax	(4) Top personal income tax
Belgium	24.28%	DIT	15%	53.5%
Switzerland	21.74%	ITC	35%	40.46%
Czech Republic	31%	DIT	15%	32%
Denmark	30%	DTC	28%	59.7%
Estonia	0%	Exemption	26%	26%
Spain	30%	ITC	15%	45%
Finland	29%	DIT	29%	54%
United Kingdom	19%	2/8 ITC	0%	40%
Hungary	19.64%	DIT	20%	40%
Italy	38.25%	DIT	12.5%	45%
Lithuania	13%	None	15%	33%
Luxembourg	28.3%	DTC	20%	38.95%
Latvia	15.2%	DIT	0%	25%
Netherlands	29%	DTC	25%	52%
Norway	28%	ITC	0%	47.5%
Portugal	22%	50% exem.	15%	40%
Romania	25%	DIT	5%	40%
Sweden	28%	DIT	30%	55%
Slovenia	25%	60% DTC	25%	50%
Slovakia	25%	DIT	15%	38%
Average	24.1%		17.3%	42.8%

Source: Structures of taxation systems, IBFD, OECD tax database and own calculations. The statutory rates include all local taxes and surcharges. DIT: Dual Income Tax, ITC: Indirect Tax Credit, DTC: Direct Tax Credit.

Some countries adopt progressive systems for the corporate tax by applying reduced rates for low levels of profit. Since our focus is on small businesses, the reduced rates will probably determine the impact on the choice of legal form. We therefore use the reduced rates for Belgium, Latvia, Lithuania, Luxembourg, the Netherlands, Portugal, Spain and the

intermediate rate (20% or 19%) for the UK as our measure for the corporate income tax; the other countries do not feature reduced rates. The corporate tax rate per country for 2003 is presented in the first column of Table 3.4. We see that the mean corporate tax on small business is 24%. It ranges from zero for Estonia to 38.25% in Italy.

In most countries, the corporate tax is not the only tax that bears on equity income from corporations. For instance, under the classical system of corporate income taxation, the personal income tax (on profit after corporate tax) should be added to the tax levied at the corporate level. In Europe, countries adopt a variety of regimes to avoid such double taxation of corporate income, including dual income tax systems (with reduced rates on equity income), indirect tax credits, direct imputation credits and full exemptions. The second column of Table 3.4 shows this for 2003. Still, it is unclear to what extend this tax on dividends affects the effective tax burden on the corporate form, since small companies usually have other ways to distribute profits. Mackie-Mason and Gordon (1997), for instance, determine the effective personal tax on equity income by a weighted average of the tax on dividends and the tax on capital gains, where the weight is determined by the average dividend payout ratio. The weight on the capital gains tax is adjusted as tax deferral and the tax exemption of some types of capital gains provide relief. Mackie-Mason and Gordon (1997) compute the accrual equivalent of these gains at more than ¾ of the capital gains. Hence, capital gains taxes hardly seem to play a role for the personal tax on equity income. Goolsbee (2004) argues that this means that a zero tax on equity income at the personal level is probably the most accurate since small businesses usually pay very few dividends. This is supported by recent evidence on dividend payout ratios of De Angelo et al. (2004) and Von Eije and Meggison (2006). We therefore take the corporate tax as a benchmark indicator for the tax on the corporate sector in estimating equation (2.1). As a check on the robustness of this assumption, we also explore a regression in which the dividend tax is added to it. Thereby, we assume that 30% of net equity income (i.e. the average dividend payout ratio in the EU according to Von Eije and Meggison (2006)) is taxed under the dividend tax as reported in the third column of Table 3.3. Thereby, we also take account of the dividend relief system.

For the personal income tax that applies to sole proprietorships, we follow Gordon and Mackie-Mason (1997) and Goolsbee (2004) by using the top personal income tax rate in regressions for organizational form. It is presented in the fourth column of Table 3.3. It ranges in 2003 from 25% in Latvia to almost 60% in Denmark.

