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# Effects of taxation on European multi-nationals' financing and profits<sup>\*</sup>

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Important determinants of multinational firms' choice of location include, besides resource cost and infrastructure, the taxation regime through its effects on international pricing and profits. This paper investigates the effects of tax rates on firms' profits and financing decisions by analyzing a panel of several hundred thousand European firms for the years 1985 to 2010. Results indicate that taxation has a negative effect on firm profits measured as returns on shareholder funds. Additionally, corporate taxation rates may positively affect the gearing ratio, i.e. the higher corporate tax rates in a particular jurisdiction the higher the ratio of debt financing to equity financing of firms residing in that jurisdiction. This may indicate that high-tax jurisdictions deter valuable investment by multinational enterprises because they provide incentives to locate value-driving business parts requiring more equity financing elsewhere.

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## 1. Introduction

International restructurings by globally acting enterprises have become a common occurrence in the wake of accelerating globalization and lead to increasing global relocations of economic activities. Besides resource cost and infrastructure, the taxation regime, through its effects on institutional hurdles for business development on one hand and on international pricing on the other hand, is an important determinant of the geographical development of globalization.

The tax regime ultimately affects profits of a firm, but it also affects the capital structure, i.e. the mix between debt and equity financing of firms, the co-called gearing ratio. The capital structure, in turn, affects the entrepreneurial function that can be taken on by a particular enterprise, e.g. highly innovative firms using and developing cutting-edge intellectual property tend to need more equity financing than firms performing mature routine functions. Hence the taxation regime may hinder or promote firms' location of highly innovative industries in a particular jurisdiction by making debt financing more or less attractive relative to equity financing.

This research presents evidence that both statutory corporate tax rates as well as firm-individual effective corporate income tax rates affect the gearing ratio – higher tax rates appear to lead to higher debt financing. This suggests in turn that lower tax rates may attract more equity-financed high-value business formation. Data analyzed comes from the Amadeus firm-level data base as well as from the OECD and spans a panel of 240,000 firms from 24 European countries for the years 1985 to 2010.

The remainder of the paper is structured as follows. Section 2 introduces the economic and institutional background, the resulting research questions posed here, as well as the hypotheses to be investigated. The underlying theoretical framework is presented in Section 3. Section 4 describes the data used. Section 5 presents the general modeling and summarizes the results. Section 6 concludes. Statistical and econometric results are presented in the appendix.

## 2. Background and research questions

Theoretical arguments for the tax sensitivity of capital structures center on the value of the implied tax shield from interest rate deductions; Modigliani/Miller (1963). Accordingly, higher taxes should lead, *ceteris paribus*, to higher debt/equity ratios (gearing ratios). Several theoretical models explain capital structure choices; e.g. models on financial distress (Kraus/Litzenberger (1973), or on agency issues (Jensen/Meckling (1976), Myers (1977)). Wrede (2010) e.g. finds that under separate accounting, multinational enterprises adopt tax-efficient capital-to-debt ratios and tend to shift debt from low-tax to high-tax countries. Moreover, according to Weichenrieder (1996) an increase in the taxation rates of foreign dividends may result in a lower cost of capital for the foreign subsidiary. Luciano/Nicodano (2011) demonstrate that tax rates do not only affect the extent of inter-company lending within multinational enterprises but also the level of guarantees provided by the parent company. For a recent overview of related work see Gordon (2010).

A similar effect is visible in the case of corporate patent filings by European multinational enterprises. Corporate patents are perceived as key profit drivers in many industries, such as technology, pharmaceuticals and others. It has been found that corporate tax rate (differential to other group members) exerts a negative effect on the number of patents filed by a subsidiary; see, e.g., Karkinsky/Riedel (2009). Furthermore, intangible assets like trademarks, are also increasingly being seen as the key to competitive success and as the drivers of firm profit. Moreover, they constitute a major source of profit shifting opportunities in multinational enterprises due to their intangibility and a highly intransparent transfer pricing process. Dischinger/Riedel (2009) and others have argued that, for both reasons, MNEs have a definite incentive to locate intangible property at company affiliates with a relatively low corporate tax rate. While analyzing taxation of inputs, it has been observed that

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higher employee-borne labor taxes are generally less conducive to the location of corporate headquarters and foreign direct investment stocks for a given host economy. Furthermore, findings suggest that personal income tax rates turn out relatively less important than profit tax rates for bilateral FDI stocks; see, e.g., Egger/Radulescu (2011). Da Rin et al. (2011) present evidence that higher effective corporate reduce entry rates of firms in European countries.

Despite a wealth of studies, the empirical evidence on tax effects on capital structure remains ambiguous; Feld et al. (2011). Da Rin et al. (2010) present evidence that higher effective corporate taxes lead to entry of higher leveraged firms. Other studies using average effective tax rates, such as Booth et al. (2001), tend to find negative or insignificant effects of tax rates on debt financing. Other studies, such as Gordon/Lee (2001, 2007) use statutory income tax rates and find mixed results. While studies such as Faccio/Xu (2011) find that statutory tax rates are significant determinants of capital structure while other studies such as Bond/Xing (2010) state that statutory or average effective tax rates do contain little additional information once the tax-adjusted user cost of capital is taken into account.

This paper investigates the effects of both statutory and individual effective corporate tax rates on firms' financing decisions as well as profit levels. Following the literature, the effect of tax rates is first analyzed on the aggregate country level by using average gearing ratios as well as average effective corporate tax rates as well as per-country statutory corporate tax rates. In a second step, the effect of taxation at the level of the individual firm is analyzed using statutory corporate tax rates as well as individual effective tax rates. Lastly, implications for international transfer pricing are discussed. For the purpose of national taxation of MNEs transfer pricing is utilized in order to determine the taxable profit of a national subsidiary by comparing its profits to profits of hypothetically comparable independent firms. Similarly international transfer

pricing is used to determine the acceptability of a financing structure for tax purposes, i.e. for determining whether and to what extent intercompany debt financing can be tax deductible.<sup>1</sup>

### 3. Theoretical framework

In the adjusted present value approach, the optimal gearing ratio (debt/equity) maximizes the overall value of the firm where the overall firm value can be determined as the unlevered firm value plus tax benefits of debt minus expected bankruptcy cost of debt.<sup>2</sup>

When the valuing an individual firm, its equity, or any other risky asset, the discounted cash flow method<sup>3</sup> (DCF) is frequently used. Since DCF consists of discounting future cash earnings, an appropriate discount rate needs to be applied. The discount rate represents the (opportunity) cost of capital invested; if the cash flows valued are those accruing to equity (FCFE), i.e. after deduction of any costs of debt financing, then the discount rate represents the cost of equity financing or the required (minimum) expected return to equity (RoE).<sup>4</sup> This RoE consists of the sum of the risk-free rate of interest and the equity risk premium (ERP) which can be derived with recourse to the Capital Asset Pricing Model (CAPM)<sup>5</sup>. According to the standard convention in the CAPM, the required return for any asset  $i$ ,  $r_i$ , can be expressed as:

$$(1) \quad r_i = r_f + \beta_i(r_m - r_f) \quad \text{and} \quad (2) \quad \beta_i = \frac{\sigma_{im}}{\sigma_m^2} = \frac{\rho_{im}\sigma_i\sigma_m}{\sigma_m^2}$$

<sup>1</sup> See OECD (1995/2001/2010) transfer pricing guidelines and the OECD (2012) discussion draft on chapter VI on intangibles.

<sup>2</sup> See, e.g., Damodaran (2011a).

<sup>3</sup> See, e.g., Brealey/Myers/Allen (2006) chapters 4 or 8, Luenberger (1998) chapter 7 for an introduction.

<sup>4</sup> FCFE is widely used and can be particularly useful for the valuation of firms with varying gearing (debt/equity financing) ratios. See, e.g., Shaw (2007), p. 15.

<sup>5</sup> See Sharpe (1964), Treynor (1962), Lintner (1965), Mossin (1966), and Markowitz (1959). For more recent discussions see, e.g., Perold (2004), Fama/French (2004). For a multi-period extension, see Fama (1977).

where  $r_f$  denotes the risk-free rate of interest,  $r_m$  denotes the market return,  $\sigma_{im}$  and  $\rho_{im}$  denote the covariance and the correlation coefficient, respectively, between firm  $i$ 's return on equity and the market return,  $\sigma_i$  denotes the standard deviation of asset  $i$ 's return,  $\sigma_m$  denotes the standard deviation of the market return, and  $\sigma_m^2$  denotes the variance of the market return.

