Taxation and the Financial Structure of Foreign Direct Investment

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COMMENTS WELCOME

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NON-TECHNICAL SUMMARY

Corporate tax incentives are one of the most important instruments used by governments to attract inward FDI flows. By lowering corporate tax rates countries raise the profitability of FDI and thus increase their attractiveness as a location. However, multinationals can also lower their tax burden by lending to the foreign subsidiary to finance the investment since interest payments made by the subsidiary are not subject to taxation. This means that any profits the subsidiary makes can be repatriated back to the parent tax free in the form of interest payments and the incentive to use debt finance should be increasing in the host country tax rate. However, if the home government operates a tax credit system, taxing repatriated profits at a rate equal to the difference between the taxes paid on those profits abroad and the domestic tax rate, there will be no net gain for the parent company. Therefore, the rules regarding the taxation of foreign income can potentially eliminate the incentive to use debt finance to shield foreign income from taxation.

In this study we estimate the importance of interest tax shields for foreign subsidiaries, and the importance of foreign income tax rules. We use data on over 8,500 subsidiaries within the EU, which allows us to look at the total amount of investment in each subsidiary, and determine the proportion of this investment that is financed by debt (the leverage ratio). The wide variety of corporate tax rates within the EU means that we can compare the leverage ratios of foreign subsidiaries in a variety of corporate tax rate jurisdictions. We use regression analysis to estimate how sensitive leverage ratios are to corporate tax rates, whilst controlling for a number of individual subsidiary characteristics.

Our results indicate that 10 per cent higher corporate tax rates are associated with 3.5 per cent greater subsidiary leverage ratios. However, if the home country operates a tax credit system our estimates suggest that this positive relationship disappears.

Taxation and the Financial Structure of Foreign Direct Investment

ABSTRACT

The vast increase in foreign assets globally has raised interest in how the home country should tax profits flowing from these investments. Broadly speaking, countries have chosen either to exempt foreign income from taxation or to subject foreign income to taxation with credits/deductions given for foreign taxes paid. Recent research has focused on the effect of these foreign income tax rules on the relationship between aggregate FDI flows and corporate tax rates. In this paper we examine how foreign income tax rules can affect the financial structure of subsidiary-level FDI in Europe. The tax-deductibility of interest payments suggests that higher (host-country) corporate tax rates should be associated with a greater proportion of debt-financed FDI, as foreign income tax credit systems should, in theory, limit the benefits of shielding foreign income from host country taxation. Our results indicate that whilst multinationals from tax exemption countries adjust the financial structure of foreign investments in response to corporate tax rates, the effect of corporate tax rates is insignificant for FDI originating from tax credit countries. These results reveal an additional channel through which foreign income tax credit systems attenuate the forces of tax competition.

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1. Introduction

Recent research in international taxation has focused on the optimal design of foreign income tax rules[1]. This research has been prompted by the huge growth in foreign direct investment (FDI) and the consequent rise in profits earned abroad. For example, Huizinga and Nicodème (2005) investigate how host countries tax the increasing share of profits earned by the foreign-owned sector. The home country must also decide how to tax income earned abroad. Home countries typically choose between exempting foreign income from taxation or taxing foreign income at the home country rate and granting foreign tax credits or deductions for foreign taxes paid. The choice of foreign income tax rules is important. Recent studies have found that foreign income tax credit systems result in significant welfare losses for countries (Desai, Foley and Hines, 2001). Clausing (2004) has shown that tax credit countries collect more revenue than countries that adopt a tax exemption system, while, Bénassy-Quéré et al (2005) demonstrate how tax credit systems can serve as a brake on tax competition. In this paper we investigate how foreign income tax rules can influence the financial structure of FDI.

Empirical research has provided ample evidence on the sensitivity of aggregate FDI to corporate tax rates (see Ederveen and de Mooij, 2003). In addition, some recent studies have compared the effects of different foreign income tax rules on the size of bilateral aggregate FDI flows (see Bénassy-Quéré et al., 2004). Corporate taxation, however, is not only important in explaining the geographic dispersion of foreign owned assets, but is also a potentially important determinant of the **financial structure** of FDI.

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[1] See, for example, the recent exchanges between: Desai and Hines (2004); Grubert (2005); Desai and Hines (2005).

The financial structure of FDI can be decomposed into a mix of equity, retained earnings and loans. Few countries report a complete disaggregation of FDI positions and currently cross-country comparisons are only possible by comparing equity and reinvested earnings together against intra-company loans[2]. Table 1 illustrates the financial structure of FDI in European countries over the period 1994-2002. The average structure of European FDI indicates that just under 75 per cent is funded by equity and re-invested earnings, the remaining is financed by intra-company loans. However, the overall average masks significant cross-country heterogeneity in the components of FDI. For example, 53 per cent of German FDI is composed of intra-company loans, whilst in Ireland equity and re-invested earnings account for over 97 per cent of total FDI. The heterogeneous financial structure of FDI across countries may be explained by differences in corporate tax rates. Specifically, because interest payments on loans can shield profits from corporate taxation one might expect FDI in high tax countries to be composed predominantly of intra-company loans. Hence, the contrast between Germany and Ireland may be explained by high corporate tax rates in Germany compared to the low tax rates in Ireland. Clearly there is less incentive to use interest tax shields when corporate tax rates are low.

