

# What Do We Know about Capital Structure of Small Firms?

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## **Abstract**

There are no stylized facts about the capital structure of small firms. Therefore, in this paper I use firm data from 15 West European countries to contrast the sources of leverage across small and large firms. Specifically, I jointly evaluate the explanatory power of firm specific, country of incorporation institutional, and macroeconomic factors. Using data that is more comprehensive in coverage than that used in the existing research, I confirm the stylized facts of the capital structure literature for large and listed firms, but I obtain contrasting evidence for smaller companies: First, the country of incorporation carries much more information for small firms supporting the idea that small firms are more financially constrained and face non-firm-specific hurdles in their capital structure choice. Second, the relationship of firm size and tangibility to leverage for small firms appears to be opposite in sign to that established for large companies.

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# 1 Introduction

Theoretical capital structure studies offer many implications based on firm characteristics. E.g. Harris and Raviv (1990) agency cost model shows that leverage is positively related with firm value and liquidation value, and Myers (1977) point out the importance of firm growth opportunities. Besides firm factors, country characteristics determine the debt/equity ratio. In Modigliani and Miller (1963) trade-off theory, firms trade off the benefits from tax shields of debt with potential bankruptcy costs. Hence, the tax rate is considered an important determinant of firm leverage as well as the legal and administrative costs of bankruptcy. Jensen and Meckling (1976) stress the importance of investor protection in a country. Finally, Levy (2001) spells out the importance of domestic macroeconomic factors. Therefore, it appears that firm capital structure emerges from three sources: firm specific, country institutional, and macroeconomic factors.

The implications of theoretical studies have been tested in numerous empirical studies. The most attention has focused on estimation of leverage on firm-specific characteristics (e.g. Bradley, Jarrell, and Kim (1984); Titman and Wessel (1988)). The latest study, based on US firms (Frank and Goyal (2004)), has found that firm characteristics explain approximately 30% of within-country firm leverage variation. Among firm variables, industry is a significant determinant of leverage. Industry alone has been found to explain up to 25% of within-country leverage variation (Bradley, Jarrell, and Kim (1984)). Kojczyk and Levy (2003) show on US firms that macroeconomic variables can explain as high a share of leverage variation as firm factors. Cross-country studies of capital structure have recently emerged. Booth, Aivazain, Demirgüç-Kunt, and Maksimovic (2001) find that country dummies explain 43% of firm leverage variation in the sample of 10 developing countries during the period 1980-90. In more detail, Desai, Foley, and Hines (2003) show that the country tax rate explain the leverage levels in different countries. Hence, there is empirical evidence for the importance of all three — firm, institutional, and macroeconomic — factors in determining firm capital structure. However, there is still lack of studies spanning a large number of countries and different firm types simultaneously.

In this paper, I study both the effects of firm and country factors on firm leverage.

This is important in two perspectives. First, I manage to quantify the relative importance of different sources, and secondly I overcome the possible omitted variable biases by including simultaneously the factors from different sources.

Cross-country capital structure studies (except Desai, Foley, and Hines (2003) who use the data of US domestic company affiliates) rely on data from large listed companies because that has been the data available.<sup>2</sup> Hence, their samples have been biased towards large firms, and the implications made on an average firm might be biased as well. Differences between large and small firms have been pointed out in the firm growth literature. Evans (1987) shows that small firms have higher growth rates than large firms. More relevant to capital structure study, Carpenter and Petersen (2002) show that the growth of small firms are constrained by internal finance. Therefore, it appears very important to explore the capital structure of small firms as well as large firms.

Small firms are huge, when taken as a whole. European Commission and Eurostat (2001) (page 15) claim that firms with less than 250 employees account for two-thirds of all jobs and  $\sim 50\%$  of the turnover of the non-agricultural market sector in European Union. My study contributes by analysing small and unlisted firms in addition to large listed companies.

In my study, I use firm data from 15 West European countries. This data set has a number of attractive features for studying determinants of capital structure. First, I use more recent data (1995-2001). Second, my sample includes countries that have not yet been studied. Third, the firm coverage of my sample is well-balanced across firm sizes and industries.

A drawback of the data I use is that they do not contain a detailed balance sheet structure for all firms. Therefore, I use the broadest definition of leverage — total liabilities to total assets ratio in my analysis.<sup>3</sup>

I use Analyses of variance (ANOVA) to answer the question of relative importance of

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<sup>2</sup>Stock market listed firms are required to report the annual financial records by law, and usually the accounting standards for those firms across countries are the same.

<sup>3</sup>In checking the robustness of results, I compute the ratio of debt-to-assets for those firms for which data are available and repeat the analysis. The results are not sensitive to the measure of leverage used.

different sources (firm and country characteristics) for explaining firm leverage. I show that the influence of the factors on firms' leverage differs across firm types. In particular, country factors are less important determinants of capital structure for large firms than for small firms. This finding is in accord with Holmstrom and Tirole's (1997) prediction that small firms face stricter constraints in achieving external finance, and hence, the domestic macroeconomic and institutional factors contribute more to the determination of leverage. Large firms are more likely (Claessens, Klinebiel, and Schmukler (2003)) to cross-list in international equity markets confirming that for those firms domestic financial market situation is less important. In a richer model, I add along with country dummies, a set of country-specific variables known in the literature to explain firm leverage. Even after controlling for observable country variables, the country dummies still explain 10% of leverage variation for listed and 22% for unlisted firms. This finding suggests that there are significant (unobservable) institutional differences across countries explaining firm leverage.

In the last part of my of analysis, I estimate a leverage regression on pooled cross-country data. I include to the regression firm-specific variables, country factors, and country and year dummies. I find that the effects of firm specific-factors have the same signs as in previous capital structure studies for listed firms, but the signs are different for unlisted firms. Apparently the results from large listed firms does not shade light on small firms leverage.