Suppose asset  $i$  is a particular firm financed with a debt to equity ratio of  $\delta$  and taxed at rate  $\tau$ , then equation (2) becomes

$$(2') \quad \beta_i = (1 + (1 - \tau)\delta_i) \frac{\rho_{im} \sigma_i \sigma_m}{\sigma_m^2}.$$

According to Modigliani/Miller (1958), equation (2) denotes the pure investment risk (captured by the ‘‘asset beta’’) whereas equation (2') also captures the additional financing risk due to debt financing. Note that while volatility is a significant determinant of returns, the market correlation  $\rho_{im}$  is typically not significant. This has been shown repeatedly in capital-market studies and also seems to hold with enterprise data. In fact, empirical analyses using historical financial markets data show that the ERP paid by the capital market for the assumption of risk corresponds to a multiple of the standard deviation of RoE.<sup>6</sup> Taking this into account and treating the market return volatility as given, we can define  $\alpha_i$  as:

$$(3) \quad \alpha_i = (1 + (1 - \tau)\delta_i) \frac{\rho_{im}}{\sigma_m} (r_m - r_f).$$

For the firm  $i$ , let  $C_i$  be its contemporary FCFE,  $r_i$  its required return on equity (the applicable discount rate), and  $g_i$  the expected growth rate of  $C_i$ . Firm  $i$ 's market value of equity will then be given by  $V_i$ :

$$(4) \quad V_i = \frac{C_i}{(r_i - g_i)}$$

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<sup>6</sup>See Damodaran (2011b), Lutz (2012), Lutz/Kleinfeldt (2012).

and firm  $i$ 's overall value is given by the sum of  $V_i$  and the value of its debt.

Furthermore, let  $\sigma_{C_i}$  be the standard deviation of  $C_i$  then the required return on equity can be expressed as

$$(5) \quad r_i = r_f + \alpha_i \sigma_i \quad \text{where} \quad (6) \quad \sigma_i = \sigma_{C_i} \left( \frac{1}{V_i} \right)^{.7}$$

If the risk characteristics, i.e. the volatility, of the underlying asset changes, e.g. due to a functional change of a subsidiary within a multi-national enterprise, then the applicable discount rate will have to be adjusted. For a change of the volatility of the underlying asset from  $\sigma_0$  to  $\sigma_1$  all other things being equal,  $\beta_i$  changes from  $\beta_0$  to  $\beta_1$  as shown here:

$$(7) \quad \beta_1 = \frac{\sigma_1 \rho_{1m}}{\sigma_0 \rho_{0m}} \beta_0$$

and the return on equity becomes:

$$(8) \quad r_i = r_f + \beta_1 (r_m - r_f)$$

In a DCF valuation, the tax benefits of debt enter in two forms:

- (a) Cash flow: is increased by the tax deduction on debt interest payments. (It is also decreased by the interest payments net of tax.)
- (b) discount rate: is increased by the tax shield of debt financing; this tends to decrease firm values. However, at a given debt ratio, higher tax rates decrease the discount rate and increase the firm value.

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<sup>7</sup> This formulation allows for the joint determination of firm value and discount rate in cases where the applicable discount rate is not known, e.g. when valuing firms that are not publicly quoted; see Lutz (2011).



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Effects of gearing ratio  $\delta$  and tax rate  $\tau$  on the discount rate:

CAPM postulates that the required return on equity is given by equation (1) where  $\beta$  is given by equation (2). Hence  $\delta$  increases the discount rate whereas  $\tau$  decreases it.

In summary, it can be shown that the gearing ratio  $\delta$  is increasing in the corporate tax rate  $\tau$  as long as the probability of default and the debt interest rate do not rise too quickly with the gearing ratio.<sup>8</sup>

#### 4. The Data

The empirical analysis is based on firm-level data from Bureau van Dijk's AMADEUS database and from Thomson Reuters Mutual Funds Holding (s12 Master File data); these data have been provided by Wharton Research Data Services (WRDS) as well as directly by Bureau van Dijk. Data on statutory corporate income and dividend income tax rates have been obtained from the OECD website. Further data on US and European stock and bond markets as well as on macroeconomic indicators have been assembled from a variety of sources. A full list of data sources utilized and data obtained is given in Table 1 in the appendix. A full list of variables used is given in Table 2 in the appendix. Some data on tax rates as well as summary statistics for selected variables are provided in Tables 3.1, 3.2, and 3.3 in the appendix.

The latest Amadeus database version (available through WRDS) contains financial data (profit and loss statement and balance sheet data) for more than 407,000 companies from 41 European countries; the corresponding data for the years 1985 to 2010 (between 1 and ten years; 5.5 years on average) were downloaded and compiled in July 2011. OECD tax data was available for 24 of those European countries. Restricting the data set to firms from those 24 countries reduced the number of companies covered to about 240,000 firms.

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<sup>8</sup> I am not aware of a complete theoretical derivation of this result, but it can be shown numerically.

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Amadeus data collected includes in particular the following variables: company identification (name, BvD ID number, ticker, address etc.), trade and activities descriptions, industry codes (NACE 1.1 and NAICS 2002), shareholder information, year of incorporation, number of employees, profit/loss data (revenue, cost of goods sold, operating cost, EBIT, etc.), balance sheet data (total assets, working capital, shareholders funds, etc.), cash flow, enterprise value, liquidity and financing ratios, and return on shareholder funds. Thomson Reuters data collected includes in particular share prices and numbers of shares outstanding.

The data allow for analyses of tax effects on several profit and return measures as well as on financial ratios such as the gearing ratio (debt-to-equity financing ratio). Firms' trade and activities descriptions as well as their industry codes were screened in order to generate indicator (dummy) variables for the functions manufacturing, wholesale, retail, and service, activities. Shareholder and independence variables were screened to create an independence indicator (dummy) variable according to customary benchmark selection criteria. Further dummy variables were created per country, year, and consolidation code.

Data on general macroeconomic developments and climate were taken from the Ifo Institute's collection of European economic indices as well as from Eurostat via the European Central Bank. These comprise indices for European economic climate, European capacity utilization, and European production. Data on US and European stock market and bond market returns were taken from Damodaran (2010), from ECB, Bundesbank and CESifo websites, and from Bloomberg. These comprise the S&P 500 and the MSCI Europe stock market indices, 6-month US treasury bills, 10-year US treasury bonds, and generic Euro-area 10-year and 3-months government benchmark bonds.

## 5. Modeling and results

For the preliminary analysis of aggregate country-level data the following general model is used:

$$(9) \quad y_{j,t} = \alpha + \Gamma H_{j,t} + \Delta M_t + \varepsilon_{j,t} + \eta_j$$

where the dependent variable  $y_{j,t}$  is the average gearing ratio, the average effective tax rate or an average profit level indicator (e.g. return on shareholder funds) of country  $j$  in period  $t$ ;  $H_{j,t}$  is a vector of determinants that may vary between countries and also over time (e.g., statutory tax rates, average gearing ratio, average return on shareholder funds);  $M_t$  is a vector of period-specific determinants outside of a particular country (e.g. global economic factors and market indicators);  $\varepsilon_{j,t}$  is an idiosyncratic error term that may vary between countries and also over time and is independently distributed with  $E(\varepsilon_{j,t}) = 0$ ; and  $\eta_j$  represents unobserved heterogeneity across countries, i.e., a country specific random effect that is independently distributed. This general specification allows for either random-effects or fixed-effects modeling, where the random or fixed effects are country-specific components.