In addition to the corporate tax rate, the rules governing the taxation of foreign income may be a significant determinant of the financial structure of FDI. FDI originating from countries operating foreign income tax-exemption rules are likely to feature a higher proportion of debt finance, as profits shielded from taxation abroad will not be subject to additional taxation upon repatriation. In contrast, the financial structure

[2] The stock of equity and re-invested earnings is the value of the own capital of the enterprise, including the value accumulated from past re-invested earnings. Intra-company loans are the stock of debts between direct investors and the direct investment enterprise.

of FDI originating from countries that adopt foreign income tax credit rules may be less sensitive to corporate tax rates. This is because credit systems tax **worldwide** income, granting credits only for foreign taxes paid. Foreign income repatriated home is subject to repatriation taxes equal to the difference between the home country tax liability and the amount of foreign taxes paid. Therefore, income that has been shielded from taxation abroad will be liable for higher repatriation taxes. Since this postpones any net tax saving, the result is that there may be no deterministic relationship between host country corporate tax rates and the financial structure of FDI from tax credit countries[3].

In this paper we use financial data at the subsidiary level to examine the financial structure of foreign-owned assets. The purpose of this paper is to provide new evidence on how corporate tax rates and corporate tax rules affect the financial composition of FDI in European countries. In this respect, we make two main contributions. Firstly, we investigate whether the financial structure of FDI is sensitive to different corporate tax rates. This tests the results of the extant literature in an international context and checks the robustness of these results using a variety of tax rate measures. Secondly, we provide new evidence on how foreign income tax rules may affect the tax-minimising behaviour of multinationals. By identifying the country of origin of each subsidiary, we can estimate the importance of foreign income tax rules in determining the financial structure of FDI originating from contrasting foreign income tax systems. This study is the first to directly

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[3] Classifying foreign income tax systems as either credit or exemption is not always immediately clear, however, it is possible to broadly classify countries as either exempting foreign income or operating a tax credit system. In the case of a credit system, there may be instances when there exists a net tax advantage to using debt finance for FDI– we discuss this more fully in the next section.

estimate the impact of contrasting foreign income tax rules on multinational firm-level data.

Our results confirm recent research findings that corporate taxation is an important determinant of the financial structure of FDI. The econometric evidence suggests that 10 per cent higher taxes lead to a 3.4 per cent higher proportion of debt financed FDI. Our results prove robust to a variety of corporate tax rate measures and cross-country validation. However, this result is dependent on the international tax rules adopted by the home country. As expected, when the country of origin adopts foreign income tax credit rules it appears to eliminate the incentive for its FDI enterprises to use debt-financed FDI to shield foreign income. In contrast, the estimates for FDI originating from countries operating tax exemption rules support the hypothesis that multinationals can effectively shield profits from corporate taxation by using debt financed FDI. This provides evidence on the effectiveness of foreign income tax rules in securing corporate tax revenue for credit countries and indicates that FDI from tax-exemption countries can be optimally financed to reduce foreign tax liabilities in high tax countries, relieving pressure on the so called 'race to the bottom' in statutory corporate tax rates[4].

The rest of this paper is structured as follows. Section 2 briefly reviews the extant literature on the how corporate taxation affects FDI and the limited evidence on how corporate taxation affects the financial structure of FDI. Section 3 describes the AMADEUS dataset that we use in this study. In section 4 we present the estimation

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[4] For a recent review of this literature, see Devereux, Lockwood and Redoano (2003)

methodology and results that use a number of firm level controls and an interaction term to capture the effect of foreign income tax rules. Finally, Section 5 concludes.

2. The literature

A recent meta-analysis surveying the literature on how FDI responds to corporate taxation estimated an absolute mean elasticity of FDI to corporate tax rates of 3.3 per cent (Ederveen and de Mooij, 2003). This suggests that a 1 per cent increase in host country corporate tax rates leads to a 3.3 per cent decrease in FDI. There is, however, no consensus on how foreign income tax rules affect FDI. Slemrod (1990) compares the sensitivity of aggregate FDI flows distinguishing between credit and exemption countries; however, his results reveal no significant differences. Hines (1996), using a similar methodology to Slemrod (1990), finds that U.S. inward FDI flows originating from tax exemption countries are significantly more sensitive to U.S. statutory corporate tax rates than FDI originating from tax credit countries. More recently, Bénassy-Quéré et al (2005) explore this question using aggregate data on bilateral FDI flows between 11 OECD countries from 1984-2000. They find that FDI flows respond asymmetrically to tax rate differentials between countries and that the effect of credit and exemption rules is important. Desai, Foley and Hines (2004), using U.S. multinational data, find that the location of affiliate assets is particularly sensitive to corporate tax rates within Europe, and they argue that this is indirect evidence on the effect of tax exemption systems common among European countries.

The aggregate statistics in Table 1 suggest that corporate tax rates may be important in determining the pattern of intra-company loans. Intra-company loans may be particularly sensitive to corporate tax rates as tax legislation allows the interest expense on loans to be deductible from profits before they are subject to corporate taxation. In the case of the multinational subsidiary, intra-company loans can be used to shield income from taxation in high corporate tax jurisdictions.