4. Empirical analysis

Table 4.1 shows our regression results for the degree of incorporation according to equation (2.1). In the regressions, we include sector dummies and country or year dummies if structural breaks have been reported in the data. The table shows the impact of the difference in the personal tax and the corporate tax on the four indicators for the degree of incorporation. The upper part of the table uses all information available for each of the four indicators. The number of observations differs, however, as fewer observation are available for the employment shares. The lower part of the table uses the panel for which information is available for all four indicators. This allows us to compare the regressions across the four indicators.

Table 4.1 Regression results on taxation and incorporation

	(1) ***Degree of incorporation of new firms***	**(2)** ***Share of incorporated firms in total employment created by new firms***	**(3)** ***Degree of incorporation of active firms***	**(4)** ***Share of incorporated firms in total employment in active firms***
Different panels				
Intercept	.326***	.559***	.326***	.744***
	(.013)	(.016)	(.012)	(.014)
Difference in taxes	.554***	.602***	1.022***	.817***
	(.055)	(.083)	(.048)	(.070)
Adj-R^2	.423	.346	.456	.345
Number obs.	3,325	2,383	3,617	2,069
Single panel				
Intercept	.345***	.576***	.311***	.744***
	(.015)	(.016)	(.014)	(.014)
Difference in taxes	.554***	.543***	1.023***	.817***
	(.061)	(.084)	(.060)	(.070)
Adj-R^2	.292	.298	.338	.345
Number obs.	2,069	2,069	2,069	2,069

The data are for 1997-2003. The degree of incorporation is the number of firms in limited liability form divided by the number of firms in limited liability or in sole proprietorship form. All regressions use a linear model and include industry dummies as well as dummies to correct for country and time structural breaks in the data collection. The difference in taxes is computed as the difference between the top marginal personal income tax rate and the statutory corporate tax rate applicable to small companies. The single panel consist of a panel in which information for each of the four indicators is present to allow for comparison across indicators. Detailed variable definitions and data sources are given in Appendix A. White Heteroskedasticity-consistent errors are given in parentheses. *, ** and *** indicate significance levels of 10, 5 and 1 percent, respectively.

We see from Table 4.1 that the coefficient for the tax difference is positive and significant at the 1% confidence level for each indicator. This is consistent with income shifting from the personal to the corporate tax base in response to a lower corporate tax relative to the personal tax. The first two columns refer to the incorporation rate of new

companies. The lower part of the table shows that the magnitude of the tax effect is very similar for the firm and employment shares if the panel is the same. Apparently, taxes do not affect large and small newly created firms differently in their organizational form choice, possibly because most newly created firms are small. The third and fourth columns of Table 4.1 refer to active companies. These coefficients are larger than for the new firms, which suggests that existing firms are more responsive in their legal form choice than are newly created enterprises (which may start as small proprietorships and later change into the corporate form). For active firms, the coefficient for the company share is larger than for the employment share. It suggests that small active firms are more responsive to taxes than large active firms. Many large firms probably do not consider the non-corporate form due to large non-tax benefits of incorporation.

To better understand what the marginal coefficients in Table 4.1 imply for corporate tax policy, we compute the elasticity of the corporate tax base. The underlying assumption is that the corporate shares of (new or active) firms or employment serve as good indicators for the corporate share of total business income. As larger firms are more likely to be incorporated than small firms, the employment share probably better serves this purpose than the number of firms.[3] To obtain the semi-elasticities of the tax base, we divide the marginal coefficients for the tax variable in the upper part of Table 4.1 (i.e. using all available information per indicator) by the respective sample means of the corporate income share, as reported in Table 3.1. The resulting semi-elasticity measures the percentage change in the corporate tax base in response to a 1%-point change in the tax differential between corporate and the non-corporate sector. If we do this, we find the following semi-elasticities of the corporate tax base: 1.5 for the number of new firms; 2.9 for the number of existing firms; 1.0 for the employment shares of both new and existing firms.