For the detailed analysis of the firm-level panel data the generalized regression model is modified in the following way:

$$(10) \quad y_{i,t} = \alpha + \mathbf{B}F_i + \Gamma G_{i,t} + \Delta M_t + \varepsilon_{i,t} + \eta_i$$

where the dependent variable  $y_{i,t}$  is the individual gearing ratio, the individual effective tax rate or an individual profit level indicator (e.g. return on shareholder funds) of company  $i$  in period  $t$ ;  $F_i$  is a vector of determinants specific to firm  $i$  but invariant over time (such as country, industry, functions performed, date incorporated);  $G_{i,t}$  is a vector of determinants that may vary between firms and also over time (e.g., material costs, working capital, income

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volatility);  $M_t$  is a vector of period-specific determinants outside of a particular firm (e.g. global economic factors and market indicators);  $\varepsilon_{i,t}$  is an idiosyncratic error term that may vary between firms and also over time and is independently distributed with  $E(\varepsilon_{i,t}) = 0$ ; and  $\eta_i$  represents unobserved heterogeneity across firms, i.e., a company specific random effect that is independently distributed.

This general specification allows for either random-effects or fixed-effects modeling, where the random or fixed effects are firm-specific components. The more general approach is to allow for random firm-specific effects; the case where these effects are fixed, that is determinate constants instead of random variables, is a special sub-case. The data available contains several firm-specific, time-invariant variables that can be assumed to capture a significant part of present fixed effects (e.g. country, industry indicators, functional dummies, etc.). Hence a random-effects specification seems to be a priori more appropriate. Therefore, the majority of results presented are based on random-effects estimations.

In order to test the hypotheses introduced in Sections 2 and 3, several sets of regressions are run. The first set of regressions in Models (4.1.\*) present preliminary explorations of the aggregate country-level data. The second set of regressions in Models (4.2.\*) presents a first overview with several simple pooled OLS regressions. The third set of regressions in Models (4.3.\*) analyses profit variables (*rshf*) while the fourth set of regressions in Models (4.4.\*) and (4.5.\*) analyzes capital structure variables (*gear*). Since various profitability indicators and several tax rate measures are positively correlated with each other<sup>9</sup>, the results presented within these models are generally robust to some degree regardless of particular variables chosen. Thus the random-effects specification of Model (4.1.3) is given by:

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<sup>9</sup> See Table 3.4 in the appendix for correlation coefficients of various profit and return on capital variables.

$$(11) \quad avgcygear_{jt} = \alpha + \gamma_1 citprofrate_{jt} + \Gamma C_j + \Delta Y_t + \eta_i + \varepsilon_{jt}$$

where C and Y are year and country dummies, respectively. The OLS specification of Model (4.2.1) is given by:

$$(12) \quad gear_{it} = \alpha + \gamma_1 tx_{it} + \gamma_2 tx_{it-1} + BF_i + \Gamma G_{i,t} + \Delta M_t + \varepsilon_{it}$$

where F includes country dummies and M includes year dummies. The fixed-effects specification of Model (4.3.3) is then given by:

$$(13) \quad gear_{it} = \alpha + \beta_i + \gamma_1 tx_{it} + \Gamma G_{i,t} + \Delta M_t + \varepsilon_{it}$$

where M includes yearly macroeconomic indicators. The instrumental-variables random-effects specification of Model (4.4.1) is then given by:

$$(14.a) \quad gear_{it} = \alpha + \gamma_1 \widehat{tx}_{it} + \gamma_2 shfd_{it} + BF_i + \Gamma G_{i,t} + \Delta M_t + \eta_i + \varepsilon_{it}$$

$$(14.b) \quad tx_{it} = \alpha + \gamma_1 citprofrate_{it} + \gamma_2 shfd_{it} + BF_i + \Gamma G_{i,t} + \Delta M_t + \varepsilon_{it}$$

where the individual effective corporate tax rate ( $tx$ ) in equation (14.a) is instrumented using the statutory rate ( $citprofrate$ ) in equation (14.b). The random-effects specification of Model (4.5.2) is given by:

$$(15) \quad rshf_{it} = \alpha + \gamma_1 cittargted\_yes_{it} + BF_i + \Gamma G_{i,t} + \Delta M_t + \eta_i + \varepsilon_{it}$$

where F includes industry dummies and M includes year dummies. The other models are set up accordingly. The results of all model regressions are summarized in Tables 4.1 through 4.5 reported in the appendix.

Aggregate country level results indicate that statutory corporate income tax rates influence average gearing ratios positively whereas using average effective tax rates produces mixed results. This holds true for a variety of pooled regression and random-effects panel-specifications, whereas fixed-effects models yield no stable results even for statutory tax rates.

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Furthermore, neither statutory tax rates nor average effective tax rates show significant negative effects on average profits and returns.

These results are reported in Table 4.1 for the gearing ratio. Comparing models (4.1.2) and 4.1.3) shows that a random-effects model with year and country dummies can explain more than half of the variation in the average gearing ratio (*avgcygear*); if the model uses only the statutory corporate income tax rate as an explanatory variable besides year and country dummies, still over a third of the variation of the average gearing ratio can be explained. Model (4.1.4) uses an indicator variable for tax rate changes (*dtaxtotal*) as an explanatory variable. While this variable carries less information<sup>10</sup>, the model is still able to explain close to a quarter of the variation of the average gearing ratio.

Simple pooled OLS regressions give a first impression of the individual firm-level results to be expected. Results using effective individual tax rates basically indicate that taxes do tend to decrease returns on shareholder funds and increase the gearing ratio. However, statutory taxes do not seem to have a significant negative effect on returns to shareholder funds. The results for the gearing ratio are reported in Table 4.2; results for returns to shareholder funds are reported in Table 4.5 and discussed later in this section. A positive effect of taxation on the gearing ratio can be shown to be significant regardless of how taxes are measured – either as effective individual taxation rate or as statutory corporate tax rate. Model specifications typically explain close to half of the variation in the firm-individual gearing ratios while both statutory tax rate variables and individual effective tax rate variables are highly significant. Model 4.2.1 also illustrates that the effective tax rate variable remains significant also when estimated together with several statutory tax rate measures.

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<sup>10</sup> The variable *dtaxtotal* takes a value of one (minus one) if the statutory corporate income tax rate is increased (decreased) in comparison to last year's rate. The total of 283 observations include 88 tax decreases and 26 tax increases; see table 3.2 in the appendix.

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Table 4.3 presents two random effects (RE) and two fixed effects (FE) specifications using a variety of statutory tax rate variables. These models basically confirm the preliminary results presented so far. Model 4.3.2, e.g., again shows the indicator variable for tax rate changes (*dtaxtotal*) as significant determinant of the gearing ratio. Furthermore, the indicator for special tax rate incentives (*cittargeted\_yes*) is also a significant determinant of the gearing ratio, which seems to indicate that firms do react to special tax incentives offered by individual jurisdictions.

Table 4.4. presents various instrumental variables models – random effects (RE-IV) and fixed effects (FE-IV) models – using individual effective taxation with or without statutory tax rate measures as explanatory variables. Individual effective taxation rate (*tx*) is instrumented by a variety of statutory tax rate measures together with contemporary revenue, cost, and profit measures. All estimations include a lagged dependent variable, control for yearly effects and, where appropriate, for country effects. Effective tax rates as well as statutory tax rates have significant and positive effects on the gearing ratio in all models presented. The random-effects specifications explain around half of the fluctuation of the gearing ratio whereas the fixed-effects specifications still explain around 40 percent.

In summary the effect of taxation on the gearing ratio can be demonstrated consistently using both aggregate and firm-individual data and across a variety of model specifications and estimation techniques. The picture looks somewhat different when examining possible effects of tax rates on profit measures. Neither effective individual taxation rates nor statutory corporate tax rates can be shown to have a clear negative impact on returns to equity; instead the picture is decidedly mixed. This is presented in table 4.5 for a variety of OLS, RE, FE and IV models. As can be seen in model 4.5.5, e.g., negative and significant effective tax rate effects tend to be very small when they can be identified. Findings with respect to alternative profit measures and/or instruments are also inconclusive.

## 6. Conclusions

Results do not generally confirm that taxation has a negative effect on firm profits measured as returns on shareholder funds. Results with respect to other profit measures and/or using other tax rate measures/proxies are inconclusive also. The effects of taxation on firms' capital structure choice, however, seem to be clearly positive, significant and robust over a large variety of specifications.

This research presents strong evidence that corporate taxation rates do positively affect the gearing ratio, i.e. the higher corporate tax rates in a particular jurisdiction the higher the ratio of debt financing to equity financing of firms residing in that jurisdiction. While the body of pre-existing literature so far presented ambiguous results (Feld et al. (2011), the results presented here give a clear indication and are more in line with other newer research such as Faccio/Xu (2011). These results may indicate that high-tax jurisdictions deter valuable investment by multinational enterprises because they provide incentives to locate value-driving business parts requiring more equity financing elsewhere.