Gropp and Kostial (2000) is the first study that attempts to examine the effect of corporate taxation on the components of FDI, and also integrate foreign income tax rules into the analysis. The data they use are highly aggregated, allowing them to distinguish only between debt and equity investment and re-invested earnings together. Furthermore, due to data availability problems they are limited to a study of FDI outflows only. They postulate that foreign affiliates ultimately owned in tax credit countries have a larger incentive to reinvest their earnings abroad (rather than repatriate them) relative to an affiliate from a tax exemption country. The results of their analysis reveal that the composition of FDI outflows exhibit different patterns for credit and exemption countries. Specifically, they find that affiliates from tax exemption countries invest more abroad, but are less likely to use re-invested earnings to fund this investment and much more likely to use a combination of debt and new equity[5]. They find that the composition of inward FDI flows is insensitive to corporate tax rates, and depends only on the foreign income tax rules adopted by the host country.

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[5] Unfortunately they are unable to disentangle whether they use more debt or more new equity.

It is not possible to control for many features of individual FDI decisions using aggregate data. At the subsidiary level we expect that higher host country corporate tax rates should be reflected in higher subsidiary leverage ratios [6]. There are, however, potential costs to increased subsidiary leverage in high tax rate countries. Singh and Hodder (2000) note that while borrowing can increase interest tax shields, it also increases costs such as the risk of loosing tax shields, financial distress as well as agency costs. Transaction costs may also be important in setting up such tax planning strategies, with economies of scale resulting in larger subsidiaries facing much lower costs of arranging an optimal leverage ratio. Furthermore, subsidiaries with large fixed asset investments may require the use of increased debt finance to fund investment irrespective of host country tax rates. Therefore, controlling for these subsidiary characteristics, will allow a more robust estimation of the effects of host country corporate taxation on the financial structure of subsidiary-level FDI. Recent survey evidence appears to corroborate these theoretical insights: nearly 80 per cent of multinational firms surveyed consider tax as a factor when they decide between new equity and debt when financing foreign operations[7].

The problematic nature of aggregate FDI data coupled with the need to control for subsidiary level characteristics has meant that recent studies have used affiliate level data to investigate the relationship between corporate taxation and the financial structure of FDI. Altshuler and Grubert (2003) use U.S. data sourced from the Internal Revenue

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[6] See Chowdry and Nanda (1994) for a theoretical treatment
[7] For more details see European Union Tax Survey (2004)
http://europa.eu.int/comm/taxation_customs/resources/documents/tax_survey.pdf

Service for 1996 to investigate the sensitivity of affiliate debt-asset ratios to host country corporate tax rates. Using data on just under 6,000 U.S. affiliates, they find that 10 per cent higher host country tax rates lead to 3.9 per cent higher debt-asset ratios. Jog and Tang (2001) compare changes in the relative tax rates of the U.S. and Canada to the debt-asset ratio of U.S. subsidiaries in Canada. They find that the increase in the Canadian tax rate over the period 1984-1994 correlated with an increase in the debt-asset ratios of 120 U.S. affiliates in their sample. More recently, Desai, Foley and Hines (2003a) use over 32,000 affiliate observations from U.S. Bureau of Economic Analysis (BEA) data for the years 1982, 1989 and 1994, to investigate the sensitivity of affiliate debt-asset ratios to host country corporate tax rates. They find that 10 per cent higher host country tax rates lead to 2.8 per cent higher debt-asset ratios. In the first contribution to the non-U.S. literature, Ramb and Weichenrieder (2005) are unable to find evidence that debt-asset ratios are sensitive to corporate tax rates. They use data from the Deutsche Bundesbank FDI database to examine the financing patterns of German inward FDI. Similar to Jog and Tang (2001), Ramb and Weichenrieder use a measure of the tax rate difference between the home country of the affiliate and the German tax rate. They estimate the effect of the tax rate difference on the use of intra-company loans by almost 10,000 foreign subsidiaries over the period 1996-2001. They are, however, unable to uncover any statistically significant relationship.

Until now, the literature has not considered the effect of foreign income tax rules on the benefits of altering the financial structure of FDI in order to shield foreign income from corporate taxation. Under a credit system, a parent company that structures

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investment in a subsidiary to shield foreign income from host country taxation will incur higher repatriation taxes when transferred home. As a result, the parent company from the credit country will be indifferent between financing the foreign subsidiary through re-invested profits, debt and equity finance. However, if the parent company is located in an exemption country, income shielded from taxation abroad can be repatriated home without attracting additional taxes. The multinational firm resident in a foreign income tax-exemption country can realise the tax savings it has made by optimally financing the foreign investment. In reality, thin capitalization rules will limit the extent to which subsidiaries from exemption countries can shield income using intra-company loans; and, the use of deferral and the limited foreign tax credits may give some advantage to using debt finance for subsidiaries from credit countries. In this paper, we examine use data at the subsidiary-level to estimate the importance of foreign income tax rules in determining the relationship between the financial structure of foreign subsidiary investments and host country corporate tax rates.

3. Empirical Analysis

The data

We use the AMADEUS (Analyse Major Databases from European Sources) dataset comprising financial and ownership data on incorporated companies operating in Europe[8]. Bureau Van Dyke compiles the AMADEUS database from company accounts filed under legal obligations in European countries. The financial data are supplemented using information from company reports and direct communications with the individual

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[8] For recent studies using AMADEUS see Huizinga and Nicodème (2005) and Desai (2003)

companies. In total, AMADEUS contains financial and ownership data on over 1.5

million companies, an estimated 98 per cent coverage of all companies incorporated in

Europe. The observations are standardised (both in currency and definition) across all

countries so that items in the profit and loss and balance sheet are directly comparable for

every entity.