The semi-elasticity of the tax base can be compared to previous studies. Goolsbee (2004) adopts the same specification as we do and considers alternative indicators for the corporate share of business, including firms, employment and sales. His basic results suggest a tax base elasticity of 1.1 for the number of firms and 0.4 for employment and sales. This is somewhat smaller than our elasticities. Yet, the results are consistent with Goolsbee's finding that a smaller response is found for the employment share than for the firm share. MacKie-Mason and Gordon (1997) use a slightly different specification in that they scale their tax

[3] Goolsbee (2004) reports corporate shares of sales and employment and finds that these are very similar.

term by (1-*Tc*). Moreover, they consider the share of corporate assets. With a corporate share of 2/3, their semi-elasticity would be somewhere between 0.03 and 0.2, which is much smaller than what we find. Gordon and Slemrod (2002) consider income shifting in the US. Their findings suggest that a 1%-point increase in the tax differential between corporate and personal taxes increases reported labour income by 3%. Fuest and Weichenrieder (2003) conclude that a 1%-point reduction in the corporate tax rate increases the fraction of corporate savings in total private savings by some 2.6%. Our estimates are smaller than these latter estimates.

Table 4.2. Regressions on degree of incorporation per sector.

	(1) Mining	(2) Elec. gas water	(3) Manufact.	(4) Construct.	(5) Retail	(6) Storage&com.	(7) Financial	(8) Estate&bus.	(9) Computer	(10) R&D	(11) Professions	(12) Social
Intercept	.706***	.5683***	.340***	.135***	.181***	.368***	.459***	.486***	.248***	.132**	.269***	.205***
	(.076)	(.062)	(.024)	(.034)	(.018)	(.049)	(.090)	(.052)	(.028)	(.060)	(.026)	(.035)
Difference	-.389	1.199***	.450***	.577***	.443***	.444**	1.215***	.524**	.821***	1.633***	.504***	.441**
in taxes	(.386)	(.297)	(.119)	(.160)	(.087)	(.229)	(.404)	(.255)	(.135)	(.259)	(.129)	(.175)
Adj-R^2	.190	.212	.375	.834	.565	.311	.109	.254	.359	.353	.419	.396
Number obs.	81	87	740	56	551	317	154	158	376	55	438	312

The data are for 1997-2003. The degree of incorporation is the number of new firms in limited liability form divided by the number of new firms in limited liability or in sole proprietorship form. All regressions use a linear model and include dummies to correct for country and time structural breaks in the data collection. The difference in taxes is computed as the difference between the top marginal personal income tax rate and the statutory corporate tax rate applicable to small companies. Detailed variable definitions and data sources are given in Appendix A. White Heteroskedasticity-consistent errors are given in parentheses. *, ** and *** indicate significance levels of 10, 5 and 1 percent, respectively.

Table 4.3. Robustness regressions on degree of incorporation.

	(1) Semi-log	(2) Log-log	(3) Squared tax	(4) Alt. tax	(5) Lead tax	(6) Dummies	(7) Div. tax	(8) Random	(9) Clustering	(10) CORP2	(11) CORP3
Intercept	-1.493***	-.498***	.248***	.313***	.320***	.006	.386***	..349***	.196***	.321***	.347***
	(.047)	(.043)	(.016)	(.014)	(.014)	(.039)	(.012)	(.040)	(.040)	(.012)	(.014)
Diff in tax	2.343***	.287***	2.319***	.565***	.572***	3.117***	.314***	.554***	.379***	.308***	.759***
	(.204)	(.019)	(.223)	(.049)	(.053)	(.165)	(.054)	(.058)	(.113)	(.049)	(.058)
diff in tax^2			-6.113***								
			(.746)								
Adj-R^2	.325	.352	.435	.429	.478	.455	.412			.456	.376
No, obs.	3,282	3,220	3,325	3,325	2,317	3,325	3,325	3,325	3,325	3,337	3,337

