The Effects of Access to Public Debt Markets on Capital Structure

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Abstract

This paper investigates the role played by credit ratings in determining a firm's capital structure choice. Until recently the primary focus of capital structure studies has been demand side determinants of firm leverage. Little thought has been given to supply side factors that might open up access to alternative sources of debt capital. In this paper we use a firm's possession of a corporate credit rating as an indicator of access to the public bond markets. We find firms that have an S&P or Fitch long-term debt rating possess twice as much leverage compared to those without a rating. These results are robust to the use of alternative measures of leverage and methods of estimation. The debt access and leverage effects we find for rated firms have important value implications via a firm's debt tax shield and the accompanying increase in interest deductions and facilitating investment in value enhancing projects that would otherwise be foregone because of bank lending constraints.

KEYWORDS: Capital Structure, Credit Ratings, Bond Market Access.
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1. Introduction

The turmoil in the credit markets in 2008 brought the wholesale money markets to a virtual standstill leading to serious consequences for the non-financial corporate sector or "real" economy. Many companies have suffered from a lack of access to short-term money market funds, known as commercial paper, due to the non-existent liquidity in this market. The Financial Times (10/10/08) reported that across Europe manufacturing and services firms are being hit from falling demand in many of their markets and financing problems that are causing firms to go slow on investment. For example, Flavio Radice, chief executive of Peitro Carnaghi, an Italian industrial company, said "The credit situation is getting worse every day and that is affecting investment…" (FT, 10/10/08, page 11). Also Carlos Ghosn, head of Renault, has suggested that the squeeze in financing is leading companies to conserve cash by cutting investment.[2] In March 2009, the Confederation of Business Industry's Access to Finance survey reported that a net balance of 30% of companies indicated that financing conditions had adversely affected their output over the past three months. With banks being unwilling to lend to one another it is not unsurprising that the corporate sector would soon feel the effects of retrenchment in bank loan finance and therefore the availability of bank credit. In response to this the Bank of England started to buy sterling commercial paper at attractive rates in an attempt to improve liquidity in the UK markets. However, the Bank of England's asset purchase facility is only going to help companies with a rating. In order to become eligible companies will require a credit rating.

This crisis that has inflicted global credit markets over the past two years plus speculation over the role of ratings agencies has triggered some concern amongst finance directors and corporate treasurers and on the issue of credit ratings. Given the significant financial cost incurred in getting an initial rating and then managing it, key questions for finance directors and corporate treasurers and ultimately shareholders are how important are ratings in practice, and in particular do they provide any tangible benefits? Given that 82% of FTSE 100 companies are publicly rated today it is pertinent to ask what benefits these firms derive from having a rating. Recent events in the wholesale money markets have brought the home the need to ensure that firms have access to a diversified source of financing. This study examines whether credit ratings provide this access by investigating the leverage effects of having a credit rating over an eight year period between 1999 and 2006 for a sample of listed UK non-financial firms.

Credit ratings are seen to be important to all the participants in the public debt markets. For example, for large listed corporates, a public credit rating from one or more of the major agencies (S&P, Moody's or Fitch) is an invaluable asset when considering the capital markets. Finance directors of listed firms that make issues of debt instruments have long recognized that they must obtain credit ratings to be accorded capital market acceptance. Without a credit rating, it would be difficult to go to the public markets to obtain debt capital. The benefits of a credit rating are not only in terms of widening the pool of investors and potentially improving pricing, but also in terms of gaining international visibility and reducing reliance on local banks for debt funding. For example, a credit rating enables a firm to diversify its sources of funding by tapping the debt capital markets such as

[2] Financial Times 10/10/08, page 11.

the Eurobond markets, which provide an additional source of finance and in particular long-term finance. It follows from this that we should expect to find, that since a credit rating provides access to an additional source of debt (via the public debt market), companies with a credit rating should have more debt in their capital structure and therefore be more levered.

For banks acting as intermediaries an external credit rating is valuable when negotiating, pricing, and participating in the issuing of debt. The process of marketing the issue to potential investors is made that much easier when the quality of the debt has been assessed by an external credit rating agency. For investors, firms possessing a wide range of credit ratings provide a larger pool of investment opportunities with varying levels of credit risk. With regulation, investment and performance parameters increasingly demanding for many institutional investors and in light of several high profile accounting scandals in recent years (for example, WorldCom and Enron) it could be argued that external credit ratings provide an independent measure of firm credit risk.