In addition to the existing capital structure literature, my study is also related to several research areas in the field of corporate finance and industrial organization. First, it is closely connected to the literature of financial constraints and external finance dependence. Second, it is related to the firm growth and firm size distribution literature. Third, the stock market returns literature, which explores the significance of firm, industry or country characteristics in explaining stock returns, is also linked to the leverage of listed firms.<sup>4</sup>

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<sup>4</sup>Morck, Yeung, and Yu (2000) show that stock prices are moving together more in poor economies than in rich ones — country factors matter more for firm stocks prices in poor markets. Cambell, Lettau, Malkiel, and Xu (2001) show that in the US, firm-specific factors gained importance over market factors during 1967-1997. Hence, it would be interesting to analyse how the importance of firm, industry and

This paper is organized as follows: In the next section, I briefly review the relevant empirical studies of capital structure. There I also introduce my question of interest and the empirical methodology for answering it. The data section follows and section 4 presents the results. Finally, I conclude and discuss the policy implications in section 5.

## 2 Background

As Myers (2003) notes, the present theories of capital structure are conditional. They are relevant in different settings. This is well documented in empirical studies of capital structure, which have found support for all theories. Firms' behavior seems to be a hybrid of proposed theoretical grounds.<sup>5</sup>

In a recent study, Frank and Goyal (2004) use US publicly traded firms over 1950-2000 and evaluate the importance of 36 factors (both firm- and economy-specific) on leverage.<sup>6</sup> They conclude that 7 factors – median industry leverage, market-to-book ratio, collateral, profits, dividends paying, logarithm of assets, and expected inflation are the most reliable ones. The authors note that the combined predictive power of those variables has decreased over the past 50 years from 40% to 30%.

The present empirical evidence on capital structure is that profitability as well as market-to-book ratio and dividend paying are negatively related to leverage. More profitable firms have larger internal slack and do not need to apply for external finance. Market-to-book ratio proxies growth opportunities and are negatively related to leverage due to the agency costs between the owners and bondholders. Dividend-paying firms are considered to be financially unconstrained, and unconstrained firms are expected to be less dependent on debt. Median industry leverage, collateral, log of assets, and expected inflation are found to be in positive relation with leverage. It is natural to think that firms with more assets and more collateral available face less obstacles in receiving debt,

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country effects has changed on firm market leverage on long time-series data.

<sup>5</sup>Beside Myers (2003), see Harris and Raviv (1991) for a detailed review of theoretical and empirical capital structure studies.

<sup>6</sup>Frank and Goyal (2004) use Compustat data.

and, hence, have higher leverage. Expectation of high inflation makes credit cheaper today and therefore is positively related to leverage. Industry leverage is important since firms in the same industry exposed to the same technology and therefore are likely to have a similar optimal financial structure.<sup>7</sup>

In contrast with Frank and Goyal (2004), Korajczyk and Levy (2003) find that the domestic macroeconomic conditions,<sup>8</sup> besides inflation, help determine a firm's leverage. They show that financially unconstrained firms take into account the macroeconomic situation when issuing debt or equity more than constrained firms, whose issue choice follows less the macro movements in the country.

Few papers have taken the challenge to pool firm data from different countries and shed light upon the effects of country differences on firm leverage. While controlling for macroeconomic factors, Demirgüç-Kunt and Maksimovic (1995) and Schmukler and Vesperoni (2001) try to pin down the importance of institutional factors. Demirgüç-Kunt and Maksimovic (1995) study the relation of firm financial structure with the local capital market development. They aggregate firm level data to country averages. Their sample consisted of 31 developed and developing countries in 1981-1991. They find a statistically significant negative relation between the stock market development and the debt/equity ratio. They also observe a positive relationship between the local banking sector size and firm leverage.

Schmukler and Vesperoni (2001) are interested in a country's financial liberalization effect on firms' capital structure. Their analysis is based on 7 developing countries from Asia and South America in the 1980's and 1990's. Interestingly, they find that after financial liberalization (after achieving access to international debt and equity markets), the debt-to-equity ratios did not change, but the share of short-term debt increased. So

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<sup>7</sup>MacKay and Phillips (2003) show that not only industry dummies but also firm position in its industry matters (e.g. proximity to median industry capital/labor ratio). Frank and Goyal (2004) show that omitting industry from the leverage regression turns many other firm characteristics significant, and therefore, industry captures a number of different effects.

<sup>8</sup>They use three macroeconomic variables — 2-year aggregate domestic non-financial corporations profit growth, 2-year equity market returns and commercial paper spreads — to describe overall tendencies in the market.

financial liberalization shuffles debt structure but not the debt/equity ratio.

The cross-country studies cited above show that some institutional factors are assessable and significant determinants of firm leverage even after controlling for macroeconomic variables.<sup>9</sup> In my research, I focus on the significance of country factors in leverage estimation and whether the effects of those factors are the same across firm types. Considering that previous research in the topic has been done on relatively large companies my study will shed light on small firms' capital structure as well.

An important issue for empirical studies and their comparability is the precise definition of leverage used. Rajan and Zingales (1995) offer six different definitions of leverage.<sup>10</sup> Due to data limitations, I use the broadest definition of leverage — ratio of total liabilities to total assets — it does not differentiate between the different sources of debt (accounts payable, bank debt, and bonds). I use only book leverage cause for unlisted firms the market ratio do not exist.<sup>11</sup>

I contrast the importance of firm characteristics with country characteristics in determining firm leverage ratio. I ask whether country effects have the same influence on all types of firms in a country. Is listed-firms' leverage determined by the same factors as that of unlisted firms? Do firms of different size have the same leverage determinants?

In answering these questions, I use two approaches: First, I perform an Analyses of Variance (ANOVA) of leverage for detecting the importance of the size, industry, and country factors in leverage variation. Second, I use regression analyses for comparing my study to previous research in the field.

The ANOVA exercise explains how much of the variation of the variable of interest

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<sup>9</sup>Frank and Goyal (2004) use only US data and therefore only observe the time variation of country variables while not observing the cross-sectional variation.

<sup>10</sup>Rajan and Zingales (1995) divide the leverage measures into two groups. First, measures that evaluate the share of debt to assets, where the definitions debt and assets vary. The debt can be measured as broadly as total liabilities. Second, measures that evaluate interest coverage.

<sup>11</sup>For listed firms I computed the ratio of debt to both book and market assets. I estimated exactly the same leverage specification as Rajan and Zingales (1995). I received similar estimates (the results of those estimates are available upon request). Hence, I conclude that my data quality is comparable to the data used in existing capital structure studies.

is explained by different sets of variables. I use 4 sets of explanatory variables — size, industry, country, and year.<sup>12</sup> I categorize firms to 5 size classes<sup>13</sup> and use the 3-digit NACE industry classification (I have 55 industries).