These findings also have important implications for international transfer pricing. International transfer pricing is used to determine whether and to what extent intercompany debt financing can be tax deductible. The research presented here implies that effective tax levels are an important determinant of capital structure and therefore need to be taken into account when evaluating multi-national firms' inter-company financing structures for tax purposes.

This work is research in progress and there are some important questions open for further research. Firstly, to what extent does taxation, through its effect on financing, ultimately affect other elementary business decisions such as R&D and innovative activity as well as entry and location decisions? Secondly, to what extent do the effects of taxation on firms' financing and investment choice run through the tax-adjusted user cost of capital? Other open questions



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include possible differential tax effects on small and medium firms or possible effects of marginal effective tax rates on financing. Further research may also include analyzing data from non-European and in particular North-American firms as well as exploring the effects of using other profit indicators and/or taxation measures.

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## Appendix

**Table 1. Data sources**

#	Data type	Source	Downloaded / data	Date
1	Firm data (balance sheet, profit/loss)	Wharton Research Data Services (WRDS) <sup>11</sup> ; Bureau van Dijk	<a href="https://wrds-web.wharton.upenn.edu/wrds/">https://wrds-web.wharton.upenn.edu/wrds/</a> (Data set: bvd/amadeus_1)	14 June 2011
2	Firm data (descriptive)	Bureau van Dijk	Amadeus “Very large, large and medium sized companies” Blue-Ray disk	Version January 2011
3	Firm data (publicly quoted stock data)	WRDS: Thomson Reuters	<a href="https://wrds-web.wharton.upenn.edu/wrds/">https://wrds-web.wharton.upenn.edu/wrds/</a> (Data set: tfn/s12type2, variables selected: CUSIP EXCHCD FDATE INDCODE PRC SHROUT1 SHROUT2 STKCD STKDESC STKNAME TICKER TICKER2)	8 July 2011
4	European economic climate index data	CESifo	( <a href="http://www.cesifo-group.de/link/wes-zeitreihen-euro-2009q4.xls">http://www.cesifo-group.de/link/wes-zeitreihen-euro-2009q4.xls</a> (Wirtschaftsklimaindikator Euroraum, Index R1)	March 2010
5	Capacity utilization data	Bundesbank	<a href="http://www.bundesbank.de/statistik/statistik_zeitreihen.php?lang=de&amp;open=&amp;func=row&amp;tr=YJW244">http://www.bundesbank.de/statistik/statistik_zeitreihen.php?lang=de&amp;open=&amp;func=row&amp;tr=YJW244</a> (series YJW244, capacity utilization in manufacturing, Euro zone (16), in percent)	March 2010
6	Industrial production index data	European Central Bank	<a href="http://sdw.ecb.europa.eu/">http://sdw.ecb.europa.eu/</a> (Eurostat, Industrial Production Index, series STS.M.I5.W.PROD.2C0000.4.000, STS.M.I5.W.PROD.NS0040.4.000, and STS.M.I5.W.PROD.NS0050.4.000, short-term statistics, monthly, fixed composition, working-day adjusted)	March 2010
7	U.S. stocks and bonds data	Damodaran, A., Stern School of Business, New York University	<a href="http://pages.stern.nyu.edu/~adamodar/pdf/iles/papers/ERP2011.pdf">http://pages.stern.nyu.edu/~adamodar/pdf/iles/papers/ERP2011.pdf</a> (Appendix 1, annual returns on U.S. stocks (S&P 500, treasury bills (6 months) and treasury bonds (10 years))	February 2011
			<b>(to be continued)</b>	

<sup>11</sup> Wharton Research Data Services (WRDS) was used in preparing part of the data set used in the research reported in this paper. This service and the data available thereon constitute valuable intellectual property and trade secrets of WRDS and/or its third-party suppliers.

<b>Table 1. Data sources (continued)</b>				
<b>#</b>	<b>Data type</b>	<b>Source</b>	<b>Downloaded / data</b>	<b>Date</b>
<b>8</b>	European stocks and bonds data	Bloomberg	Bloomberg Terminal ( MSCI Europe Index MXEU PX_LAST, Euro Generic Government Bond 3M GECU3M Index PX_LAST)	17 March 2010
<b>9</b>	European longterm bonds data	European Central Bank	<a href="http://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=143.FM.M.U2.EUR.4F.B.B.U2_10Y.YLD">http://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=143.FM.M.U2.EUR.4F.B.B.U2_10Y.YLD</a> (Euro area 10-year Government Benchmark bond yield – Euro (FM.M.U2.EUR.4F.BB.U2_10Y.YLD))	July 2011
<b>10</b>	Statutory income tax rates	OECD	<a href="http://www.oecd.org/document/60/0,3746,en_2649_34533_1942460_1_1_1_1,00.html#C_CorporateCapital">http://www.oecd.org/document/60/0,3746,en_2649_34533_1942460_1_1_1_1,00.html#C_CorporateCapital</a> (Basic (non-targeted) corporate income tax rates, II.1, date: 02-24-2012); <a href="http://www.oecd.org/document/60/0,3746,en_2649_34533_1942460_1_1_1_1,00.html#C_CorporateCapital">http://www.oecd.org/document/60/0,3746,en_2649_34533_1942460_1_1_1_1,00.html#C_CorporateCapital</a> (Overall statutory tax rates on dividend income, II.4, date: 02-24-2012);	March 2012

**Table 2. List of variables**

<b>Variable</b>	<b>Definition</b>
id_number	BvD ID number (alphanumeric), Bureau van Dijk's unique identification number for firms
BvD	Firm ID number (numeric)
Year	Year
nacpri	NACE Rev.1.1 industry code
naicor	NAICS 2002 industry code
yearinc	Year of incorporation
opre	Operating revenue, EUR thousand
gros	gross profit, EUR thousand
ebit	EBIT, EUR thousand
ebta	EBITDA, EUR thousand
fipl	Financial profit/loss, EUR thousand
depre	Depreciation, EUR thousand
inte	Interest paid, EUR thousand
plbt	Profit/loss before tax, EUR thousand
taxa	Taxation, EUR thousand
plat	Profit/loss after tax, EUR thousand
pl	Profit/loss for the period, EUR thousand
cf	Cash flow, EUR thousand
av	Added value, EUR thousand
toas	Total assets, EUR thousand
wkca	Working capital, EUR thousand
cash	Cash and cash equivalent, EUR thousand
capi	Capital, EUR thousand
ltdb	Long-term debt, EUR thousand
loan	Loans, EUR thousand
tshf	Total shareholder funds and liabilities, EUR thousand
curr	Current ratio
solr	Solvency ratio (%)
prma	Profit margin (%)
liqr	Liquidity ratio
shlq	Shareholders liquidity ratio
gear	Gearing ratio (%)
prc	Share price, end of quarter
enva / envainv	Enterprise value, EUR thousand / inverse of enva
rshf	Return on shareholder funds (%)
rcem	Return on capital employed (%)
rtas	Return on total assets (%)
	<b>(to be continued)</b>