With ratings deemed to have such significance for firms financing decisions it is surprising that there are only a handful of papers that have examined the link between credit ratings and capital structure decisions (see Table 1). Given the widespread use of credit ratings in the US, largely due to SEC regulatory requirements, all of these studies, bar one, employ North American data. The only study using data from outside this region is that by Bancel and Mitto (2002). Their study is based on survey data of 87 firms from 16 European countries. The analysis in this study is limited to univariate comparisons of firms based on their survey responses. Given the relatively small number of responses spread across several countries, it is difficult to gauge whether their findings are truly representative of European corporates, especially since the legal systems, bankruptcy codes, corporate governance rules and tax regimes vary considerably across Europe, all of which may influence firm responses. For example, in Germany corporates have traditionally relied on local banks rather than capital market issuance for their financing needs.

In September 2008 UK corporates were major issuers of international debt securities. The UK was ranked third amongst 24 developed countries for international debt securities outstanding.[3] UK corporates had $291 billion in international debt securities outstanding, the corresponding figures for US and French corporates were $880.5 and $315.9 billion, respectively (BIS Quarterly Review, December 2008).

In terms of international bond amounts outstanding the UK is ranked third behind the US and Germany.[4] BIS statistics show that the US, Germany, UK, France and the Netherlands have been major issuers of international bonds in recent years. Outside the US, the UK has seen the greatest acceptance of credit ratings, with around 33 per cent of large listed firms (top 350) possessing a rating.[5] Given the share of bond market activity and the possession of credit ratings by UK issuers it seems that the UK is a good setting to carry out research into the role played by credit ratings in determining capital structure.

[3] Sourced from Table 12C International debt securities – corporate issuers, pg A88, BIS Quarterly Review, December 2008.
[4] Sourced from International Banking and Financial Market Development, Bank for International Settlements, June 2008.
[5] Sourced from the Treasurer, July/August 2007, page 26.

2. Overview of Empirical Literature

Previous survey based research has demonstrated that credit ratings are an important factor in firms capital structure decisions. Graham and Harvey (2001) survey 392 CFOs in the US and find that CFOs consider credit rating to be the second most important factor following financial flexibility in determining how firms choose the appropriate amount of debt. In their survey 57% of CFOs ranked credit rating as important or very important. They also report that credit rating is especially important for large firms, those with foreign sales and for firms operating in regulated industries. Servaes and Tufano (2006) conduct a survey of 334 global firms and find that credit rating considerations is the most important factor in determining the level of debt, with 57% of their respondents ranking this factor as important or very important.[6] In view of this result they argue that credit ratings are far more important in capital structure decisions than that suggested by corporate finance theory. Servaes and Tufano also enquired as to why firms did not use more debt in their capital structure. Credit rating considerations were again seen to be an important factor in this context, with 60% of firms indicating this factor to be important or very important. Although not mentioned explicitly in these two studies it seems that the usage of the term credit rating in these studies refers to the level of rating rather than simply the possession of a rating.

The only non-North American study is that by Bancel and Mittoo (2002). They conduct a similar survey to Graham and Harvey (2001) in their examination of capital structure practices of 87 firms in 16 European countries. They find that a credit rating and target debt ratios are important issues for managers in European firms. Consistent with Graham and Harvey (2001) their research shows that credit rating is ranked as the second most important determinant of debt after financial flexibility (73% of managers considered credit rating important or very important). When they compare managers' responses from the US with those from Europe, they find that a credit rating is considered to be more important by European managers (73% of the European managers consider credit rating to be important or very important versus 57% of US managers).

Faulkender and Petersen (2006) examine a sample of US non-financial firms with and without a credit rating over the period 1986 to 2000. Using a large panel dataset they find that firms which have access to the public bond market as proxied by having a debt rating have 35 percent more leverage. In another US based study Kisgen (2006) looks at the effect of credit rating changes on firms leverage levels. Unlike Faulkender and Petersen (2006), Kisgen's sample only includes firms with a credit rating. He finds that firms reduce leverage following credit rating downgrades, whereas, rating upgrades do not affect subsequent capital structure activity, suggesting that firms target minimum rating levels. Kisgen (2006) reports that firms that have been downgraded issue over 2.0% less net debt as a percentage of assets relative to equity the subsequent year than control firms.