The data are for 1997-2003. The degree of incorporation is the number of new firms in limited liability form divided by the number of new firms in limited liability or in sole proprietorship form, except for (10) and (11). The difference in taxes is computed as the difference between the top marginal personal income tax rate and the statutory corporate tax rate applicable to small companies. All regressions use a linear model, except for regressions (1) and (2). All regressions also include industry dummies as well as dummies to correct for country and time structural breaks in the data collection. In addition, regression (6) contains all time and country fixed effects. Regression (3) also includes the squared value of this variable. Regression (4) uses use the ratio of the difference between these two rates on one minus the corporate tax rate as independent variable. Regression (5) uses the lead of this difference in taxes variable. Regression (7) uses the difference between the top personal income tax rate and the effective tax rate on distributed profit, taking into account taxation at both the corporate and personal level. Regression (8) looks at random effects for industry and is estimated via Maximum Likelihood. Regression (9) is also estimated via Maximum Likelihood and uses a compound symmetry structure for the covariance matrix to correct for country and industry clustering effects and Huber (1967) –White (1980) robust standard errors (asymptotically consistent estimator, adjusted for correlations of error terms across observations). Regression (10) takes (new) partnerships into account, assuming that they are not incorporated, while regression (11) makes the assumption that they are. Detailed variable definitions and data sources are given in Appendix A. White Heteroskedasticity-consistent errors are given in parentheses. *, ** and *** indicate significance levels of 10, 5 and 1 percent, respectively.

Table 4.2 presents regression results on legal form choice per sector for the number of new firms. Again, we control for structural breaks in the data through dummies. Significant positive coefficients (at the 5% level) are reported for all sectors but mining. The coefficients for utilities, financial firms and R&D are large, suggesting that these firms are relatively responsive to taxes.

Table 4.3 explores the robustness of our findings for alternative specifications, again for the number of new firms. The regressions include single and double log specifications, a squared tax term, and an alternative tax term that divides the tax difference by (1-*Tc*) as was done by MacKie-Mason and Gordon (1997). Each of the regressions suggests a positive and significant impact of the tax term. Computing the associated semi-elasticity of the tax base evaluated at sample means yields values of 1.5 for the log model, 2.3 for the semi-log model and 2.0 for the alternative tax. This fits well with semi-elasticity of 1.5 for the linear model. The tax base elasticity in the model with the squared tax term is extremely sensitive to the tax differential. At the sample mean of 0.187, it equals 0.1; at a tax difference of e.g. 14%, it would equal 1.7. The fifth column presents the lead of tax variable, which captures possible anticipation effects. It yields a positive but slightly larger coefficient for the tax term than the original regression in Table 4.1. If we introduce country and year dummies, the sixth column of Table 4.3 shows that the tax term remains significant and positive but the value becomes implausibly large. As the dummies take away much of the cross-section variation that is meant to identify the impact of taxes on legal form, we do not prefer this specification.[4] Column 7 of Table 4.3 considers an alternative tax measure for corporate firms where we add the personal tax on dividends (see section 3). Including the personal tax reduces the magnitude of the tax term by forty percent, but the tax term remains significant at the 1% confidence level. Next, we test for random industry effects. Because we have three dimensions (countries, year and industry) and that industry is an aggregate of several NACE categories, we have more than one observation per country and industry. Therefore, our statistical package does not allow directly carrying out a Hausman test. We go around this problem in two ways. First, we estimate random effects based on the sub-categories of industry (NACE). With a p-value of .999, the test does not reject random industry effects. In addition, we estimate two models with respectively fixed and random industry effects via

[4] We also analyzed other control variables that differ across countries and years, such as the interest spread and the startup costs. These do not significantly contribute to the explanation of corporate share variations.