Besides analysing how much different types of factors explain the leverage variation, I run a simple leverage regression to observe the direction of the effects. The basic form of the regression is the following:

$$Y_{ijt} = \alpha + \beta_j + \gamma_t + \delta X_{ijt} + \varepsilon_{ijt},$$

where  $i$  is the index of firm,  $j$  is the index of country, and  $t$  is the index of year.  $X_{ijt}$  contains the firm specific variables profitability, tangibility, logarithm of assets, and median industry leverage.  $\beta_j$  is the country fixed effects and  $\gamma_t$  are the year effects.  $\varepsilon_{ij}$  is the random disturbance. In the next step, I am also interested in determining the country factors that matter to a firm's capital structure. Therefore, I add the country-specific variables to the regression:

$$Y_{ijt} = \alpha + \beta_i + \gamma_t + \delta X_{ijt} + \zeta C_{jt} + \varepsilon_{ijt},$$

where  $C_{jt}$  are country variables. Many different country characteristics have been proposed by earlier studies. Since some of those variables are strongly correlated with each other, I selected five measures to pin down the country effect. From macro factors I include GDP growth and inflation as Demirgüç-Kunt and Maksimovic (1995) did. GDP growth rate proxies the firms' growth opportunities. Since high-growth firms are expected to rely more on internal funds, the correlation of this variable with leverage is expected to be negative. The correlation of inflation and leverage is expected to be positive. As Holmstrom and Tirole (1997) note, it is important to consider the capital constrains of financial intermediaries. The domestic credit supply as total domestic savings ratio to GDP proxies the capital supply of financial intermediary. Higher savings ratio should

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<sup>12</sup>ANOVA estimation finds the total sum of squares of the dependent variable (SST), which is decomposed to the sum of squares of the model (SSR) and the sum of squares of the error term (SSE). Note that the ratio SSR/SST is the  $R^2$  in the OLS regression. Also, ANOVA calculates for each explanatory variable the partial sum of squares.

<sup>13</sup>Class 1 firms have total assets smaller than \$1 million. Class 2 firms have total assets between \$1 and 2 million. Class 3 firms have total assets between \$2 and 5 million. Class 4 firms have total assets between \$5 to 50 million and finally, Class 5 firms with total assets above \$50 million.



cause higher leverage levels. From institutional factors, I add statutory corporate tax rate (including local taxes) and total market capitalization to GDP. Higher taxes should cause higher leverage while higher stock market development are expected to lead to lower levels of leverage.

### 3 Data

I use firm-level data from the Amadeus (Analyse MAJOR Databases from EUROPEAN Sources) database, collected by Bureau Van Dijk. The company accounting statements are harmonized by Bureau Van Dijk making the cross-country comparisons reliable. Data are also available for unlisted firms. Due to national legislations, the coverage of financial variables varies across countries. This limits the depth of analysis and affects my choice of variables.<sup>14</sup>

The firms selected were the Amadeus Top 1 million companies (online version in February and March 2004). These met at least one of the following inclusion criteria: operating revenue > 1 million euros, total assets > 2 million euros, or number of employees > 10. For firms from United Kingdom, Germany, France, and Italy these cut offs were 1.5, 3 and 15 respectively. European Commission defines the firms with less than 10 employees as micro-enterprise. Hence, the Amadeus inclusion criteria bias the sample only for the smallest firms but provide an excellent possibility to analyse the behavior of small and medium-sized firms.

Firms were excluded if total assets were not given or were negative; the sum of detail balance sheet items deviated more than 5% from total assets given; industry were missing; a company was from the financial intermediation sector;<sup>15</sup> or leverage ratio were positioned more than 3 times the difference between the 25th and 75th percentile away (eliminating outliers).

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<sup>14</sup>For example, small and medium sized German firms are not legally forced to disclose (Desai, Gompers, and Lerner 2003). For some countries (e.g. Norway), the detailed structure of current and non-current liabilities are missing. This does not allow me to calculate the share of debt in liabilities.

<sup>15</sup>The financial intermediation sector has a specific balance sheet structure. It is a standard to disregard those firms in capital structure studies.

My study is based on firms from 15 West European countries. I compare the coverage of the final sample I use with data from “Enterprises in Europe” provided by the European Commission and Eurostat. These data cover the number of firms, employment, and production from the European Union and the European Free Trade Agreement countries. “Enterprises in Europe” is expected to cover the whole population of firms in the country.<sup>16</sup> I assess the representativeness of Amadeus data across firm size and industry. Firms are divided into 3 sizes and 6 industry classes.<sup>17</sup>

Table 1 in appendix presents the correlations of firm size distributions across industries and just industry distributions correlations for each country.<sup>18</sup> Amadeus data are well representative for most of the countries, except Austria, Germany, and Ireland. From those countries a small number of mainly large firms are covered by my data, so I will do sensitivity analysis.<sup>19</sup> Industry representativeness of Amadeus is good on average. Manufacturing firms are over sampled from all countries, while other services, trade, and construction are under represented in some countries.<sup>20</sup>

The number of firms reaches 551,442 in 2000 in my sample. This is an order of magnitude more than in any present cross-country capital structure study of which I am aware. The existing cross-country studies use mainly the Global Vantage database (Rajan and Zingales (1995) and Demirgüç-Kunt and Maksimovic (1995)) or International Finance Corporations (IFS) data (Booth, Aivazain, Demirgüç-Kunt, and Maksimovic

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<sup>16</sup>For more details about “Enterprises in Europe” see Kumar, Rajan, and Zingales (2002).

<sup>17</sup>Note that firms are divided into size classes based on number of employees. Only 2/3 of firms in my data report employment. Therefore, the coverage figures presented should be taken as proxies for the coverage of a full sample.

<sup>18</sup>The size and industries distributions for Amadeus and “Enterprises in Europe” are presented in Appendix Table 4.

<sup>19</sup>Appendix Table 2 and 3 presents the number of unlisted and listed firms across countries in my sample during 1995-2001. Exclusion of countries with small number of firms does not change the results of the paper.

<sup>20</sup>The representativeness of Amadeus data is also presented in Gomez-Salvador, Messina, and Vallanti (2004). They find that firms in Amadeus data cover on average 25% of employment of National Labor Force Surveys’. Different industries are well represented in Amadeus data. Gomez-Salvador, Messina, and Vallanti (2004) conclude that the industry coverage is similar across countries and stable over time.