Tang (2006) also looks at the effect of credit rating changes. This study examines Moody's credit rating format refinement in 1982 to study the effects of information asymmetry on firms' credit market access, financing decisions, and investment policies. Tang (2006) finds

[6] Financial flexibility, including the ability to maintain investment and dividends, is the second most important factor. The value of tax shields associated with debt ranks as the third most important in practice.

that firms that are upgraded due to the refinement enjoy better credit market access through a lower cost of borrowing and a greater amount of debt issuance compared to firms that are downgraded. Tang (2006) finds a rating upgrade resulting from the rating refinement leads to a seven basis points or a 0.5 percent reduction in a firm's borrowing cost whereas a rating downgrade results in a 13 basis point or 0.7 percent increase over the same time period. With a full set of control variables Tang (2006) reports that a rating refinement upgrade leads to a two percent increase in firms' subsequent long-term debt issuance over its previous debt issuance, relative to a rating downgrade. Tang also finds that the better credit market access facilitated by the higher refined rating drives these firms to issue less equity and rely more on debt financing.

Sufi (2006) examines the effect of loan ratings on company's financial and investment policy. A loan rating is given to a specific tranche of borrowing tied to a particular project rather than to the company as a whole. His findings provide evidence that firms that obtain a loan rating experience an increase in the supply of debt available, in their equilibrium use of debt, and a permanent rise in their leverage. In particular, Sufi (2006) shows that loan ratings allow borrowers to expand the set of creditors beyond domestic commercial banks toward less informed investors such as foreign banks and institutional investors. These results are consistent with the notion that loan ratings increase the supply of available debt financing. This is in line with the findings of Faulkender and Petersen (2006).

Hovakimian, Kayhan, and Titman (2008) examine how firms target their credit ratings. They find that below-target firms tend to make financing, payout, and acquisition choices that decrease their leverage whereas above-target firms tend to make choices that increase their leverage. They also find that since a high rating requires a firm to include a substantial amount of equity in its capital structure, high credit ratings are observed only for firms that are likely to benefit the most from a higher credit rating, for example, for growth firms that expect to be raising substantial capital in the future.

Byoun (2008) tests what he refers to as the financial flexibility hypothesis (FFH). This hypothesis suggests an inverted-U relationship between leverage and having a credit rating. Byoun's (2008) idea is that small developing firms with no credit ratings have lower leverage ratios since they issue much more equity than debt to manage their lack of financial flexibility. He argues that medium growing firms with credit ratings have high debt ratios by issuing debt against large future expected cash flows. Finally, his model predicts that large mature firms with good credit ratings have moderate leverage ratios as they rely on internal funds and use only safe debt in order to preserve financial flexibility. According to Byoun (2008) the FFH implies a negative relationship between credit rating and leverage ratio but lower leverage ratios for non-rated firms than rated firms.

Mitto and Zhang (2008) examine the capital structure of the Canadian MNCs in the 1998–2002 period. They ask three main questions: (i) Does the leverage of Canadian multinationals differ from their domestic peers and if so, what factors drive this difference? (ii) Does access to the U.S. capital markets influence the capital structure of Canadian firms and if so, does it explain the leverage difference in the MNCs and DCs? (iii) Does the capital structure of Canadian MNCs differ from the U.S. MNCs, and if so, what factors explain this difference?

Contrary to the U.S. evidence, they find that the Canadian MNCs display about three percentage points higher long-term debt ratio but similar short-term ratios compared to domestic firms, after controlling for industry and firm characteristics. They suggest that the higher leverage of the Canadian MNCs stems largely from their U.S. operations and that the expansion in the non-U.S. markets has little impact on leverage. They find that both the agency costs of debt and business risk increase as Canadian MNCs expand their operations in non-U.S. countries but the impact of agency costs of debt is stronger. They also show that Canadian firms with access to global bond markets (proxied by the possession of a S&P long-term rating) have between 6.4% and 11.6% higher leverage than firms with no access.