maximum likelihood estimation. The results of the random effect model are reported in column 8. The coefficient for the difference in taxes is unchanged compared to fixed effects and highly significant. The comparison of the (unreported) Akaike Information Criteria suggests that the fixed effects model is a better one. In regression (9), we correct for cluster effects within country and industry pairs. In particular, observations within clusters (in one country and one industry within this country) may not be independent and standard errors may be correlated within clusters. Regression (9) controls for this. The coefficient of the tax variable decreases somewhat. A likelihood ratio test (not reported) indicates a significant improvement over the null model consisting of homogeneous residual errors. Regressions (10) and (11) include partnerships in the indicator for the degree of incorporation, either by adding partnerships to the corporate firms or to the non-corporate firms. We see that the tax coefficient decreases compared to Table 4.1 if partnerships are taken as unincorporated firms (10) but increases otherwise (11). It suggests that sole proprietorships might not only shift into limited liability companies, but also into partnerships where they might be taxed under the corporate income tax regime[5]. Only considering the shift between sole proprietorship and limited liability firms may therefore underestimate the total amount of income shifting in the economy. Yet, due to the hybrid character of the partnership form, we do not take this regression in our computations below.

Implications for corporate tax policy

We now infer what our estimates imply for the impact of tax policies for corporate tax revenue and the corporate tax-to-GDP ratio. Corporate tax revenue (R) equals the corporate tax rate (T_c) times the tax base (B). In terms of changes, denoted by Δ, the impact of corporate tax on corporate revenue can be written as:

$$\Delta R = \Delta T_c B + T_c \Delta B = \Delta T_c B[1 + \frac{T_c}{\Delta T_c}\frac{\Delta B}{B}] \qquad (4.1)$$

In (4.1), the term $\Delta T_c B$ reflects the ex-ante revenue effect from a change in the corporate tax rate. The ex-post revenue effect would be equivalent to this if the tax base would remain constant (i.e. if $\Delta B = 0$). If the corporate tax base responds to changes in the corporate tax rate, the term between square brackets on the right-hand side of (4.1) reveals that the ex-post revenue effect (ΔR) differs from the ex-ante effect ($\Delta T_c B$). We use the semi-

[5] If we replicate regressions (10) and (11) with active firms instead of new ones, we observe the same effect as

elasticity of the corporate tax base, $\frac{\Delta B}{B}$, from the regressions on the degree of incorporation to determine the ex-post revenue effect of corporate tax relief, taking into account income shifting. As we argued before, the employment share is a better indicator for the corporate share of business income than the firm share. We therefore take the semi-elasticity of 1.0 for the employment share of existing firms in our computations. According to (5.1), we need to multiply the semi-elasticity by the corporate tax rate, reported in Table 3.3. Imputing the mean corporate tax of 24% in expression (4.1) and considering a reduction in the corporate tax rate by 1%-point (i.e. ΔT_c = -1), the term between square brackets equals 0.76. It means that an ex-ante reduction in the corporate tax rate equivalent to one euro, will cost only 76 eurocents in terms of corporate tax revenue lost ex-post. Hence, 24 eurocents are regained through income shifting from the personal to the corporate tax base. This regain in corporate tax revenue comes at the expense of a decline in personal tax revenue (which is likely to exceed the regain in corporate tax revenue).

Income shifting is not the only behavioural effect of corporate tax changes that affects the corporate tax base. De Mooij (2005) discusses several other effects, such as distortions in investment, the financial structure of companies, international investment location and the profit allocation by multinationals. He uses expression (4.1) to assess the revenue gains associated with corporate tax relief through each of these mechanisms. On the basis of a review of the empirical literature on various tax base elasticities, he finds that the largest revenue effects are related to the channels of foreign direct investment (revenue gain of 12 €-cents for an average EU country) and international profit allocation (revenue gain of around 30 €-cents for the Netherlands). The channels of investment and financial structure yield much smaller effects. Our estimates suggest that profit shifting between the personal and the corporate tax base is large as well and compares to the magnitude of international distortions.