From the AMADEUS database we identify foreign subsidiaries using the standard

OECD definition[9]. There is a total of 314, 516 foreign subsidiaries identified in

AMADEUS. From these we select only those which file unconsolidated accounts so that

the subsidiary's operations can be separately identified from the multinational firm as a

whole. For our analysis, the subsidiary must also have a complete record of the financial

data over the period 2000-2003[10]. Applying this rule, the final sample size is just under

8,500 foreign subsidiaries observed annually over four years across 16 European

countries.

It is important that this dataset is representative of multinational activity in the

respective countries. To check this we cross-validated the dataset with aggregate statistics

from the OECD *Measuring Globalisation* database[11]. The OECD database has aggregate

country-level statistics on the number of foreign subsidiaries and the distribution of

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[9] A foreign direct investment subsidiary is an incorporated enterprise in which the foreign owner controls directly or indirectly (through another subsidiary) more than 50 per cent of the shareholders' voting power (OECD Benchmark Definition of Foreign Direct Investment, 3rd Edition)

[10] Specifically, the subsidiary must have recorded the following items in each year between 2000-2003: Total Assets; Current Liabilities: loans; Non-Current Liabilities: long-term debt; Tangible Fixed Assets; EBITDA; Operating Revenue; and NAICS (2002) industry code.

[11] See Gomez-Salvador, Messina, and Vallanti (2004) for a similar cross-validation exercise using the AMADEUS database

employment in these subsidiaries across 9 industry categories. We aggregated our AMADEUS data subset on number of subsidiaries and employment into the same industry categories and compared them with the OECD data using a rank correlation coefficient. For the majority of countries this returned a correlation coefficient of greater than 0.9, and in most cases it exceeded 0.99. The high correlation coefficient indicates that our sample is representative of multinational activity in our sample of European countries.

In addition to the subsidiary level dataset we also require country level data on corporate tax rates and the foreign income tax rules (credit or exemption). For corporate tax rates we use the data provided by Devereux, Griffith and Klemm (2002). This dataset comprises a range of corporate tax measures and offers a number of advantages in checking the robustness of our analysis. Whilst statutory tax rates are perhaps the most familiar they may not capture the incentives present in tax systems[12]. Two alternative approaches attempt to provide the *effective* corporate tax rate applicable in each country. The most common effective tax rate measure found in this literature is that described in Desai, Foley and Hines (2001). This measure calculates the tax paid by each firm as a percentage of its pre-tax profits. The median tax rate of firms in each country is then derived from the firm-level tax rates, and this is used as an estimate of the actual corporate tax rate in that jurisdiction. By calculating the tax rate using the actual data on taxes paid by subsidiaries, this tax rate measure attempts to capture some of the

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[12] Variations in the definition of taxable items and the scope of the tax base will not be captured by the statutory tax rate

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incentives present in the tax code of the particular country. Because these tax rates are

calculated using actual tax and profit data, they are referred to as ex-post tax rates.

An alternative approach is to calculate the effective tax rate on a hypothetical investment

project. This tax rate measure captures the incentives present in the tax code of the

particular country in which the investment is being made, by modeling the specific

features of the tax code in that jurisdiction. These ex ante tax rates were pioneered by

King and Fullerton (1983) and more recently developed and updated by Devereux,

Griffith and Klemm (2002)[13]. In this study we use both measures of effective tax rates as

well as the statutory tax rates, thereby testing the robustness of our results to different tax

rate measures. For a review of the relative merits of each measure of corporate taxation

see Nicodème (2001). Finally, we use the *PriceWaterhouseCoopers Worldwide Tax

Summaries Handbook* to identify how each source country in the sample taxes foreign

income.

Specification

In order to obtain estimates of the effect of corporate taxation on the financial structure of

FDI, we estimate an OLS panel data model of the form:

$$Y_{it} = \beta_1 \mathbf{TAX}_{jt} + \beta_2 SIZE_{it} + \beta_3 TANG_{it} + \beta_4 PROFIT_{it} + c_m + v_{it} \qquad (1)$$

The dependent variable (Y_{it}) is the leverage ratio of the individual subsidiary (i) in each

year (t). It is defined as the ratio of short and long-term debt to total assets at the

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[13] These effective tax rates estimates are available at www.ifs.org.uk/publications.php?publication_id=3210

subsidiary, thus capturing the proportion of the total investment financed by debt. Using this measure has the additional advantage of allowing us to directly compare our results with previous studies. The most important explanatory variable is the corporate tax rate (TAX_{jt}) for each country (j) in each year (t).

The theoretical literature suggests that we use a number of controls to account for subsidiary heterogeneity. We control for the size of the subsidiary measured as the log of operating revenue ($SIZE_{it}$) to capture the effect of economies of scale that may allow some subsidiaries to adapt financial structure more easily to corporate tax rates. We also control for the profitability of the subsidiary ($PROFIT_{it}$) which is measured as the ratio of earnings before interest, tax, depreciation and amortization (EBITDA) to total assets. Less profitable subsidiaries may prefer lower leverage ratios to avoid the costs of financial distress and the risk of losing tax shields. Finally, subsidiaries with large investments in fixed assets may require substantial financing necessitating the use of increased debt finance. This effect is controlled for by including the proportion of subsidiary tangible fixed assets to total assets ($TANG_{it}$).