	<b>Table 2. List of variables (continued)</b>
<b>Variable</b>	<b>Definition</b>
RoEV	plat/enva
rcfenva	cf/enva
rprc	Percentage change of prc: (prc-l.prc)/l.prc
sp500returns	S&P 500 stock returns
rmxeuye	Return on MSCI Europe Index year end
USTBills6m	US Treasury Bill rates 6 months
USTBonds10y	US Treasury Bond rates 10 years
EurGovtBonds3m	ECB European govt bond yield 3 months
EurGovtBonds10y	ECB European govt bond yield 10 years
IFO_eur	IFO index, economic climate, Euro zone
Cap_Util_EWU	Capacity utilization, in percent, Euro zone (16)
Active	Dummy variable, by legal status
Independence	Dummy variable, if IndepA or IndepB or ishdirect<=25%
Manufacturing	Dummy variable; set to “1” if NACE 1.1 (10*, 15*, 17*-35*), NACE 2 (10*-32*) or NAICS (31*-33*) industry codes indicate manufacturing or if company description (in trade description English, main activity or secondary activity) contains at least one of the terms manufact*, manufact*, producti*, Producti*
Wholesale	Dummy variable; set to “1” if NACE 1.1 (50*-51*), NACE 2 (45*-46*) or NAICS (42*) industry codes indicate wholesale or if company description (in trade description English, main activity or secondary activity) contains at least one of the terms Wholesal*, wholesal*, whole sal*, Whole sal*
Retail	Dummy variable; set to “1” if NACE 1.1 (52*), NACE 2 (47*) or NAICS (44*- 45*) industry codes indicate retail or if company description (in trade description English, main activity or secondary activity) contains at least one of the terms Retail*, retail*, end custom*, end consum*
Service	Dummy variable set to “1” if NACE 1.1 (25*-37*, 40*-41*, 90*), NACE 2 (33*-39*) or NAICS (54*-56*) industry codes indicates service or repair or if company description (in trade description English, main activity or secondary activity) contains at least one of the terms repair*, service*, traini*, consul*
<Country>	Dummy variable, by <Country>
_IYear_<year>	Dummy variable, by <year>
consol_<#>	Dummy variables, by BvD consolidation code, _1 if “C1”, _2 if “C2”, _3 if “LF”, _4 if “U1”, _5 if “U2”
	<b>(to be continued)</b>



	<b>Table 2. List of variables (continued)</b>
<b>Variable</b>	<b>Definition</b>
avg3rshf	3-period moving average of rshf (rshf +1.rshf +12.rshf)/3
std3rshf	3-period moving standard deviation of rshf
avg3<var>	3-period moving average of <var>
std3<var>	3-period moving standard deviation of <var>
tx	Effective tax rate (%), $100*(plbt-plat)/plbt$
citcentralinclsurtax	Central government corporate income tax rate incl. surtax
citcentralexclsurtax	Central government corporate income tax rate excl. surtax
citcentraladjusted	Central government corporate income tax rate, adjusted
citcombined	Combined corporate income tax rate
citprofrate	Corporate income tax rate on distributed profits (CIT)
cittargetedyes	Targeted CIT (special lower rates for qualifying income) exists
pretaxdistprof	Pre-tax distributed profits (tax gross-up)
distprof	Distributed profits
withholdtax	OECD Final with-holding tax
netpersonaltax	Net personal tax (at shareholder level)
pitdivrate	Personal income tax rate on (grossed-up) dividends (PIT)
taxtotal	Overall PIT + CIT rate
dtaxtotal	Indicator tax change; taking values -1, 0, +1 for negative, no, or positive tax change, respectively
citshare	CIT share in taxtotal
pitshare	PIT share in taxtotal
avgcygear	Average gearing ratio (per country per year)
avgcy<var>	Average <var> (per country per year); variable names for Independence, Active, and industry dummies are abbreviated as avgcyInd, etc.

**Table 3.1. Taxation of Corporate and Capital Income 2011**

Country	Central government corporate income tax rate	Adjusted central government corporate income tax rate	Sub-central government corporate income tax rate	Combined corporate income tax rate
Australia	30.0	30.0		30.0
Austria	25.0	25.0		25.0
Belgium	33.99 (33.0)	34.0		34.0
Canada	16.5	16.5	11.1	27.6
Chile	20.0	20.0		20.0
Czech Republic	19.0	19.0		19.0
Denmark	25.0	25.0		25.0
Estonia	21.0	21.0		21.0
Finland	26.0	26.0		26.0
France	34.4	34.4		34.4
Germany	15,825 (15,0)	15,825	14.4	30.2
Greece	20.0	20.0		20.0
Hungary	19.0	19.0		19.0
Iceland	20.0	20.0		20.0
Ireland	12.5	12.5		12.5
Israel	24.0	24.0	0.0	24.0
Italy	27.5	27.5		27.5
Japan	30.0	28.0	11.6	39.5
Korea	22.0	22.0	2.2	24.2
Luxembourg	22.05 (21.0)	22.1	6.8	28.8
Mexico	30.0	30.0		30.0
Netherlands	25.0	25.0		25.0
New Zealand	28.0	28.0		28.0
Norway	28.0	28.0		28.0
Poland	19.0	19.0		19.0
Portugal	25.0	25.0	1.5	26.5
Slovak Republic	19.0	19.0		19.0
Slovenia	20.0	20.0		20.0
Spain	30.0	30.0		30.0
Sweden	26.3	26.3		26.3
Switzerland	8.5	6.7	14.5	21.2
Turkey	20.0	20.0		20.0
United Kingdom	26.0	26.0		26.0
United States	35.0	32.7	6.4	39.2

Source: OECD, Table II.1. Corporate income tax rate, downloaded 24 February 2012, [http://www.oecd.org/document/60/0,3746,en\\_2649\\_34533\\_1942460\\_1\\_1\\_1\\_1,00.html#C\\_CorporateCapital](http://www.oecd.org/document/60/0,3746,en_2649_34533_1942460_1_1_1_1,00.html#C_CorporateCapital)

**Table 3.2. Overall tax rate on distributed profits: tax rate changes by country 1985-2011**

<b>Country</b>	<b>Tax decreases</b>	<b>Tax increases</b>
<b>Austria</b>	1	0
<b>Belgium</b>	2	0
<b>Czech Republic</b>	11	0
<b>Denmark</b>	2	1
<b>Estonia</b>	4	0
<b>Finland</b>	0	2
<b>France</b>	8	4
<b>Germany</b>	0	1
<b>Greece</b>	3	1
<b>Hungary</b>	2	4
<b>Ireland</b>	9	2
<b>Italy</b>	5	3
<b>Luxembourg</b>	3	0
<b>Netherlands</b>	5	1
<b>Norway</b>	3	2
<b>Poland</b>	3	0
<b>Portugal</b>	3	0
<b>Slovenia</b>	4	1
<b>Spain</b>	5	1
<b>Sweden</b>	3	0
<b>Switzerland</b>	9	0
<b>United Kingdom</b>	3	3
<b>Sum</b>	88	26

Source: OECD Overall statutory tax rates on dividend income , downloaded 24 February 2012, [http://www.oecd.org/document/60/0,3746,en\\_2649\\_34533\\_1942460\\_1\\_1\\_1\\_1,00.html#C\\_CorporateCapital](http://www.oecd.org/document/60/0,3746,en_2649_34533_1942460_1_1_1_1,00.html#C_CorporateCapital), and authors calculations.

**Table 3.3. Summary statistics (selected variables)**

<b>Variable</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
yearinc	1142581	1984.052	19.01302	1851	2010
nacpri	1138032	4661.635	1973.946	100	9900
naicor	1138032	4229.729	1257.873	1100	9281
Active	1363158	.8151322	.3881904	0	1
Independence	1363158	.1767271	.3814378	0	1
Manufacturing	1363158	.2155796	.4112239	0	1
Wholesale	1363158	.188824	.3913689	0	1
Services	1363158	.2865258	.4521382	0	1
Retail	1363158	.0566545	.2311813	0	1
toas	1362858	3.19e+07	9.21e+07	-2631842	1.00e+09
shfd	1363158	1.38e+07	5.28e+07	1	9.96e+08
empl	1009079	281.2701	3349.529	0	1893091
opre	1243491	3.60e+07	9.98e+07	1	1.00e+09
plbt	1363158	2778379	1.39e+07	1	8.87e+08
cf	1149993	3169230	1.28e+07	-4.26e+08	9.76e+08
rshf	1363158	38.57373	64.9938	.01	1000
std3rshf	762017	15.25405	29.60213	0	572.8825
cash	1299641	2925209	1.61e+07	-1.19e+08	9.98e+08
capi	1340705	4792965	2.91e+07	-3.87e+08	9.99e+08
ltdb	1248418	4228223	2.62e+07	-1.39e+08	9.23e+08
loan	1294618	2200139	1.17e+07	-4.51e+08	8.54e+08
wkca	1319660	6078313	2.26e+07	-7.23e+08	9.57e+08
enva	11727	2126022	1.77e+07	-1.73e+07	8.71e+08
cost	73662	3.22e+07	9.42e+07	-2.12e+08	9.62e+08
gros	85959	1.03e+07	3.37e+07	-4.70e+07	9.68e+08
oope	121868	4539033	2.07e+07	-3.29e+08	8.98e+08
fipl	1360980	388311.9	9906510	-3.55e+08	9.60e+08
taxa	1333850	592380.3	3029862	-4.71e+08	6.74e+08
plat	1333126	2244698	1.26e+07	-3.77e+08	8.87e+08
expt	245230	935979.5	1.92e+07	-780701	9.96e+08
mate	998146	2.18e+07	6.73e+07	-9.01e+08	9.98e+08
staf	1160365	5347024	2.05e+07	-2.61e+08	9.62e+08
depre	1188892	1055451	4586149	-2.59e+08	4.03e+08
inte	1163553	452751.2	2467879	-2.42e+07	8.01e+08
av	973441	9002240	2.87e+07	-5.18e+08	9.94e+08
ebit	1346352	2416761	1.06e+07	-4.41e+08	8.00e+08
ebta	1216452	3484196	1.30e+07	-4.17e+08	8.01e+08
curr	1328172	2.620336	6.941465	0	99.98
solr	1362853	37.16301	26.04185	0	100
prma	1243617	8.212753	13.26387	0	100
rcem	1140735	29.12828	44.4509	-112.32	1000
liqr	1311422	2.178741	6.70824	0	99.98
shlq	1141194	50.60817	364.6084	0	10000
				<b>(to be continued)</b>	