Implications for the corporate tax-to-GDP ratio

The semi-elasticity of the corporate tax base of 1.0 implies that the difference between personal and corporate taxes affects the corporate tax-to-GDP ratio. To illustrate this, we take the average tax differential between the top personal tax and the reduced corporate tax in the EU-15 between 1991 and 2006. This average tax gap is equal to 17%. With a semi-elasticity

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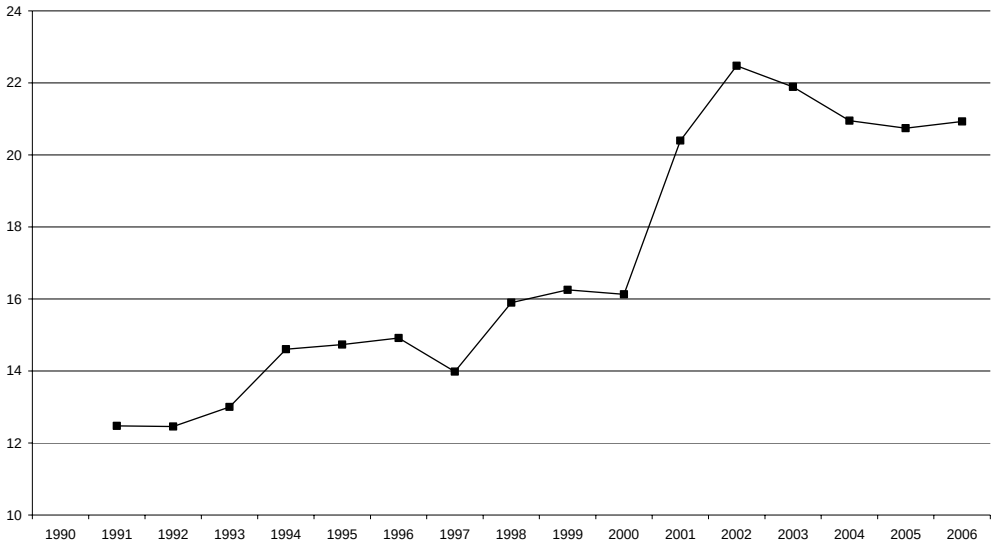
the coefficients respectively become .665 and 1.010 (both significant at 1%-level).

of 1.0, the corporate tax base would be on average 17% broader than without such a tax gap. With an average corporate tax-to-GDP ratio in the EU-15 of 2.7% in 2004, the tax gap is responsible for a revenue share of around 0.45% of GDP. Hence, without the tax gap the tax-to-GDP ratio is expected to fall from 2.7 to 2.25%. We call this difference the *corporate tax gain from income shifting*.