(2001) and Schmukler and Vesperoni (2001)). In Rajan and Zingales (1995) study on 7 developed countries the largest sample of firms is from US (2583 firms) and the smallest from Italy (118 firms). In Booth, Aivazain, Demirgüç-Kunt, and Maksimovic (2001) study the number of firms from each country remains below hundred. The average firm size in those databases is much larger than in my sample. Therefore, my study gives a better understanding of the average firm leverage.

Table 1 present mean and median leverage ratios across countries and across stock market listed and unlisted firms in 1997. Leverage is higher for unlisted firms. Hence, equity as a source of finance is more common for listed firms. Median leverage varies from 85% in Italy to 60% in Ireland among unlisted firms (means are slightly lower).

I also make use of country-specific variables. Macro data (inflation, GDP growth ratio, and saving ratio) and capital market size info (total market capitalization to GDP) are from the World Bank, World Development Indicators. The statutory corporate income tax rate is adopted from Devereux, Griffith, and Klemm (2002).

## 4 Results

### 4.1 Analysis of Variance

In this section, I explore how much different sources explain leverage variation. I use pooled data — across firms from different countries and over 7 years. Pooled data analysis is more powerful than just simple cross-sectional data analysis since it allows the incorporation of both firm and country specific factors plus the time invariant country effects.

Table 2 presents the ANOVA results for listed firms. The largest share ( $\sim 50\%$ ) of leverage variation is explained by industry dummies. Size dummies and country dummies explain 23% and 17% respectively. In the second column, I add firm profitability and tangibility. The shares of industry and country dummies in explaining leverage variation do not change while the set of size dummies loses 6 percentage points. The results seem to be robust to inclusion of the firm-specific variables and the model gains 2% in descriptive power. In the last column of Table 2, I include in addition to firm charac-

teristics the country specific variables. The explanatory share of country dummies drops to 10%. Hence, unobservable country characteristics explain only 10% of listed firms leverage variation.

Table 3 presents the corresponding results for unlisted companies. Country dummies explain close to half while industry and size dummies explain approximately 1/4 and 1/5 of leverage variation respectively. The inclusion of firm characteristics in the second column does not change the results. Hence, the well-known firm characteristics do not contribute to the leverage determination. The inclusion of country variables in column 3 decreases the significance of country dummies by more than half. Still, a large 22% of leverage variation is explained by unobservable country institutional factors.

An interesting finding from comparing listed and unlisted firms is that while industry effects explain approximately 2.5 times more than country effects for listed firms than for unlisted firms the pattern is reversed — country effects explain roughly 2 times more than industry effects. Hence, it seems that the country of incorporation bears more valuable information for the unlisted firms. Both observable and unobservable country factors explain the larger share of leverage variation of unlisted firms.

One explanation for the different influence of country factors for listed and unlisted firms is that listed firms have better financing opportunities. Being listed in the stock market can be considered as a signal of good quality and therefore the potential financing sources for those firms are not limited with domestic financiers. Claessens, Klinebiel, and Schmukler (2004) report that for high-income countries market capitalization of international firms (firms that cross-list abroad) to total market capitalization is 56% in 2000. This explains why listed firms leverage variation is less explained by country factors compared to unlisted firms. Hence, for listed firms the industry technology carries a most important part of leverage determination. Unlisted companies on the other hand rely mainly on the finance from domestic market. Therefore, the country factors matter a lot in explaining leverage variation.

Note that the adjusted  $R^2$ 's are quite low. In a comparable study Booth, Aivazain, Demirgüç-Kunt, and Maksimovic (2001) received  $R^2$  above 40%. On the other hand, Schmukler and Vesperoni (2001) reported  $R^2$  as low as 4-12%. An open question is to

what extent low explanatory power of the existing empirical studies correspond to the measurement error in leverage ratios or alternatively to the lack of dynamic modelling.<sup>21</sup>

Since the stock market listed firms are on average much larger than the unlisted firms, it is interesting to see how the firms from different size groups respond to country effects. In Table 4 the results are presented for listed firms.<sup>22</sup> Firms from the three smallest size groups are combined since the number of observations in each class separately were small. The industry dummies are explaining a larger share of leverage variation compared to country effects in all size classes.

Table 5 presents the results for unlisted firms. Up to the 4th size class of the firms, country factors are explaining the biggest share of leverage variation. The industry and country characteristics explain roughly the same share of leverage variation for firms in the 4th size group. The largest firms face a reversed pattern — industry effects largely dominate the country effects. In other words, we observe the dilution of country effects on firm leverage when firms become larger. The largest unlisted firms share a common feature with listed firms — industry effects dominate country effects. Hence, it is important to distinguish the size of the firm besides the traded/nontraded firms distinction. It appears that being listed does not affect the sources of firms' capital structure for large firms. This might be since large firms are found more likely to go public (Pagano, Panetta, and Zingales (1998)) as well as they are more likely to issue equity in international markets (Claessens, Klinebiel, and Schmukler (2003)).

The analysis in this section shows that both firm and country specific variables are important for explaining leverage variation. The relative importance of those factors varies by firm type. Small and unlisted firms are affected more by country characteristics. Half of the country explanatory power emerges from unobservable institutional factors. Therefore, it is important to consider a firm's country of incorporation in leverage study even after controlling for observable country factors.

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<sup>21</sup>See Strebulaev (2003) for details about dynamic capital structure.

<sup>22</sup>Firm and country variables are not introduced here since they do not change the pattern of results.

## 4.2 Regression Analysis

As in ANOVA I use pooled data in regression analysis. I compare the results of this section with findings from earlier studies on capital structure. Table 6 reports the results. All regressions include country and year dummies, which are jointly statistically significant in all specifications.

In the first column, no country specific variables are included to the listed firms leverage estimation. All firm specific factors are statistically significant. Size<sup>23</sup> and tangibility are positively related to leverage. Profitability is negatively related to leverage. The signs coincide with the findings of earlier capital structure studies on firms from developed countries (Rajan and Zingales (1995)). In the second column, I add the set of country variables. The goodness of fit does not change. As in ANOVA, the inclusion of country-specific variables absorbs some part of the explanatory power of country dummies. Only two out of five country variables are statistically significant, but even for those variables the coefficients are very small. The higher GDP growth and higher savings ratio to GDP are related to higher leverage.