Bacon, Grout and O'Donovan (2009) conducted interviews at the tail-end of 2008 with 43 UK corporate treasurers on the impact of the credit crisis on corporate funding. They found that all firms reported that the availability of funds from the banking sector were significantly down. Furthermore, their survey revealed that corporate treasurers believed that bank lending capacity was going to be constrained for the foreseeable future. Consequently firms expected leverage levels in the corporate sector to fall. The report pointed out that firms that do not have access to the bond markets are highly dependent on bank finance and at this time (during the crisis) the availability of medium term debt from banks has declined. An alternative to bank finance is the private placement bond market which has the advantage over the public debt markets in that firms do not need a credit rating. However, the report noted that private placement markets require extensive documentation more onerous than for issues in the public bond markets making private placements a less viable alternative. Consequently, Bacon et al. (2009) find that in the current climate firms have recognized the need for a credit rating in order to provide access to alternative sources of funding and to avoid reliance on the bank markets. They also report that many currently unrated firms were considering obtaining their first rating.

To the best of our knowledge, this study is the first to investigate the relationship between credit ratings and capital structure choice for a large sample of UK firms, and therefore provides a valuable additional case study. In so doing it helps cast light on the international validity of the current empirical literature.

[INSERT TABLE 1 HERE]

3. Sample and Firm Characteristics

Our sample comprises non-financial firms in the top 500 of UK listed firms by market capitalization for the period 1999–2006. We measure leverage as the ratio of the firm's total debt to the value of its assets. Total debt includes both long-term and short-term debt which includes the current portion of long-term debt due within a year and we utilise in the denominator both the book value (BV) and market value (MV) of assets.[7] The latter is defined as the BV of assets minus the BV of equity plus the MV of equity. As a robustness tests, we also use net leverage and the interest cover ratio as additional measures of the firm's leverage.

[7] Servaes and Tufano (2006) point out that when determining debt levels ratings agencies consider a range of categories of debt, however, the only ones always included in the debt definition are short-term and long-term debt.

Using credit rating data sourced directly from S&P and Fitch we find that in our sample about 27% (862/3220) of firm-years have a credit rating and thus access to the public debt market. In comparison, only 19% of US firms have a debt rating (Faulkender and Petersen, 2006). When we exclude firms with zero debt our proportion of rated firms goes up to 29% (21% in the case of Faulkender and Petersen, 2006). Across the sample period this figure ranges from a low of 27.4% in 2001 to a high of 29.9% in 2004. The difference in the possession of corporate credit ratings between the US and UK corporate sector might be due to the fact that our sample comprises a higher proportion of large firms (top 500 of UK listed firms) whereas the sample coverage of Faulkender and Petersen (2006) is much wider and consequently incorporates a larger pool of smaller firms who are less likely to have a credit rating.

Several recent papers have argued that access to the public debt markets is an important factor in determining its capital structure choice (Faulkender and Petersen, 2006; Mitto and Zhang, 2008)[8]. In these studies access is measured by the possession of a credit rating. We follow suit and also measure access in this way. We define our main measure of leverage as total debt divided by market value of equity plus total debt (see Appendix 1 for full details).[9] To examine the importance of capital market access, we compared the leverage of the firms with a credit rating to those without a rating. Using both gross and net leverage (market value and book value measures), we find that firms with debt ratings have significantly greater leverage than firms without a debt rating (see Table 2). Whether we measure leverage using gross debt or net debt (total debt less cash and marketable securities) we still see that companies with bond market access are about 8% more leveraged. If we look at the figures for gross leverage then we can see that for firms' with a credit rating the average debt ratio is 26.9 versus 19.1 % for the sample of firms without a rating. When we examine net leverage figures, the difference is slightly larger: 18.29 versus 9.71. Excluding the effect of other factors a debt rating increases the firm's debt by almost 41% [(26.91-19.09)/19.09]. In similar univariate tests Faulkender and Petersen (2006), report a 59% increase in leverage resulting from having a credit rating.

[INSERT TABLE 2 HERE]

Like, Faulkender and Petersen (2006) we also observe leverage differences between rated and non-rated firms at various percentiles of the distribution. Panel A of Table 2 shows that firms with a debt rating have higher leverage at the 25th, 50th, and 75th percentiles of the distribution. Our data for the median firm shows that having a debt rating raises gross leverage by almost 10% (from 13.9 to 23.6 percentage points) and net leverage by 8.6%. These differences are both statistically (1%) and economically significant.

When examining BV leverage we see a similar pattern, i.e. firms with bond market access have greater leverage than those without access. For BV gross leverage, having a bond rating increases leverage by 8.5%, however, it increases the BV net leverage by more than 13% (see panel B Table 2).