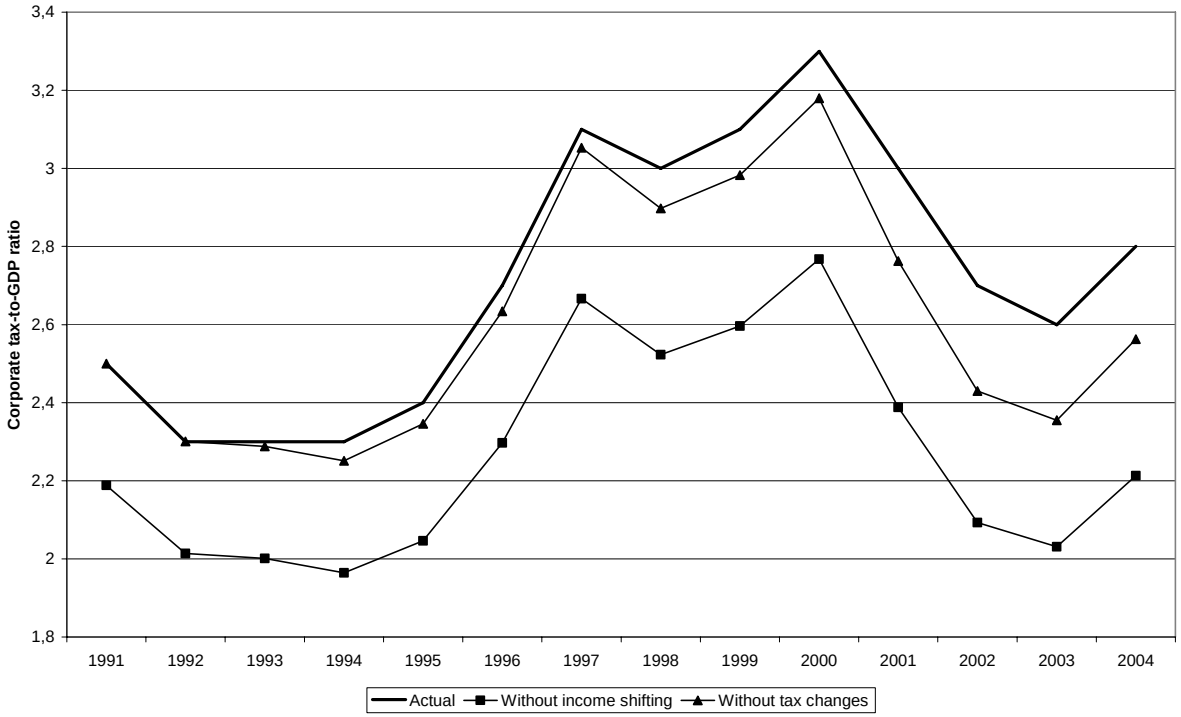
Figure 4.1: Difference between the personal income and reduced corporate tax



GDP-weighted average of top personal tax minus reduced corporate tax in the EU-15
Source: IBFD and own calculations

Figures 4.1 and 4.2 demonstrate the development of this corporate tax gain from income shifting in the EU-15 over time. In particular, Figure 4.1 demonstrates the development of the average tax gap between the top personal tax rate and the reduced corporate tax rate between 1991 and 2006. We see that this tax gap increased from around 12%-points in the early 1990s towards more than 20%-points in recent years. This is primarily the result of decreasing corporate tax rates, which fell from an average of 41% to 27%.

Figure 4.2: Actual and simulated developments of the corporate tax-to-GDP ratio



The impact of the rising tax gap on corporate tax revenue is shown in Figure 4.2. It demonstrates three alternative developments of the tax-to-GDP ratio in the EU-15 between 1991 and 2004. The first is the development of the actual corporate tax-to-GDP ratio ('Actual'). The second line in Figure 4.2 ("Without income shifting") represents the simulated development under the assumption that the tax gap would have been zero in all years between 1991 and 2004. It is constructed by subtracting the corporate tax revenue associated with income shifting (i.e. the tax base elasticity of 1.0 times the tax gap in each year) from the actual corporate tax-to-GDP ratio. The difference between the two lines can be interpreted as the corporate tax gain from income shifting. We see from Figure 4.2 that this corporate tax gain rose from around 0.3%-points of GDP in the early 1990s to 0.55%-points in 2004. Hence, income shifting can indeed explain part of the stabilization of corporate tax revenue since the early 1990s. The third line in Figure 4.2 ("Without tax changes") shows the same development in an alternative manner. It shows the simulated development of the corporate tax-to-GDP ratio if the tax gap between personal and corporate taxation would have remained unchanged since 1991. It is constructed by subtracting the additional income shifting induced by the rising tax gap since 1991 from the actual tax-to-GDP ratio. The difference between this line and the actual corporate tax-to-GDP ratio yields direct insight in the corporate tax gain from income shifting. We see from Figure 4.2 that this gain has gradually increased over time to around 0.25%-points in recent years. The rising tax gap thus explains 0.25%-points of the stabilization of the corporate tax-to-GDP ratio since the early 1990s.