Column three and four of Table 6 present the results for unlisted firms. The coefficients on firm characteristics are statistically significant, but the signs are negative for tangibility and size. Larger firms as well as firms with a higher share of tangible assets have lower leverage. Booth, Aivazain, Demirgüç-Kunt, and Maksimovic (2001) also found a negative coefficient on tangibility in their sample of firms from developing countries. It is well known for transition countries to have a negative coefficient on tangibility (Cornelli, Portes, and Schaffer (1998)). Therefore, the leverage of unlisted firms from West European countries seem to behave somehow similar to the firms from less developed countries. The negative sign in front of size is puzzling.<sup>24</sup> One explanation for the negative relation between size and leverage may be that size proxies the firm growth opportunity, which is expected to be negatively related to leverage. This is sup-

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<sup>23</sup>All regression results are robust if instead of logarithm of total assets are used the discrete size variable for the 5 size groups exploited in the ANOVA section.

<sup>24</sup>In fact, Rajan and Zingales (1995) found negative significant coefficient in front of size for German listed firms.

ported by Evans's (1987) finding that small firms are growing quicker. Five out of four country variables are highly statistically significant, but as in the case of listed firms the coefficients have very low values. The negative signs of the GDP growth, inflation, and corporate tax rate coefficients also contradict theoretical predictions.

I run the regressions also on cross-sectional data to see whether the results are stable over time and over countries. I find firm specific-factors to have stable coefficients over time. Interestingly, the corporate tax rate has a positive, and on most of the years, significant coefficient. Since this variable does not change much over years, the country dummies may absorb some of its effect in pooled regression and cause the imprecise estimate. The coefficients in front of GDP growth rate and inflation change signs over the years implying that the results are not stable. This might be since the countries I observe are similar and there is a tiny variation in inflation and GDP growth.

In country-specific regressions, I observe fluctuations of the estimated signs of firm-specific variables. In contrast to pooled-regression coefficients, the listed Irish, Italian, and Spanish firms' leverage is negatively related to tangibility. Among unlisted firms Belgian, Danish, French, Dutch, Norwegian, and Swedish firms have a positive sign in front of tangibility compared to negative sign in pooled regression. Therefore, it seems that the effect of tangibility on firms' leverage varies not only across listed and unlisted firms but also across countries. The  $R^2$ 's of cross-country regression are comparable to the ones reported in Rajan and Zingales (1995). These findings motivate future work on country-specific institutional factors.

## 5 Conclusions

In this paper, I use a large European firm data set to show how firm leverage variation emerges from firm and country factors. The importance of firm versus country effects on firm capital structure varies across firm types. The country effects are most important for small and unlisted firms. In other words, small firms, which are likely to be financially constrained, face non-firm-specific determinants of leverage. This is an important finding for several reasons: First, apparently a change in domestic macroeconomic variables and

institutions can change a firm's financial structure. Second, the theoretical work in the field of capital structure should turn more attention on the country of incorporation factors.

In addition to using simple country dummies, I add to my analysis five country variables. This allows me to pin down how much country explanatory power in leverage variation is determined by unobservable country factors. I find that the share of unobservable factors are 10% and 22% respectively for listed and unlisted firms. Hence, the institutional differences across countries explain quite a high share of leverage.

The listed firms leverage regression results on the pooled data are comparable to the results found in previous studies in the field. The results on unlisted firms are different from existing studies. I find the negative sign in front of the logarithm of total assets and share of tangible assets to total assets. The theory as well as empirical research available to-date confirm a positive relationship between the size of the firm and firm leverage. The different result reported here may have emerged since I observe smaller firms compared to earlier studies and stresses the importance of future research.

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TABLE 1 — SUMMARY STATISTICS,  
MEAN AND MEDIAN LEVERAGE, MEDIAN ASSETS AND NUMBER OF FIRMS IN 1997

Country	Unlisted firms				Listed firms			
	Leverage		Assets	Number of Firms	Leverage		Assets	Number of Firms
	Median	Mean	Median		Median	Mean	Median	
Italy	0.85	0.81	3170	60099	0.64	0.62	152398	60
Germany	0.76	0.72	35002	3073	0.66	0.63	171275	319
Netherlands	0.76	0.73	5392	3727	0.72	0.72	10167829	1
Norway	0.76	0.72	912	26990	0.56	0.55	83442	95
Denmark	0.75	0.70	2761	764	0.48	0.48	323210	2
Sweden	0.75	0.71	1474	18241	0.58	0.54	54916	171
Belgium	0.74	0.69	2027	29630	0.63	0.60	28585	13
France	0.74	0.72	1507	119944	0.59	0.56	73995	504
Spain	0.74	0.70	1153	81718	0.51	0.48	117144	132
Switzerland	0.71	0.66	72763	249	0.58	0.58	234807	167
Portugal	0.71	0.69	2792	5559	0.62	0.59	76399	59
Austria	0.71	0.68	36869	455	0.53	0.51	166253	30
United Kingdom	0.67	0.65	5024	53707	0.54	0.55	65152	929
Finland	0.66	0.63	1197	10170	0.56	0.53	93891	96
Ireland	0.60	0.59	8678	544	0.60	0.56	145588	18

NOTES: Assets are given in thousands of US dollars.

TABLE 2 — ANOVA RESULTS FOR LISTED FIRMS  
LEVERAGE IN 1995-2001

Source	SSR		SSR		SSR	
Size	27	23%	25	17%	25	17%
	( 5 )		( 5 )		( 5 )	
Industry	50	43%	58	41%	57	40%
	( 53 )		( 53 )		( 53 )	
Country	20	17%	25	18%	15	10%
	( 15 )		( 15 )		( 15 )	
Year	7	6%	7	5%	5	3%
	( 7 )		( 7 )		( 7 )	
Model	117		140		143	
Total	1224		1224		1224	
Firms ch.	No		Yes		Yes	
Country ch.	No		No		Yes	
Adj. R <sup>2</sup>	0.09		0.11		0.11	
Obs.	20790		20790		20790	

NOTES: Numbers in cells refer to partial sum of squares (SSR). The numbers in parentheses refer to number of indicators. Industry is 3-digit NACE. Firm size classes: Class 1 total assets smaller than \$1 million, Class 2 total assets between \$1 and 2 million, Class 3 total assets between \$2 and 5 million, Class 4 total assets between \$5 to 50 million, and Class 5 total assets above \$50 millions. Firm characteristics are tangible assets to total assets and profit to assets ratios. Country characteristics are GDP growth rate, Inflation, Savings to GDP, statutory corporate income tax rate, and total market capitalization to GDP.