[8] Faulkender and Petersen (2006) provide an excellent theoretical justification for this link.

[9] Mitto and Zhang (2008) use a long-term debt ratio as the main leverage variable in their analysis. They define this as long-term debt divided by the sum of total debt and the market value of equity. They find that the difference in overall leverage (Total debt ratio) between Canadian multinational firms and domestic firms is due to the former having more long-term debt.

Around 12 percent of our firm-year observations have zero debt (zero gross leverage). These firms may be subject to rationing by the debt markets or they may have access but prefer to finance themselves only with equity. Faulkender and Petersen (2006) point out that if some of these zero debt firms have no desire for debt capital and consequently have no credit rating they will be incorrectly classified as not having access to the bond market. Therefore, throughout the paper we present results for both samples: for all firms and for firms with positive debt only. In Table 3 we repeat the above analysis after excluding firms with zero debt. As expected the difference between firms with access and those without is slightly lower. Firms with credit ratings have about 6% more leverage (28.36-22.50% or 19.32-13.13%) when measured on a market value basis and about 7 to 9% higher on a book value basis. This means that firms with debt rating have around 26% more gross debt (5.85/22.50, see Table 3).[10]

[INSERT TABLE 3 HERE]

4. Empirical Analysis

4.1 Differences in Firm Characteristics (Univariate Analysis)

In this section we examine the differences in the financial and operating characteristics of rated and non-rated firms in order to see whether these differences can explain the variation in leverage. Appendix 1 provides definitions of the variables used in this study.

[INSERT TABLE 4 HERE]

Employing a range of firm size measures Table 4 shows that rated firms are larger than non-rated firms. For example, when looking at market capitalisation, and total sales, we can see that firms with credit rating are three times larger. We also find that 68% of firms among the top 100 firms by market capitalisation have a credit rating compared to only 9% of those outside the top 100 firms. These results are consistent with the fact that the average size of issues in the public debt market is larger, and the fixed costs of issuing public bonds are greater than in the private debt markets (Faulkender and Petersen (2006)).

Table 4 shows that firms with credit rating are older than firms without a rating, which is consistent with the findings of Faulkender and Petersen (2006). Our univariate results also show that rated firms have more tangible assets (38% versus 31% of book assets) but spend less on research and development (R&D) (2% versus 24%) and possess fewer growth opportunities as measured by the market-to-book ratio. Firms with a credit rating also undertake less capital expenditure. Table 4 shows that firms with a credit rating are more likely to have an equity market listing in the United States in the form of American Deposit

[10] Following Faulkender and Petersen (2006) we assume that firms without a debt rating do not have access to the public debt markets. They point out that if this assumption is incorrect and firms without a rating do in fact have access then this will bias the leverage ratios between the groups towards each other.

Receipts (ADRs). We find that a higher proportion of rated firms have ADRs than non-rated firms (54% versus only 12% without credit ratings).[11]

An alternative way of measuring leverage is by examining the extent to which a firm can service its interest payments, namely, interest cover. Consistent with our results for leverage we find that rated firms have less interest coverage. This seems to be quite reasonable since these companies have more debt in their capital structure and, therefore, the interest they have to pay is higher compared to the corresponding figure for firms without credit rating, resulting in lower average interest coverage for rate firms. Based on measures of pre-tax margin and return on capital employed we find that firms with a credit rating are also more profitable. However, we find no significant differences in stock returns between rated and non-rated firms. Consistent with Faulkender and Petersen (2006), we find that firms with access to the public bond market possess less volatile assets than those without access.

We find rated firms possess significantly more long-term debt. From Table 5 we can clearly see that firms with no access to the public debt market have significantly more debt maturing in less than 1 year (35% versus 26%), as well as in between 1 and 5 years (41% versus 37%, p-value<0.01). Whereas firms with credit rating have greater proportion of debt after 1 year (74% versus 65%, p<0.01), and more debt maturing after 5 years (32% versus 21%, p-value<0.01). Faulkender and Petersen (2006) present similar results. For example they also find that firms with a rating have less short-term debt and more long-term debt. In their sample, rated firms have on average 65% of their debt due in more than 5 years as compared to only 34% for firms without a rating.