6. Conclusions

In the policy debate on tax competition in the European Union, the paradox of declining corporate tax rates and rising tax-to-GDP ratios casts doubts on how serious is the threat of tax competition for the public finances of Member States. This paper argues that simply looking at corporate tax-to-GDP ratios can be misleading as part of the revenue consequences of corporate tax relief shows up in lower personal tax revenue, rather than lower corporate tax revenue. Indeed, we explore income shifting from the personal towards the corporate tax base, induced by corporate tax cuts, via an increase in the degree of incorporation of firms. The results suggest that the tax gap between personal and corporate tax rates exerts a significant positive effect on the degree of incorporation. This result is robust for alternative indicators and specifications. The impact of income shifting in response to a larger tax gap is sizeable. Indeed, a one euro ex-ante tax relief in corporate taxes costs only 76 eurocents in terms of corporate tax revenue ex-post if the shifting of income towards the corporate tax base is taken into account. This result can help explaining the part of the corporate tax rate-revenue paradox, as the tax gap between personal and corporate tax rates has grown since the early 1990s. Using our regression results, we find that around 12% of the corporate tax-to-GDP ratio was due to income shifting in the early 1990s but this share has grown to 21% in recent years due to the growing tax gap. Accordingly, income shifting has contributed to the stabilization of the corporate tax-to-GDP ratio by around 0.25%-point since the early 1990s. Income shifting thus only provides part of the explanation for the diverging trends of corporate tax rates and revenues, not a full explanation.

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Appendix (A): Variable definitions and data sources

Variable	Definition	Source
Corporate tax rate	Statutory corporate tax rate applicable to small companies.	European Commission and Office of Tax Policy Research.
Degree of incorporation of firms.	Number of firms in limited liability form divided by the number of firms in either limited liability of sole proprietorship form. This ratio can be computed for new or for active firms, as well as in number of firms or in number of employees.	Eurostat's harmonized data collection on business demography and own calculations.
Difference in taxes	Difference between the top personal income tax rate and the statutory corporate tax rate applicable to small companies.	European Commission, Office of Tax Policy Research and own calculations.
Sectors	Based on NACE-4digit classification, the have the following 12 large sectors and 60 sub-sectors: 1. mining (C): mining of energy (CA), mining except energy (CB); 2. Manufacturing (D): food and beverage (DA), textile (DB), leather (DC), wood (DD), paper (DE), coke (DF), chemicals (DG), rubber and plastics (DH), non-metal minerals (DI), metals (DJ), machinery and equipment (DK), electrical and optical (DL), transport equipment (DM), manufacturing NEC (DN); 3. utilities (E): energy supply (E40), collection and purification (E41); 4. construction (F): construction (F45); 5. retail (G, H): motor vehicules (G50), wholesale except motor (G51), retail non-specialised stores (G521), retail of food in specialized stores (G522), retail in specialized stores (G523-G525), retail not in stores (G526), repair of personal goods (G527), hotels and campings (H551-H552), restaurants and bars (H553-H554-H555); 6. storage and communications (I): land transport (I60), water transport (I61), air transport (I62), support to transport activities (I63), post (I641), telecommunications (I642); 7. financial (J): financial except insurance and pension (J65), insurance and pension (J66), support to financial activities (J67); 8. estate and business (K70-K71): real estate (K70), renting of machinery (K71); 9. computers (K72): hardware computer (K721), software computer (K722), data computer (K723), database activities (K724), repair of computers (K725), other computer activities (K726); 10. R&D (K73); 11. professions (K74): accounting and auditing (K741), architecture and engineering (K742), technical testing (K743), advertising (K744), labour recruitment (K745), investigation and security (K746), industrial cleaning (K747), business NEC (K748); 12. social (M,N,O): education (M80), health and social work (N85), sewage, disposal and sanitation (O90), membership organizations (O91), cultural and sport activities (O92), other services (O93).	Eurostat's harmonized data collection on business demography and own aggregations.
Gross Operating Surplus	Gross Value added minus compensation of employees minus taxes on import and production plus subsidies on production (for total economy or for corporate sector).	AMECO Database

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