TABLE 3 — ANOVA RESULTS FOR UNLISTED FIRMS  
LEVERAGE IN 1995-2001

Source	SSR		SSR		SSR	
Size	2963	20%	2945	20%	2936	20%
	( 5 )		( 5 )		( 5 )	
Industry	3718	26%	3656	25%	3657	25%
	( 55 )		( 55 )		( 55 )	
Country	6769	47%	6677	46%	3174	22%
	( 15 )		( 15 )		( 15 )	
Year	7	0%	7	0%	54	0%
	( 7 )		( 7 )		( 6 )	
Model	14554		14627		14706	
Total	225500		225500		225500	
Firms ch.	No		Yes		Yes	
Country ch.	No		No		Yes	
Adj. R <sup>2</sup>	0.06		0.06		0.07	
Obs.	3253734		3253734		3253734	

NOTES: Numbers in cells refer to partial sum of squares (SSR). The numbers in parentheses refer to number of indicators. Industry is 3-digit NACE. Firm size classes: Class 1 total assets smaller than \$1 million, Class 2 total assets between \$1 and 2 million, Class 3 total assets between \$2 and 5 million, Class 4 total assets between \$5 to 50 million, and Class 5 total assets above \$50 millions. Firm characteristics are tangible assets to total assets and profit to assets ratios. Country characteristics are GDP growth rate, Inflation, Savings to GDP, statutory corporate income tax rate, and total market capitalization to GDP.

TABLE 4 — ANOVA RESULTS FOR LISTED FIRMS  
LEVERAGE BY SIZE CLASSES IN 1995-2001

Source	Size<4		Size 4		Size 5	
Industry	15	67%	23	58%	39	72%
	( 42 )		( 51 )		( 52 )	
Country	4	19%	9	22%	14	26%
	( 13 )		( 14 )		( 15 )	
Year	1	6%	6	16%	2	3%
	( 7 )		( 7 )		( 7 )	
Model	22		40		54	
Total	138		483		568	
Adj. R <sup>2</sup>	0.12		0.07		0.09	
Obs.	1243		6645		12902	

NOTES: Numbers in cells refer to partial sum of squares. The numbers in parentheses refer to number of indicators. Industry is 3-digit NACE. Firm size classes: Class 1 total assets smaller than \$1 million, Class 2 total assets between \$1 and 2 million, Class 3 total assets between \$2 and 5 million, Class 4 total assets between \$5 to 50 million, and Class 5 total assets above \$50 millions.

TABLE 5 — ANOVA RESULTS FOR UNLISTED FIRMS  
LEVERAGE BY SIZE CLASSES IN 1995-2001

Source	Size 1		Size 2		Size 3		Size 4		Size 5	
Industry	695	37%	560	24%	1224	30%	1740	49%	616	77%
	( 54 )		( 54 )		( 55 )		( 55 )		( 55 )	
Country	1152	61%	1683	72%	2407	60%	1691	47%	154	19%
	( 15 )		( 15 )		( 15 )		( 15 )		( 15 )	
Year	1	0%	2	0%	3	0%	9	0%	2	0%
	( 7 )		( 7 )		( 7 )		( 7 )		( 7 )	
Model	1875		2328		4015		3578		797	
Total	63636		38065		54270		54049		11925	
Adj. R <sup>2</sup>	0.03		0.06		0.07		0.07		0.07	
Obs.	981498		648595		766691		717740		139210	

NOTES: Numbers in cells refer to partial sum of squares. The numbers in parentheses refer to number of indicators. Industry is 3-digit NACE. Firm size classes: Class 1 total assets smaller than \$1 million, Class 2 total assets between \$1 and 2 million, Class 3 total assets between \$2 and 5 million, Class 4 total assets between \$5 to 50 million, and Class 5 total assets above \$50 million.

TABLE 6 — LEVERAGE REGRESSION IN 1995-2001

	Listed firms		Unlisted firms	
Cons.	-0.1153 ( 0.0475 )**	-0.3430 ( 0.0601 )***	0.2478 ( 0.0092 )***	0.2471 ( 0.0096 )***
Tangibility	0.0758 ( 0.0145 )***	0.0746 ( 0.0145 )***	-0.0054 ( 0.0016 )***	-0.0054 ( 0.0016 )***
Profitability	-0.1077 ( 0.0123 )***	-0.1088 ( 0.0123 )***	-0.0021 ( 0.0015 )	-0.0021 ( 0.0015 )
Log assets	0.0159 ( 0.0017 )***	0.0159 ( 0.0017 )***	-0.0168 ( 0.0002 )***	-0.0168 ( 0.0002 )***
Industry leverage	0.7121 ( 0.0407 )***	0.7110 ( 0.0408 )***	0.8392 ( 0.0077 )***	0.8391 ( 0.0077 )***
GDP growth		0.0054 ( 0.0022 )**		-0.0002 ( 0.0002 )
Inflation		0.0023 ( 0.0023 )		-0.0047 ( 0.0002 )***
Savings		0.0101 ( 0.0016 )***		0.0006 ( 0.0001 )***
Corporate tax		-0.0007 ( 0.0005 )		-0.0003 ( 0.0000 )***
Total Mrk. Cap.		0.0000 ( 0.0000 )		-0.0003 ( 0.0000 )***
Adj. R <sup>2</sup>	0.11	0.11	0.06	0.06
Obs.	20790	20790	3253734	3253734

NOTES: Standard errors are in brackets. \*\*\*, \*\*, and \* denote significance at the 1, 5 and 10 percent level respectively. Standard errors are based on clustering across firms. All regressions include country and year dummies.