<b>Table 3.3. Summary statistics (selected variables) (continued)</b>					
<b>Variable</b>	<b>Obs</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>rtas</b>	1362851	9.275726	11.0921	-7.52	100
<b>consol_1</b>	1363158	.03409	.1814603	0	1
<b>consol_2</b>	1363158	.059514	.2365843	0	1
<b>consol_4</b>	1363158	.8617915	.3451188	0	1
<b>consol_5</b>	1363158	.0446016	.2064275	0	1
<b>tx</b>	1333126	.4434162	17.8537	-3715	16513
<b>citcentraladjusted</b>	1362903	30.54193	5.93674	6.137	53.2
<b>citsubcentral</b>	159726	12.50364	6.376693	0	21.661
<b>citcombined</b>	1362903	32.00737	5.363256	12.5	60.1
<b>cittargetedyes</b>	1363148	.6179659	.485885	0	1
<b>citprofrate</b>	1249289	31.57176	5.156022	12.5	60.1
<b>withholdtax</b>	408777	12.70318	5.303518	0	25
<b>pitdivrate</b>	1249289	31.49136	16.28147	0	72.8
<b>netpersonaltax</b>	1249289	22.9841	10.28337	0	72.8
<b>taxtotal</b>	1249289	47.28863	8.19538	21	89.1
<b>citshare</b>	1249289	67.96553	12.14718	25.4	100
<b>Belgium</b>	1363158	.0533291	.224689	0	1
<b>France</b>	1363158	.1730746	.3783119	0	1
<b>Germany</b>	1363158	.082771	.2755359	0	1
<b>Italy</b>	1363158	.1823164	.3861052	0	1
<b>Netherlands</b>	1363158	.0412315	.1988252	0	1
<b>Norway</b>	1363158	.0410327	.1983659	0	1
<b>Poland</b>	1363158	.0441563	.2054423	0	1
<b>Spain</b>	1363158	.158815	.3655037	0	1
<b>Sweden</b>	1363158	.041957	.200491	0	1
<b>UK</b>	1363158	.0605447	.2384934	0	1
<b>2000</b>	1363158	.0684785	.2525653	0	1
<b>2001</b>	1363158	.0753625	.2639755	0	1
<b>2002</b>	1363158	.0818651	.2741591	0	1
<b>2003</b>	1363158	.0888789	.284569	0	1
<b>2004</b>	1363158	.1006545	.3008708	0	1
<b>2005</b>	1363158	.1150358	.3190653	0	1
<b>2006</b>	1363158	.1275017	.3335343	0	1
<b>2007</b>	1363158	.1306048	.3369678	0	1
<b>2008</b>	1363158	.1158098	.3199968	0	1
<b>2009</b>	1363158	.0459785	.2094386	0	1
<b>sp500returns</b>	1362403	.0165841	.1968936	-.3658	.372
<b>rmxeuye</b>	1201885	-.0130648	.2458795	-.4723618	3040179
<b>USTBills6m</b>	1362403	.0413832	.026466	.0159	.14
<b>USTBonds10y</b>	1362403	.0692684	.0817308	-.1112	.2348
<b>EurGovtBonds3m</b>	1295232	2.96272	.9379818	.63	4.15
<b>EurGovtBonds10y</b>	1362403	.043302	.0057413	.0344088	.1016043
<b>IFO_eur</b>	1362403	88.78034	14.40186	57.83898	116.5254
<b>Capacity_Util_EWU</b>	1362403	81.81994	2.610822	71.3	84.2

**Table 3.4. Correlations (selected variables)**

	tx	gear	rshf	shfd	opre	cf
tx	1.0000					
gear	0.0103	1.0000				
rshf	-0.0092	0.2330	1.0000			
shfd	-0.0045	-0.0671	-0.0809	1.0000		
opre	-0.0036	-0.0386	0.0039	0.5175	1.0000	
cf	-0.0048	-0.0367	0.0341	0.6663	0.5615	1.0000

	tx	citcombined	citprofrate	withholdtax	pitdivrate	netpersonaltax	taxtotal
tx	1.0000						
citcombined	0.0091	1.0000					
citprofrate	0.0091	0.9999	1.0000				
withholdtax	-0.0015	-0.4765	-0.4764	1.0000			
pitdivrate	-0.0075	0.0777	0.0776	-0.6074	1.0000		
netpersonaltax	-0.0073	0.0170	0.0169	-0.3724	0.8791	1.0000	
taxtotal	0.0006	0.6583	0.6582	-0.5850	0.7066	0.7597	1.0000

	toas	shfd	cash	capi	ltdb	loan	cred	wkca
toas	1.0000							
shfd	0.8315	1.0000						
cash	0.4803	0.4725	1.0000					
capi	0.5655	0.7074	0.2871	1.0000				
ltdb	0.5277	0.2256	0.1424	0.1405	1.0000			
loan	0.4204	0.2202	0.1121	0.1484	0.1800	1.0000		
cred	0.5159	0.2923	0.2524	0.1668	0.1542	0.3181	1.0000	
wkca	0.5216	0.3549	0.1829	0.1913	0.2035	0.4117	0.3434	1.000

	curr	solr	prma	rcem	liqr	shlq	gear	rtas
curr	1.0000							
solr	0.2068	1.0000						
prma	0.1193	0.2877	1.0000					
rcem	-0.0657	-0.2116	0.0801	1.0000				
liqr	0.8440	0.1961	0.1154	-0.0474	1.0000			
shlq	0.0486	0.1561	0.0508	0.0048	0.0491	1.0000		
gear	0.0144	-0.3639	-0.0356	0.0261	0.0015	-0.0429	1.0000	
rtas	0.0466	0.2906	0.3543	0.4597	0.0489	0.0474	-0.1732	1.0000
rshf	-0.0243	-0.2835	0.1035	0.6040	-0.0160	-0.0253	0.2479	0.3771

**(to be continued)**

**Table 3.3. Correlations (selected variables) (continued)**

	plbt	cf	gros	oope	oppl	fipl	plat	pl
plbt	1.0000							
cf	0.9308	1.0000						
gros	0.4851	0.6304	1.0000					
oope	0.2920	0.4646	0.9765	1.0000				
oppl	0.9723	0.9259	0.5200	0.3237	1.0000			
fipl	0.2214	0.1189	-0.0944	-0.1014	-0.0126	1.0000		
plat	0.9966	0.9302	0.4663	0.2726	0.9662	0.2322	1.0000	
pl	0.9901	0.9330	0.4506	0.2579	0.9556	0.2490	0.9906	1.0000
av	0.6156	0.7715	0.9114	0.8477	0.6416	-0.0436	0.6040	0.5943
ebit	0.9723	0.9259	0.5200	0.3237	1.0000	-0.0126	0.9662	0.9556
ebta	0.9061	0.9749	0.6632	0.4956	0.9474	-0.0765	0.9005	0.8882

av	ebit	ebta	
av	1.0000		
ebit	0.6416	1.0000	
ebta	0.7853	0.9474	1.0000

	sales	cost	gros	oope	taxa	expt	mate	staf
sales	1.0000							
cost	0.9153	1.0000						
gros	0.8337	0.5414	1.0000					
oope	0.8017	0.4955	0.9964	1.0000				
taxa	0.6913	0.4801	0.7670	0.7366	1.0000			
expt	0.5911	0.4287	0.6217	0.6000	0.8520	1.0000		
mate	0.8446	0.9710	0.4252	0.3756	0.4892	0.4923	1.0000	
staf	0.8632	0.5989	0.9864	0.9816	0.6932	0.5700	0.4653	1.0000
depre	0.7627	0.5189	0.8896	0.8691	0.6359	0.4015	0.3596	0.9067
inte	0.1774	0.1341	0.1905	0.1494	0.1254	0.0618	0.0433	0.2431
opre	0.9995	0.9067	0.8455	0.8145	0.6897	0.5842	0.8300	0.8752

	depre	inte	opre
depre	1.0000		
inte	0.5643	1.0000	
opre	0.7758	0.1807	1.0000

	gear	shfd	loan	ltdb
gear	1.0000			
shfd	-0.0646	1.0000		
loan	0.0533	0.2144	1.0000	
ltdb	0.0943	0.2209	0.1775	1.0000