We use C_m to represent a vector of fixed effects. Our estimates include fixed effects for the parent company, the industry of the affiliate and the year. By employing a parent company fixed effect, we can control for unobserved heterogeneity between multinational firms subsidiary leverage policies. For example, some multinational groups may have specific preferences over financial structure that we cannot observe; however, by including the parent company fixed effect we can control for this unobserved

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heterogeneity when we estimate the sensitivity of the financial structure of FDI to corporate taxation. The industry fixed effect controls for inter-industry differences in leverage ratios, and the year effect controls for year-specific effects. v_{gti} is an independent error term.

Contrasting foreign income tax rules can lead to differences in the sensitivity of subsidiary leverage to corporate taxation. To capture this we use an interaction term (CREDIT) that is set equal to 1 if the subsidiary is from a foreign income tax credit country, and zero otherwise.

$$Y_{it} = \beta_1 \textbf{TAX}_{jt} + \beta_2(\textbf{CREDIT*TAX}_{jt}) + \beta_3 SIZE_{it} + \beta_4 TANG_{it} + \beta_5 PROFIT_{it} + c_m + v_{it} \quad (2)$$

This allows us to estimate separately the effects of corporate tax rates on the financial structure of FDI from countries that exempt foreign income compared to those which operate a foreign income tax credit system. Our intuition suggests that the coefficient on the interaction term will be negative; a negative coefficient would indicate that the sensitivity of leverage ratios of the subset of subsidiaries ultimately owned in tax credit countries will be less sensitive to taxation compared to the complete sample. In the next section we estimate equations 1 and 2, and test the robustness of our estimates using a variety for robustness checks.

4. Results

We first estimate how the financial structure of FDI responds to corporate tax rates, and then test whether foreign income tax rules influence this relationship. Figure 1 provides some suggestive evidence on how corporate tax rates affect the financial structure of FDI at an aggregate level. The figure plots the average leverage of foreign subsidiaries against the country-level effective tax rate. The regression line suggests that higher corporate tax rates are correlated with a higher proportion of debt financed FDI. The benefit of using micro-level data is that we can control for various subsidiary characteristics and provide more robust results.

In Table 2 we present regression results using subsidiary level data. The dependent variable is the leverage ratio of each subsidiary, measured as the ratio of subsidiary long and short-term debt to total subsidiary assets. Column (1) presents the results of regressing the subsidiary leverage ratio against the ex-post corporate tax rate faced by each subsidiary in each year. The estimated coefficient on the corporate tax rate variables is positive and significant, indicating that a 10 per cent increase in corporate taxation leads to a 3.5 per cent increase in subsidiary leverage ratios. The magnitude of tax-rate effect is in line with the current literature discussed earlier. In Column (2) we control for subsidiary characteristics discussed earlier. The results in Column (2) indicate that the relationship between the financial structure of FDI and corporate tax rates is robust to controlling for individual subsidiary characteristics.

One difficulty of interpreting the estimates in Columns (1) and (2) is that they do not control for unobservable non-tax determinants of subsidiary leverage. For example,

subsidiaries owned by the same parent company may all share a common unobserved characteristic that is not controlled for in the previous OLS estimates. Therefore, in Column (3) we report estimates using Equation 1 which includes a full set of industry, year and parent company fixed effects. The estimate of the tax sensitivity in Column (3) is not affected by the unobserved effects relating to the industry of the subsidiary, the particular year of the observation, or the characteristics pertaining to the particular multinational parent. While the addition of these fixed effects reduces the sample size as the parent company is not always identifiable, the tax rate coefficient remains highly significant in all cases.

Table 3 presents results using a variety of tax rate measures that allows us to test the robustness of the corporate tax effect. In Column (1) we use the statutory tax rate as the explanatory variable, including the control variables and the fixed effects used earlier. The coefficient estimate indicates that while the leverage ratio is slightly less sensitive to the statutory tax rate, the relationship remains highly significant. Column (2) reports estimates using the ex-post tax rate measure, replicating the results presented in Table 2. In Column (3) we use the ex-ante average effective tax rates calculated by Devereux, Griffith and Klemm (2002). The ex-ante tax rate coefficient is comparable in magnitude to the ex-post tax rate coefficient presented in Column (2), and importantly the relationship remains highly significant. These results reveal that subsidiary leverage responds positively and significantly to corporate tax rates, irrespective of how they are measured.

Finally we test whether the nature of foreign income tax rules affect the relationship between corporate taxation and the financial structure of FDI at the subsidiary level. In Table 4 we estimate Equation 2 which uses an interaction variable to capture how the effect of the corporate tax rate varies according to tax-rules adopted by the country of ultimate owner. The earlier discussion suggests that foreign income tax credit rules will decrease the sensitivity of leverage ratios to corporate tax rates, and our results support this hypothesis. Columns (1) to (3) estimate how the effect of corporate tax rates vary according to the tax rules adopted by each country for the three different tax rate measures. In each case, the interaction variable has a negative co-efficient indicating that foreign income tax credit rules reduce the sensitivity of leverage ratios to corporate tax rates. For example, in Column (3) the effect of foreign income tax credit rules reduces the sensitivity of subsidiary leverage to statutory corporate tax rates to only 0.07. The magnitude and significance of the interaction variable coefficient suggests that the tax rules adopted by a country can potentially eliminate the advantage of using debt-financed FDI[14]. These results reveal that the interaction of corporate tax rules and corporate tax rates is an important determinant of the financial structure of FDI.