APPENDIX TABLE 1 — REPRESENTATIVENESS OF DATA,  
 AMADEUS DATA VERSUS “ENTERPRISES IN EUROPE”

Country	Correlation of size distribution across industries	Correlation of industry distribution
Austria	-0.747	0.447
Belgium	0.995	0.857
Denmark	0.930	0.783
Finland	0.975	0.601
France	0.989	0.552
Germany	-0.746	0.000
Ireland	0.161	0.214
Italy	0.966	0.564
Netherlands	0.988	0.630
Norway	0.998	
Portugal	0.844	0.773
Spain	0.991	0.640
Sweden	0.986	0.792
United Kingdom	0.492	0.148

NOTES: Size and industry distributions are calculated based on number of firms. Firms were divided into 3 size classes: 10-49, 50-249, and more than 250 employees. Industries were divided into 6 groups: 10-41 Industry and energy, 45 Construction, 50-55 Trade and Hotels and Restaurants, 60-64 Transport and communication, 74 Other business activities, and 70-73, 85, 90, 92, 93 Other services. Amadeus data is for 1997. EU data is for 1997 except for Denmark, France, Greece, Ireland, Italy, Netherlands, Norway, Portugal, and Sweden for which 1996 data were used.

APPENDIX TABLE 2 — AMADEUS COVERAGE, NUMBER OF UNLISTED FIRMS

Country	1995	1996	1997	1998	1999	2000	2001	Total
Austria	244	370	455	536	867	941	327	3740
Belgium	26631	28307	29633	30633	32534	33869	34262	215869
Denmark		220	764	10996	16729	17956	18633	65298
Finland	5226	7200	10171	11750	13016	14117	15026	76506
France	106705	113677	119972	129154	135390	141849	142691	889438
Germany	2184	2627	3073	3706	5544	7273	5722	30129
Ireland	665	569	544	571	684	848	689	4570
Italy	26155	52676	60101	66985	78152	87712	84671	456452
Netherlands	2958	3224	3728	4377	4796	4384	4400	27867
Norway	3417	24030	26998	29709	31919	34860	35663	186596
Portugal	5498	5529	5560	6900	9477	11927	9462	54353
Spain	60924	72918	81723	93401	104718	115730	118214	647628
Sweden			18242	32865	35196	37849	38979	112024
Switzerland	158	214	249	269	374	441	467	2172
United Kingdom	43748	49024	53733	60881	68067	75023	79509	429985
Total	302975	393994	442132	493450	542473	547607	531103	3253734

APPENDIX TABLE 3 — AMADEUS COVERAGE, NUMBER OF LISTED FIRMS

Country	1995	1996	1997	1998	1999	2000	2001	Total
Austria	28	31	30	31	40	45	27	232
Belgium	9	12	13	57	84	92	95	362
Denmark			2	83	103	107	110	405
Finland	82	87	96	101	112	116	121	715
France	140	429	504	586	652	721	734	3766
Germany	263	278	319	398	592	631	633	3114
Ireland	13	16	18	15	15	17	12	106
Italy	39	58	60	89	116	134	137	633
Netherlands	1	1	1	1	1	3	3	11
Norway	75	84	95	103	108	113	123	701
Portugal	43	58	59	65	67	69	72	433
Spain	116	128	132	144	152	158	165	995
Sweden			171	205	223	234	242	1075
Switzerland	123	155	167	175	178	185	186	1169
United Kingdom	756	835	929	993	1061	1210	1289	7073
Total	1688	2172	2596	3046	3504	3835	3949	20790

APPENDIX TABLE 4 — AMADEUS COVERAGE

Country	Industry	EE	Amadeus	EE	Amadeus	EE	Amadeus	EE	Amadeus
		Size1	Size1	Size2	Size2	Size3	Size3	Total	Total
Austria	1	0.74	0.00	0.21	0.33	0.06	0.67	0.12	0.39
	2	0.85	0.07	0.13	0.21	0.01	0.71	0.08	0.07
	3	0.88	0.11	0.11	0.54	0.02	0.36	0.44	0.29
	4	0.85	0.00	0.13	0.44	0.02	0.56	0.05	0.05
	5	0.86	0.24	0.12	0.28	0.02	0.48	0.11	0.13
	6	0.83	0.33	0.15	0.33	0.03	0.33	0.20	0.08
Belgium	1	0.76	0.71	0.18	0.24	0.06	0.06	0.09	0.23
	2	0.88	0.83	0.10	0.15	0.02	0.02	0.13	0.12
	3	0.90	0.88	0.08	0.11	0.03	0.02	0.47	0.40
	4	0.87	0.83	0.11	0.15	0.02	0.02	0.03	0.08
	5	0.78	0.74	0.15	0.21	0.07	0.05	0.14	0.09
	6	0.78	0.83	0.19	0.15	0.04	0.02	0.13	0.08
Denmark	1	0.74	0.59	0.21	0.28	0.05	0.13	0.15	0.28
	2	0.91	0.77	0.08	0.20	0.01	0.03	0.14	0.11
	3	0.88	0.76	0.10	0.16	0.01	0.07	0.41	0.32
	4	0.85	0.58	0.13	0.32	0.02	0.11	0.06	0.07
	5	0.86	0.47	0.12	0.37	0.02	0.16	0.14	0.09
	6	0.83	0.62	0.14	0.33	0.02	0.05	0.10	0.14
Finland	1	0.73	0.65	0.20	0.25	0.07	0.10	0.14	0.33
	2	0.91	0.84	0.07	0.14	0.02	0.02	0.13	0.10
	3	0.86	0.77	0.10	0.16	0.03	0.06	0.30	0.34
	4	0.81	0.67	0.15	0.23	0.04	0.09	0.11	0.07
	5	0.83	0.55	0.15	0.28	0.02	0.17	0.13	0.09
	6	0.86	0.71	0.11	0.24	0.04	0.05	0.19	0.08
France	1	0.77	0.64	0.19	0.27	0.05	0.09	0.11	0.27
	2	0.89	0.80	0.09	0.17	0.01	0.03	0.13	0.10
	3	0.88	0.82	0.10	0.15	0.02	0.03	0.33	0.37
	4	0.80	0.69	0.17	0.25	0.03	0.07	0.04	0.06
	5	0.83	0.65	0.14	0.23	0.03	0.12	0.10	0.10
	6	0.80	0.69	0.16	0.26	0.04	0.05	0.29	0.10
Germany	1	0.75	0.04	0.18	0.29	0.07	0.67	0.10	0.44
	2	0.91	0.07	0.08	0.32	0.01	0.61	0.10	0.02
	3	0.91	0.11	0.08	0.34	0.01	0.55	0.32	0.11
	4	0.88	0.06	0.11	0.19	0.01	0.75	0.04	0.06
	5	0.84	0.08	0.10	0.11	0.06	0.81	0.13	0.16
	6	0.91	0.14	0.08	0.40	0.01	0.46	0.31	0.19
Ireland	1	..	0.33	..	0.49	..	0.18	0.09	0.41
	2	0.88	0.37	0.11	0.54	0.01	0.09	0.17	0.06
	3	..	0.49	..	0.41	..	0.09	0.43	0.26
	4	..	0.48	..	0.34	..	0.18	0.05	0.09
	5	1.00	0.32	..	0.40	..	0.28	0.12	0.13
	6	..	0.33	..	0.38	..	0.29	0.13	0.04