**Table 4.1. Results summary: capital structure – country aggregates**

Model	(4.1.1) OLS	(4.1.2) RE	(4.1.3) RE	(4.1.4) RE	(4.1.5) RE
<b>Dep. Var.</b>	<b>avgcygear</b>	<b>avgcygear</b>	<b>avgcygear</b>	<b>avgcygear</b>	<b>avgcygear</b>
<b>citprofrate</b>	1.911772*	3.2658389***	3.477293***		
<b>pitdivrate</b>	-3.245538***	-1.884825***			
<b>taxtotal</b>	3.029689***				
<b>dtaxtotal</b>				18.56241*	
<b>avgcytx</b>		0.032545			0.193347**
<b>avgcyempl</b>	0.0049936***	0.0054992***			
<b>avgcysolr</b>	-4.24337***	-4.44448***			
<b>avgcyslhq</b>	.3784667***	0.413205***			
<b>lavgcycurr</b>				9.825753***	
<b>lavgcysolr</b>				-6.44137***	-14.1035***
<b>lavgcyrshf</b>				-0.3557913	
<b>avgcyyearinc</b>	1.061597*	0.698375			
<b>avgcyInd</b>	-186.909**	-291.757***		-296.049***	
<b>avgcyMfg</b>				-195.6676*	
<b>avgcyWhl</b>	-752.172***	-824.812***		-506.813***	-581.854***
<b>lavgcyAct</b>				200.8405***	510.774***
<b>Observations</b>	264	264	288	267	327
<b>Countries</b>		23	23	22	23
<b>R-sq. within</b>		0.2782	0.1201	0.1673	0.4745
<b>R-sq. between</b>		0.7145	0.7046	0.3459	0.6319
<b>R-sq. overall</b>	0.5714	0.5645	0.3712	0.2345	0.4816
<b>Prob&gt;chi2(&gt;F)</b>	0.0000	0.0000	0.0000	0.0000	0.0000

Notes.

(i) Model (1) pooled OLS regression; models (2), (3), (4) random effects.

(ii) All models include a constant. Models (1), (2), (3), (5) include year and country dummies. Country dummies: model (1): Czech Rep., Denmark, Italy, UK; model (2): Czech Rep., Denmark, Italy, UK; model (3): France, Germany, Italy, Spain, UK; model (5): France, Germany, UK.

(iii) \*\*\* denotes significant at the 1%, \*\* at the 5%, \* at the 10% level.



**Table 4.2. Results summary: capital structure – pooled regressions**

Model	(4.2.1)	(4.2.2)	(4.2.3)	(4.2.4)
Dep. Variable	gear	gear	gear	gear
citprofrate	0.0227518	3.22072***		
pitdivrate	-0.5570792***			
taxtotal			1.036059***	
dtaxtotal				4.35267***
tx	1.205706***			
l.tx	-0.0000833			
l.gear	0.5740762***	0.5800144***	0.579995***	0.5804184***
Active	-11.96491	-13.93825***	-13.9144***	-13.87155***
Independence	0.3339305	-0.5054216	-0.6007384	-0.5905318
Manufacturing	-12.09233***	-14.48251***	-14.46244***	-14.48657***
Services	6.406681***	5.127179***	5.118435***	5.187553***
Retail	-7.633938***	-7.321639***	-7.295511***	-7.393582***
IFO_eur	0.1426113***			
shfd	-1.68e-07***	-1.96e-07***	-1.99e-07***	-1.98e-07***
l.toas	1.30e-07***	1.31e-07***	1.32e-07***	1.32e-07***
l.plbt	2.96e-07***	2.50e-07**	2.44e-07***	2.61e-07**
l.cf	1.76e-06***	1.25e-06***	1.22e-06***	1.22e-06***
l.staf	1.33e-06***	8.76e-07***	8.49e-07***	8.65e-07***
l.inte	2.83e-06***	2.03e-06***	2.01e-06***	2.03e-06***
l.av	-1.68e-06***	-1.22e-06***	-1.19e-06***	-1.19e-06***
l.solr	-1.736443***	-1.978879***	-1.977791***	-1.978493***
l.prma	1.138621***	.9262104***	.9269559***	.9288776***
l.rcem	0.2619761***	0.282237***	0.2843217***	0.2851249***
l.liqr	1.748896***	1.838786***	1.858543***	1.841204***
l.rtas	-1.948233***	-2.041914***	-2.047174***	-2.051826***
Observations	564527	638720	638720	638431
R-sq. adjusted	0.4990	0.4856	0.4855	0.4859
Prob > F	0.0000	0.0000	0.0000	0.0000

Notes.

(i) All models pooled OLS regressions.

(ii) All models include a constant and a lagged dependent variable. All models include country dummies; model (1): France, Italy, Spain, UK only. Models (2), (3), (4) include year dummies.

(iii) \*\*\* denotes significant at the 1%, \*\* at the 5%, \* at the 10% level.

(iv) Model (1) includes only observations with  $0\% \leq tx \leq 100\%$ .

**Table 4.3. Results summary: capital structure – RE/FE models**

Model	(4.3.1) RE	(4.3.2) RE	(4.3.3) FE	(4.3.4) FE
Dep. Variable	gear	gear	gear	gear
citprofrate	1.758338***	1.135137***	3.40245***	2.118449***
cittargeted_yes	-16.91017***		-8.607678***	
pitdivrate	-0.8793334***	-0.8922425***	-0.9955553***	
taxtotal		0.2365352		
dtaxtotal		3.567321***		
l.gear	0.3716977***	0.3720863***	0.2174374***	0.2175849***
Active	-18.19***	-18.31878***		
Independence	-2.031121	-2.465019		
Manufacturing	-32.71781***	-32.43725***		
Services	9.839303***	10.26639***		
Retail	-15.79454***	-15.76581***		
IFO_eur	.1405641***	0.1154583***	0.1250049***	0.167089***
shfd	-2.15e-07***	-2.19e-07***	-1.99e-07***	-2.04e-07***
ltoas	1.14e-07***	1.13e-07***	1.19e-08	1.54e-08
lplbt	3.07e-07***	3.08e-07***	4.10e-07***	4.10e-07***
l.cf	8.82e-07***	8.93e-07***	3.60e-07	3.25e-07
lstaf	5.88e-07**	5.92e-07**	4.56e-07*	4.18e-07
l.inte	6.40e-07*	6.76e-07*	-2.41e-06***	-2.37e-06***
lav	-8.73e-07***	-8.85e-07***	-3.92e-07	-3.62e-07
lsolr	-2.648594***	-2.642687***	-1.790412***	-1.776722***
lprma	0.6028434***	0.6006985***	-0.1600377**	-0.1455676**
l.rcem	0.1760459***	0.1779614***	0.1072318***	0.1082056***
l.liqr	1.01187***	1.021685***	0.0363434	0.0656883
l.rtas	-1.553783***	-1.555309***	-0.8686328***	-0.8862274***
Observations	638720	636979	638720	638720
Groups (Firms)	131507	130758	131507	131507
R-sq. within	0.0733	0.0730	0.0742	0.0738
R-sq. between	0.5893	0.5906	0.5760	0.5782
R-sq. overall	0.4698	0.4700	0.4599	0.4604
Prob > chi2 (>F)	0.0000	0.0000	0.0000	0.0000

Notes.