5. Conclusion

The increasing share of profits that are earned abroad has raised interest in the design of foreign income tax rules. By locating operations in low tax rate countries, multinational

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[14] In Appendix A.1 we present the results of a cross-validation exercise that sequentially drops one country in turn from the sample and re-estimates the model. The results of this robustness exercise are unambiguous: the coefficient on corporate tax changes only marginally and it remains significant at the 1 per cent level in each scenario. In addition, the negative effect of foreign income tax credit rules is consistent across the sample.

firms can lower their tax liabilities. This tax competition has led governments to worry

over their ability to generate corporate tax revenue. Recent research suggests that foreign

income tax credit rules may serve as a brake on tax competition. Multinationals, however,

can finance FDI optimally and reduce corporate tax liabilities without any change of

location. Aggregate statistics show significant heterogeneity in the financing pattern of

FDI. Our subsidiary level analysis reveals that corporate taxation is an important

determinant of how FDI is financed. However, in congruence with recent research, we

find foreign income tax rules are critical.

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Table 1.

Worldwide FDI positions in EU-15 countries, 1994-2002

Country	% Equity and re-invested earnings	% Loans
EU-15 Average	73.7	26.3
Austria	92.6	7.4
Denmark[1]	73.1	26.9
Finland	77.2	22.8
France	72.2	27.8
Germany	47.4	52.6
Ireland[2]	97.9	2.1
Italy[3]	-	-
Luxembourg[4]	87.7	12.3
Netherlands	53.5	46.5
Norway[5]	66.9	33.1
Portugal[6]	83	17
Spain	82	18
Sweden	71.4	28.6
Switzerland[7]	-	-
United Kingdom	78.1	21.9

1. Figures for 1995 and 1997 not reported
2. Disaggregated data only available from 1998 onwards
3. No disaggregation reported
4. Only 2002 data available
5. Disaggregated data only available from 1996 onwards
6. All years except 1994
7. No disaggregation reported from 1997 onwards and earlier figures inconsistent

Source: Eurostat (europa.eu.int/comm/eurostat/)

Table 2.

The effect of corporate tax rates on subsidiary leverage

	1	2	3
Constant	0.47314	0.41827	0.36584
	[0.00993]***	[0.01467]***	[0.04199]***
Tax rate	0.3474	0.30831	0.33534
	[0.02837]***	[0.02859]***	[0.04096]***
Tangibility of assets - tangfixa/ta		-0.11404	-0.03422
		[0.00930]***	[0.01529]**
Proxy for firm size - log(oprev)		0.0107	0.01733
		[0.00110]***	[0.00179]***
Profitability of assets - ebitda/ta		-0.13311	-0.06532
		[0.05333]**	[0.04399]
Ultimate owner fixed effect?			YES
Year fixed effect?			YES
Industry fixed effect?			YES
Observations	68922	68883	34580
R-squared	0.01	0.04	0.36

Robust standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3.

Testing the robustness of results using various corporate tax rate measures

	1	2	3
Constant	0.39758	0.36584	0.39202
	[0.04758]***	[0.04199]***	[0.04776]***
Statutory tax rate	0.23769		
	[0.07041]***		
Hines tax rate		0.33534	
		[0.04096]***	
EATR			0.31171
			[0.08805]***
Tangibility of assets - tangfixa/ta	-0.03715	-0.03422	-0.03857
	[0.01543]**	[0.01529]**	[0.01533]**
Proxy for firm size - log(oprev)	0.01711	0.01733	0.01698
	[0.00180]***	[0.00179]***	[0.00180]***
Profitability of assets - ebitda/ta	-0.06504	-0.06532	-0.0649
	[0.04380]	[0.04399]	[0.04370]
Ultimate owner fixed effect?	YES	YES	YES
Year fixed effect?	YES	YES	YES
Industry fixed effect?	YES	YES	YES
Observations	34580	34580	34580
R-squared	0.35	0.36	0.35

Robust standard errors in brackets
* significant at 10%; ** significant at
5%; *** significant at 1%

Table 4.

The effect of foreign income tax credit rules on subsidiary leverage

	1 Hines Tax Rate	2 EATR tax rate	3 Statutory tax rate
Constant	0.36608 [0.04197]***	0.39463 [0.04758]***	0.39807 [0.04748]***
Tangibility of assets - tangfixa/ta	-0.03393 [0.01529]**	-0.03836 [0.01532]**	-0.03697 [0.01542]**
Proxy for firm size - log(oprev)	0.0173 [0.00179]***	0.01697 [0.00180]***	0.01706 [0.00180]***
Profitability of assets - ebitda/ta	-0.06518 [0.04393]	-0.06475 [0.04365]	-0.06485 [0.04372]
Hines tax rate	0.37567 [0.04991]***		
Hines tax rate slope dummy	-0.12338 [0.08501]		
EATR (Devereux, 2003)		0.46118 [0.10681]***	
EATR slope dummy		-0.48184 [0.17942]***	
Statutory tax rate			0.31986 [0.08547]***
Statutory tax rate slope dummy			-0.25226 [0.13851]*
Ultimate Owner, Industry and Year fixed effects?	YES	YES	YES
Observations	34580	34580	34580
R-squared	0.36	0.36	0.35