[INSERT TABLE 5 HERE]

4.2 Multivariate Analysis

The analysis above shows that rated firms possess characteristics that would encourage them to demand more debt. Therefore, in order to establish that our results are not being driven by demand side factors we need to include these factors together with our supply side variable (that is credit rating dummy) in a multivariate setting. Therefore, in this section, we run pooled OLS regression where the firm's gross leverage is regressed on a set of firm characteristics and a credit rating dummy. Following Faulkender and Petersen (2006) we include control variables such as a measure of firm size, asset tangibility, riskiness of operations, profitability and a firm's average tax ratio.

[INSERT TABLE 6 HERE]

The results in Table 6 show that the coefficient on having a debt rating is positive and both economically and statistically significant in all four specifications. After the inclusion of the aforementioned firm characteristics, firms with a debt rating are significantly more levered, with debt levels of 10.9–11.4% of the MV of the firm higher than firms without access to

[11] An American Depositary Receipt (or ADR) represents the ownership in the shares of a foreign company trading on US financial markets. The stock of many non-US companies trades on US exchanges through the use of ADRs. ADRs enable US investors to buy shares in foreign companies without undertaking cross-border transactions. ADRs carry prices in US dollars, pay dividends in US dollars, and can be traded like the shares of US-based companies.

public debt markets. The coefficient on the credit rating variable averages to around 11%, which is slightly higher than the 8% reported by Faulkender and Petersen (2006) and nearly double the 6% found by Mittoo and Zhang (2008) for Canadian firms.[12] Notwithstanding some differences in the variables employed in these studies and the composition of the sample it seems that leverage in the UK is possibly more sensitive to the possession of a credit rating than that in the US or Canada.

As predicted the coefficient on the standard deviation of asset return is negative and significant. Mitto and Zhang (2008) and Faulkender and Petersen (2006) find a similar result. We use total assets minus current assets over total assets as a measure of asset tangibility. The coefficient on tangible assets is positive and significant at the 1 percent level across all 4 specifications. Intangible assets such as, investments in brand name and intellectual capital, are not that easy to measure, therefore, we follow Faulkender and Petersen'S (2006) approach and use the firm's spending on R&D as a measure of the firm's intangible assets or growth opportunities. We also include the firm's market-to-book ratio as an additional control variable. The coefficients on both the Market-to-Book and R&D ratios are negative and significant, consistent with results in previous studies (for example, Mittoo and Zhang, 2008; Faulkender and Petersen, 2006).

Our findings on firm's tangible and intangible assets are consistent with Faulkender and Petersen (2006) findings. Increases in the tangibility of assets raise the firm's debt ratio (see Table 6). Moving a firm's tangible assets from the 25th (10%) to the 75th percentile (53%) raises the firm's debt ratio by 10.6 percent.[13] Increases in the firm's intangible assets lower the firm's debt-to-asset ratio although the level of sensitivity is much lower. For example, moving a firm's R&D expenditure (scaled by sales) from the 25th to the 75th percentile lowers the firm's leverage by only 1 percent. We find some support for the negative relationship between leverage and profitability as measured by return to invested capital, which is consistent with firms using their earnings to payoff debt.

The coefficient on the average tax ratio is negative and insignificant. Faulkender and Petersen (2006) report a negative and significant coefficient on their marginal tax rate variable which opposite to that predicted by the tradeoff theory. The coefficient on the lagged stock return variable is negative as expected but it is not statistically significant in our case. Following Faulkender and Petersen (2006), we also run the regressions on firm's supply and demand factors as determinants of leverage but only for those firms with positive debt. We report our results in Table 7. Dropping zero-debt firms from our sample does not affect our results. The results are qualitatively the same to those for the whole sample.

[INSERT TABLE 7 HERE]

4.3 Industry and Firm Fixed Effects

[12] As a robustness test we reran the regressions in Table 4 using net debt rather than total debt, where net debt is defined as total debt minus cash and marketable securities.

[13] Mitto and Zhang (2008) find that leverage increases by 15.3% in response to an increase in the firm's tangible assets from the 25th to the 75th percentile.

It has been suggested that the industry a firm operates in might influence the level of debt (Faulkender and Petersen, 2006). For example, industries with certain types of assets might be able to support higher levels of leverage. By including industry dummies in our regression specifications we can control for any determinant of leverage that is constant within an industry and thereby confirm that possessing a credit rating is not simply proxying for industry.