(i) Models (1) and (2) estimated with random effects; Models (3) and (4) estimated with fixed effects.

(ii) All models include a constant. Models (1) and (2) include country dummies: France, Germany, Italy, Spain, UK.

(iii) \*\*\* denotes significant at the 1%, \*\* at the 5%, \* at the 10% level.

**Table 4.4. Results summary: capital structure – IV models**

Model	(4.4.1) RE-IV	(4.4.2) RE-IV	(4.4.3) RE-IV	(4.4.4) FE-IV	(4.4.5) FE-IV
<b>Dep. Variable</b>	<b>gear</b>	<b>gear</b>	<b>gear</b>	<b>gear</b>	<b>gear</b>
<b>citprofrate</b>					1.40952***
<b>dtaxtotal</b>			2.666312***		
<b>tx</b>	1.63116***	3.39463***	2.31361***	3.86120***	2.72337***
<b>l.gear</b>	0.46467***	0.44821***	0.45067***	0.22368***	0.22436***
<b>Active</b>	-19.3556***	-17.3587***			
<b>Independence</b>	1.46688	-0.27280			
<b>Manufacturing</b>		-21.7983***			
<b>Services</b>	6.81517***	9.10959***			
<b>Retail</b>		-17.9104***			
<b>IFO_eur</b>		9.05325	8.03024	19.8291	16.5336*
<b>shfd</b>	-1.82e-07***	-1.59e-07***	-1.71e-07***	-1.65e-07***	-1.82e-07***
<b>l.toas</b>	1.23e-07***	1.41e-07***	1.54e-07***	8.94e-09	1.10e-08
<b>l.empl</b>	0.00021				
<b>l.plbt</b>	3.35e-07***	3.80e-07***	4.10e-07***	3.19e-07**	3.00e-07**
<b>l.cf</b>	1.13e-06***	2.14e-06***	2.02e-06***	3.84e-07	3.82e-07
<b>l.staf</b>	7.85e-07***	1.64e-06***	1.67e-06***	3.67e-07	3.49e-07
<b>l.inte</b>	2.72e-06***	2.96e-06***	2.84e-06***	-2.39e-06***	-2.51e-06***
<b>l.av</b>	-1.17e-06***	-2.09e-06***	-2.04e-06***	-3.93e-07	-3.63e-07
<b>l.solr</b>	-2.10719***	-2.14561***	-2.212395***	-1.68279***	-1.67875***
<b>l.pрма</b>	1.12849***	1.18512***	1.28507***	-0.09384	-0.14246**
<b>l.rcem</b>	0.24198***	0.25728***	0.28510***	0.16893***	0.18267***
<b>l.liqr</b>	1.38137***	1.71704***	1.68967***	0.31416**	0.28402*
<b>l.rtas</b>	-1.7698***	-1.82739***	-2.05096***	-0.66566***	-0.74825***
<b>Observations</b>	484266	588996	576171	588996	576171
<b>Groups (Firms)</b>	112208	127318	124821	127318	124821
<b>R-sq. within</b>	0.1091	0.0811	0.0829	0.0625	0.0765
<b>R-sq. between</b>	0.5819	0.5724	0.5749	0.4651	0.5027
<b>R-sq. overall</b>	0.5136	0.4753	0.4824	0.3786	0.4180
<b>Prob &gt; chi2</b>	0.0000	0.0000	0.0000	0.0000	0.0000

Notes.

(i) Models (1), (2), (3) estimated with random effects; Models (4) and (5) estimated with fixed effects. All models IV regressions with tx instrumented; instruments model (1): citprofrate, pitdivrate, l.tx, and other variables; model (3): citprofrate, cittargeted\_yes, pitdivrate, taxtotal, l.tx, and others; models (2), (4): citprofrate, cittargeted\_yes, pitdivrate, taxtotal, dtaxtotal, l.tx, and others; model (5): cittargeted\_yes, pitdivrate, taxtotal, dtaxtotal, l.tx, and others.

(ii) All models include a constant. All models include year dummies. Models (1) and (2) include country dummies; model (1) France, Italy only.

(iii) \*\*\* denotes significant at the 1%, \*\* at the 5%, \* at the 10% level.

(iv) Model (1) includes only observations with  $0\% \leq tx \leq 100\%$ .

**Table 4.5. Results summary: profits/returns**

Model	(4.5.1) OLS	(4.5.2) RE	(4.5.3) RE	(4.5.4) FE	(4.5.5) RE-IV
Dep. Variable	rshf	rshf	rshf	rshf	rshf
<b>citprofrate</b>	0.045456		0.2098***		
<b>cittargeted_yes</b>	0.988483*	1.292041***	0.351498	1.165692**	
<b>pitdivrate</b>	0.005943		-0.011432		
<b>taxtotal</b>	0.160286***		0.198096***		
<b>dtaxtotal</b>	0.703894***		0.441963***		
<b>tx</b>					-0.00662***
<b>lrshf</b>	0.484855***	0.3159919***	0.3036***	0.144871***	0.382353***
<b>Active</b>	1.493663***	1.817187***	2.314681***		1.908772***
<b>Independence</b>	-1.64548***	-2.632198***	-2.55442***		-2.18295***
<b>Manufacturing</b>	-1.79932***	-2.551298***	-3.31016***		-2.6198***
<b>Services</b>	2.432787***	3.692003***	3.988952***		3.249455***
<b>Retail</b>	3.289632***	6.004965***	5.574298***		4.538336***
<b>Ifo_eur</b>	-1.023723	0.1997943	-0.59587	-0.109261	-0.25212
<b>shfd</b>	-5.64e-09***	-1.07e-08***	-1.23e-08***	-1.41e-08***	-9.84e-09***
<b>ltoas</b>	1.30e-09	-1.35e-10	-1.68e-09	3.76e-09***	-1.10e-09
<b>lplbt</b>	-9.65e-08***	-1.09e-07***	-9.03e-08***	-1.03e-07***	-9.13e-08***
<b>lcf</b>	-3.05e-07***	-1.58e-07***	-1.90e-07***	-8.85e-08***	-2.48e-07***
<b>lstaf</b>	-2.52e-07***	-1.23e-07***	-1.50e-07***	-6.60e-08**	-2.01e-07
<b>linte</b>	-7.51e-07***	-6.17e-07***	-6.51e-07***	-4.18e-07***	-7.26e-07***
<b>lav</b>	2.94e-07***	1.69e-07***	1.95e-07***	1.04e-07***	2.47e-07***
<b>lsolr</b>	-0.244179***	-0.345589***	-0.323***	-0.35913***	-0.28822***
<b>lprma</b>	-0.0120583**	-0.045383***	-0.03342***	-0.0234***	-0.02660***
<b>lrcem</b>	0.071976***	0.05005***	0.072434***	0.048244***	0.076781***
<b>lliqr</b>	0.185074***	0.103237***	0.159607***	0.08477***	0.167568***
<b>lgear</b>	0.00305***	0.004026***	0.004283***	0.004732***	0.003868***
<b>lrtas</b>	0.425476***	0.249689***	0.243807***	0.032144***	0.331901***
<b>Observations</b>	645751	693017	645751	693017	645302
<b>Groups (Firms)</b>		149463	131819	149463	131646
<b>R-sq. within</b>		0.0667	0.0720	0.0745	0.0657
<b>R-sq. between</b>		0.5861	0.5909	0.4553	0.6060
<b>R-sq. overall</b>	0.4707	0.4577	0.4513	0.3541	0.4571
<b>Prob &gt; chi2(&gt;F)</b>	0.0000	0.0000	0.0000	0.0000	0.0000

Notes.

(i) Model (1) pooled OLS regression; models (2) and (3) random effects; model (4) fixed effects; model (5) random effects IV regression with tx tx instrumented by citprofrate cittargeted\_yes pitdivrate taxtotal dtaxtotal l.tx and other variables.

(ii) All models include a constant. All models include year dummies. Models (1), (2), (3), (5) include country dummies.

(iii) \*\*\* denotes significant at the 1%, \*\* at the 5%, \* at the 10% level.