Robust standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
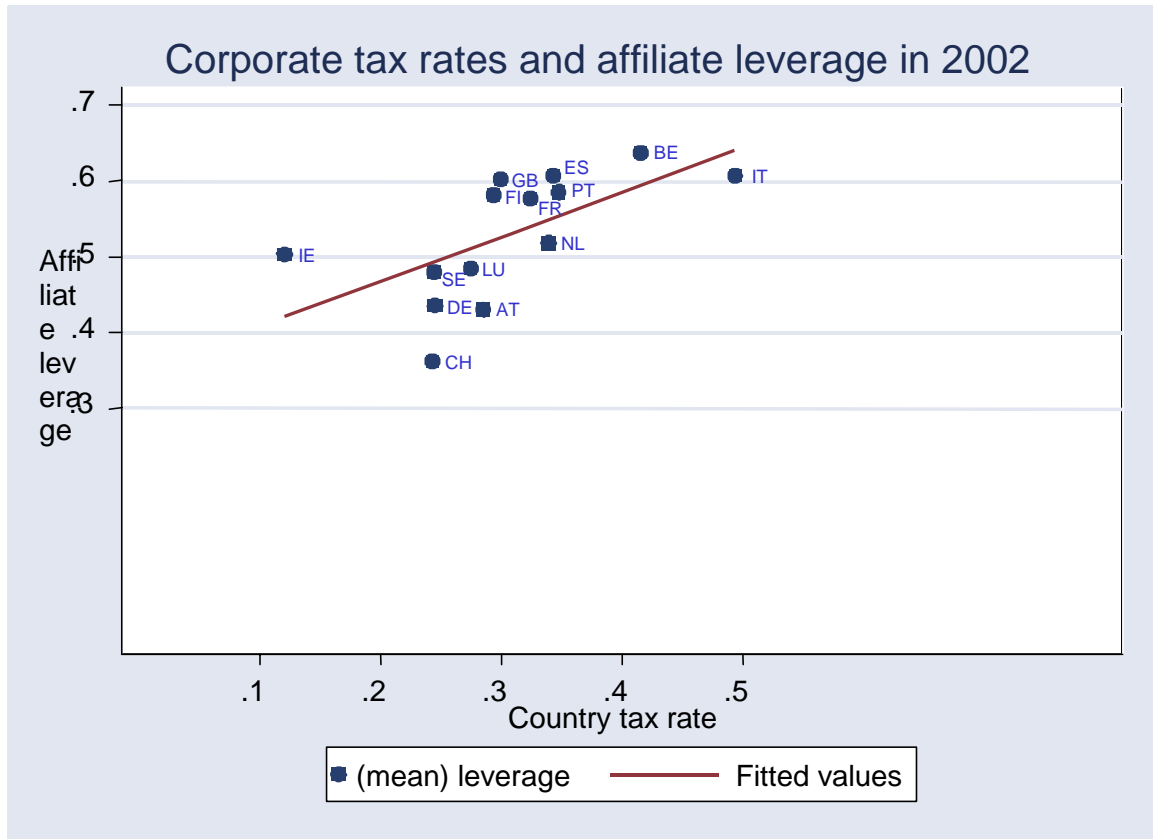
Figure 1

Corporate tax rates and affiliate leverage in 2002

*Country tax rate is Effective Tax Rate by Desai,Foley and Hines (2001) method

Appendix A.1.