NOTES: First 6 columns express the firm size distribution across industries. Last 2 columns express the industry distribution. EE — “Enterprises in Europe”. Firms size definitions: Size1 — 10-49 employees; Size2 — 50-249 employees; and Size3 more than 250 employees. Industry definitions: 1 — Industry and energy (Nace codes 10-41); 2 — Construction (45); 3 — Trade and Hotels and Restaurants (50-55); 4 — Transport and communication (60-64); 5 — Other business activities (74); and 6 — Other services (70-73, 85, 90, 92, 93). Amadeus data is for 1997. EU data is for 1997 except for Denmark, France, Greece, Ireland, Italy, Netherlands, Norway, Portugal, and Sweden for which 1996 data were used.

APPENDIX TABLE 4 — AMADEUS COVERAGE, CONT.

Country	Industry	EE Size1	Amadeus Size1	EE Size2	Amadeus Size2	EE Size3	Amadeus Size3	EE Total	Amadeus Total
Italy	1	0.88	0.70	0.10	0.26	0.02	0.04	0.15	0.45
	2	0.95	0.81	0.05	0.17	0.00	0.02	0.12	0.07
	3	0.96	0.86	0.04	0.12	0.00	0.02	0.39	0.35
	4	0.85	0.72	0.13	0.23	0.02	0.06	0.04	0.05
	5	0.84	0.57	0.16	0.33	0.00	0.10	0.13	0.03
	6	0.85	0.60	0.15	0.34	0.00	0.05	0.16	0.05
Netherlands	1	0.70	0.74	0.24	0.25	0.07	0.01	0.08	0.21
	2	0.86	0.80	0.12	0.20	0.01	0.00	0.10	0.15
	3	0.86	0.87	0.12	0.13	0.03	0.00	0.38	0.33
	4	0.80	0.74	0.17	0.26	0.03	0.01	0.05	0.08
	5	0.75	0.71	0.19	0.28	0.06	0.01	0.14	0.14
	6	0.75	0.75	0.19	0.24	0.06	0.02	0.25	0.09
Norway	1	..	0.74	..	0.22	..	0.04	..	0.19
	2	0.91	0.91	0.07	0.08	0.02	0.01	..	0.12
	3	0.89	0.89	0.09	0.10	0.02	0.01	..	0.45
	4	..	0.72	..	0.21	..	0.06	..	0.06
	5	0.85	0.80	0.11	0.17	0.04	0.03	..	0.07
	6	..	0.79	..	0.18	..	0.03	..	0.12
Portugal	1	0.80	0.44	0.17	0.45	0.03	0.12	0.15	0.38
	2	0.88	0.53	0.10	0.34	0.02	0.13	0.15	0.11
	3	0.93	0.76	0.08	0.21	0.00	0.03	0.52	0.40
	4	0.84	0.58	0.13	0.26	0.03	0.16	0.03	0.03
	5	0.79	0.38	0.16	0.23	0.05	0.39	0.07	0.04
	6	0.91	0.57	0.09	0.28	0.00	0.15	0.08	0.04
Spain	1	0.84	0.76	0.14	0.20	0.02	0.04	0.10	0.31
	2	0.90	0.85	0.08	0.13	0.01	0.02	0.11	0.13
	3	0.91	0.85	0.09	0.13	0.00	0.02	0.44	0.34
	4	0.87	0.78	0.10	0.17	0.03	0.05	0.09	0.06
	5	0.81	0.62	0.16	0.25	0.03	0.13	0.12	0.04
	6	0.85	0.77	0.12	0.19	0.03	0.04	0.14	0.11
Sweden	1	0.73	0.69	0.21	0.24	0.06	0.07	0.12	0.22
	2	0.91	0.88	0.07	0.10	0.02	0.02	0.10	0.09
	3	0.89	0.85	0.09	0.13	0.02	0.02	0.33	0.39
	4	0.83	0.78	0.13	0.17	0.03	0.05	0.06	0.07
	5	0.89	0.65	0.10	0.22	0.02	0.13	0.17	0.11
	6	0.82	0.73	0.14	0.21	0.04	0.05	0.22	0.12
United Kingdom	1	0.74	0.25	0.20	0.52	0.06	0.24	0.10	0.30
	2	0.88	0.41	0.12	0.46	0.00	0.13	0.22	0.08
	3	0.88	0.48	0.10	0.38	0.02	0.13	0.22	0.26
	4	0.81	0.36	0.14	0.42	0.05	0.22	0.06	0.06
	5	0.80	0.42	0.15	0.38	0.04	0.19	0.15	0.12
	6	0.87	0.47	0.11	0.41	0.02	0.12	0.24	0.19

NOTES: First 6 columns express the firm size distribution across industries. Last 2 columns express the industry distribution. EE — “Enterprises in Europe”. Firms size definitions: Size1 — 10-49 employees; Size2 — 50-249 employees; and Size3 more than 250 employees. Industry definitions: 1 — Industry and energy (Nace codes 10-41); 2 — Construction (45); 3 — Trade and Hotels and Restaurants (50-55); 4 — Transport and communication (60-64); 5 — Other business activities (74); and 6 — Other services (70-73, 85, 90, 92, 93). Amadeus data is for 1997. EU data is for 1997 except for Denmark, France, Greece, Ireland, Italy, Netherlands, Norway, Portugal, and Sweden for which 1996 data is available.