Cross-country validation

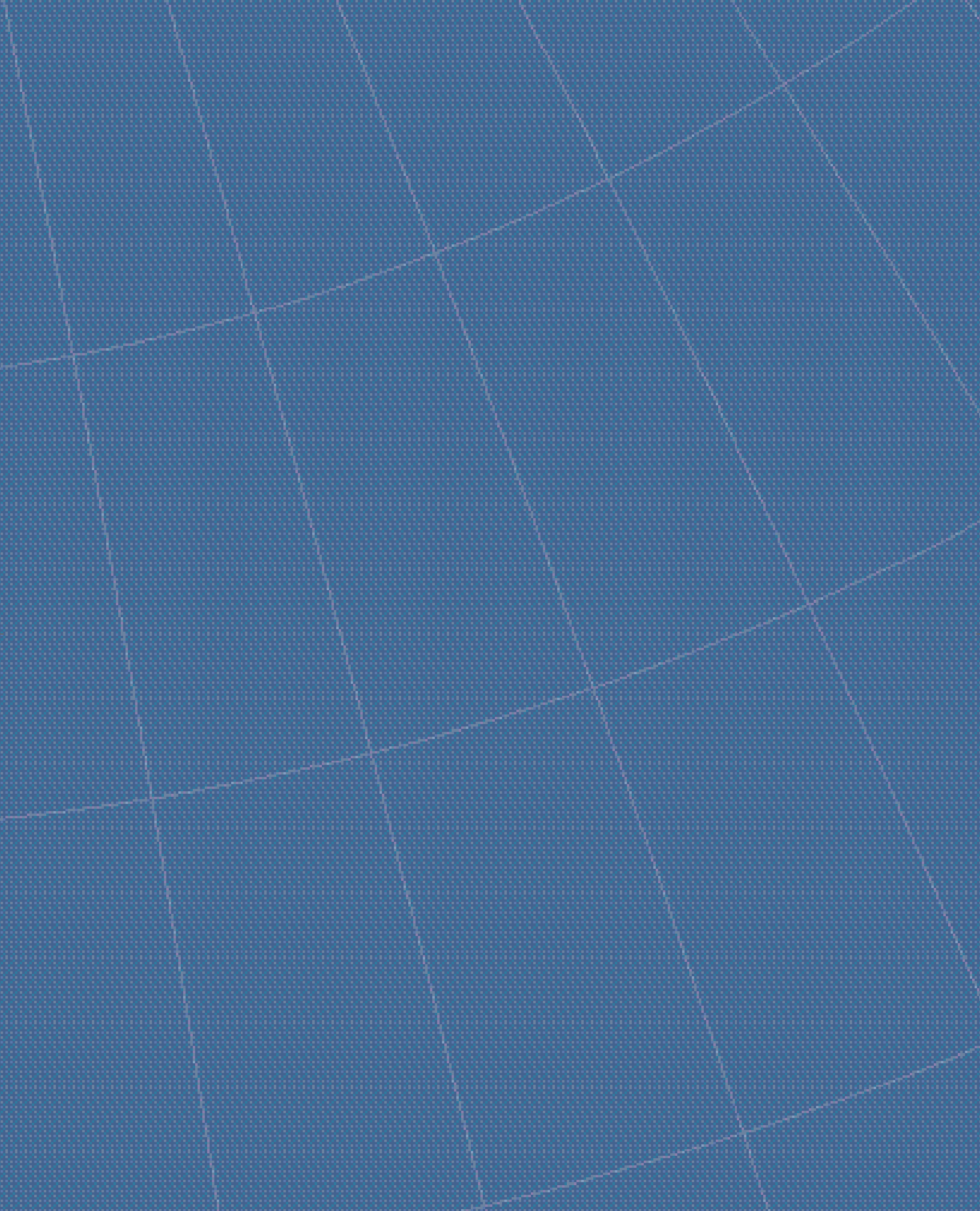| Country dropped:	Germany	U.K.	France	Italy	Portugal	Spain	Austria	Belgium
Constant	0.38373	0.36925	0.35192	0.22106	0.36696	0.36404	0.36808	0.40412
	[0.04185]***	[0.04631]***	[0.05875]***	[0.04620]***	[0.04213]***	[0.04530]***	[0.04203]***	[0.04362]***
ETR	0.33877	0.49372	0.39885	0.82733	0.38429	0.39477	0.37812	0.26847
	[0.04949]***	[0.05137]***	[0.05451]***	[0.08345]***	[0.04953]***	[0.05092]***	[0.04957]***	[0.05212]***
TANG	-0.04043	-0.05876	-0.00595	-0.0203	-0.03427	-0.02515	-0.03397	-0.05031
	[0.01534]***	[0.01766]***	[0.01794]	[0.01583]	[0.01541]**	[0.01612]	[0.01528]**	[0.01618]***
SIZE	0.0177	0.01559	0.01532	0.01925	0.01712	0.01806	0.01731	0.0156
	[0.00181]***	[0.00198]***	[0.00233]***	[0.00187]***	[0.00180]***	[0.00194]***	[0.00180]***	[0.00188]***
PROFIT	-0.06582	-0.19073	-0.04249	-0.06092	-0.06409	-0.05486	-0.06537	-0.05847
	[0.04465]	[0.01970]***	[0.03334]	[0.04227]	[0.04340]	[0.03878]	[0.04414]	[0.04115]
Credit slope dummy	-0.16417	-0.15022	-0.20136	-0.32499	-0.15096	-0.15852	-0.14686	-0.08603
	[0.08567]*	[0.08982]*	[0.09678]**	[0.14413]**	[0.08584]*	[0.08673]*	[0.08585]*	[0.09105]
Parent, Industry and Year dummies?	YES	YES	YES	YES	YES	YES	YES	YES
Observations	34263	27516	21015	31736	34149	30696	34529	31100
R-squared	0.36	0.37	0.39	0.37	0.36	0.37	0.36	0.38

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix A.1. (contd…)

Country dropped:	Switzerland	Denmark	Finland	Ireland	Luxembourg	Netherlands	Norway	Sweden
Constant	0.36694	0.36647	0.36155	0.3652	0.36693	0.3587	0.36647	0.39923
	[0.04201]***	[0.04201]***	[0.04235]***	[0.04202]***	[0.04202]***	[0.04307]***	[0.04201]***	[0.04448]***
ETR	0.3801	0.38275	0.37411	0.38752	0.38216	0.38416	0.38275	0.2134
	[0.04944]***	[0.04947]***	[0.05007]***	[0.04947]***	[0.04947]***	[0.04955]***	[0.04947]***	[0.05430]***
TANG	-0.0344	-0.03388	-0.03293	-0.03365	-0.03381	-0.03095	-0.03388	-0.03799
	[0.01528]**	[0.01529]**	[0.01564]**	[0.01528]**	[0.01528]**	[0.01539]**	[0.01529]**	[0.01581]**
SIZE	0.01733	0.0173	0.01802	0.01732	0.01727	0.01772	0.0173	0.01784
	[0.00179]***	[0.00179]***	[0.00181]***	[0.00179]***	[0.00179]***	[0.00181]***	[0.00179]***	[0.00186]***
PROFIT	-0.0652	-0.06517	-0.06435	-0.0651	-0.06512	-0.06445	-0.06517	-0.06732
	[0.04396]	[0.04393]	[0.04548]	[0.04389]	[0.04390]	[0.04365]	[0.04393]	[0.04686]
Credit slope dummy	-0.14661	-0.14994	-0.13898	-0.15443	-0.14939	-0.15509	-0.14994	-0.03803
	[0.08577]*	[0.08576]*	[0.08617]	[0.08576]*	[0.08576]*	[0.08600]*	[0.08576]*	[0.09542]
Parent, Industry and Year dummies?	YES	YES	YES	YES	YES	YES	YES	YES
Observations	34565	34577	33874	34565	34573	34174	34577	32746
R-squared	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36

Robust standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%