Another concern is that the estimated coefficients derived from the pooled OLS regressions in Tables 6 and 7 may be subject to an omitted variable problem. This arises when there is some unknown or unobservable variable or variables that cannot be controlled for that affect the dependent variable, in our case leverage. To overcome these problems our regressions include industry dummies (industry fixed-effects) and we use panel data regression methods (i.e, a random effects estimation) to mitigate the omitted variable problem alluded to above. We report the industry fixed effects results in Table 8 column I. The results are qualitatively similar to our previous results in Table 7. Faulkender and Petersen (2006) find that the effect of a debt rating on leverage falls slightly when they include controls for each of the 396 industries in their sample. However, we find the opposite result: in our case, including controls for each of the 11 industries in the sample slightly increases the effect of a debt rating on leverage from 10.9% in Table 6 column IV to 11.3% in Table 8 column 1 ($p<0.01$).

[INSERT TABLE 8 HERE]

The regression in column II controls for the unobserved firm specific variation, as opposed to industry specific variation, by utilizing a random effect panel data estimation.[14] In this specification, having a bond rating cannot be a proxy for any unobserved firm factor that influences the firm's demand for debt. Again our results differ from those in Faulkender and Petersen (2006). When they include a dummy for each firm in the sample, the coefficient on a firm having a debt rating dropped although it remained economically and statistically significant. According to our random effect panel estimation results, the coefficient on a firm having a debt rating almost doubles to 20.5% and it is economically, as well as, statistically significant (see Table 8 column II). Our estimated coefficient closely matches the results in Table 7. The firm random effects model suggests that our results are not driven by a firm-specific omitted variable that might influence the demand for debt

We also examine whether the effect (or importance) of having a credit rating varies over our sample period. This is important for our study because our sample period includes the years before the current financial (credit) crisis and recession. We find that in the pre-crisis years (2005 and 2006) the coefficient on the credit rating is insignificant suggesting that the possession of a credit rating had no material impact on firms leverage levels in these years. This is consistent with anecdotal evidence that suggests during these years the banks were very proactive in encouraging firms to take on higher levels of debt and most borrowers could not resist the cheap financing facilities available. The Bank of England Trends in Lending (2009) report points out that during this period the macroeconomic environment

[14] In Faulkender and Petersen (2006), they include a dummy variable for each firm in the sample with 59562 observations. But in our sample with 2603 observations, adding a dummy variable for each firm would suffer a considerable loss of degree of freedom. Therefore, we use an other variant of panel data model, random effects estimation method, in which firm specific effects are captured by a random variable.

was very favourable, asset prices were rising and interest rates around the world were relatively low which facilitated an increase in the amount of lending to companies in the UK and the rest of the world. The report suggests that lending to firms in the commercial property sector and leveraged buyout companies increased significantly, which was in part due to the fact that "banks were able to finance new loans by repackaging existing debt and selling it on to investors through securitisation…" (page 5).[15] Furthermore, before the credit crisis borrowing margins were on the whole at historically low levels and at the peak of the boom in the latter part of 2006 banks were falling over each other to provide credit on favourable terms.

During the credit crisis and the ensuing recession we would expect the coefficient on the rating variable to be significant because firms dependent on bank funding will have less access to debt capital and thus would be increasingly under-levered relative to firms with access to the public debt markets.

4.4 Using an Alternative Measure of Leverage: Interest Coverage

Following Faulkender and Petersen (2006), we conduct regressions to see if our findings are robust to how leverage is measured. To do so, we re-estimate our leverage regressions using interest coverage as the dependent variable. Results in Table 9 show that firms that have access to the public debt market have significantly lower interest coverage indicating that they are more levered. Since we use the natural log of interest coverage the estimated coefficient on the rating dummy can be interpreted as percent changes in interest coverage. Our result in column I of Table 9 indicates that a firm with a debt rating has interest coverage that is 80% lower than an otherwise identical firm. The magnitude of this effect remains qualitatively the same as we add the additional control variables (see Table 9, columns II–V).

[INSERT TABLE 9 HERE]

Following Faulkender and Petersen (2006) we re-estimate our regression for firms with positive debt only (see Table 10). The results show that the rating coefficients in columns I-III are about 0.15 lower than the corresponding results in table 9. We find that interest coverage for a firm with a rating is 65% lower than that for an analogous company without rating. Interestingly this result is very similar to that found by Faulkender and Petersen (2006).

[INSERT TABLE 10 HERE]

As robustness test we also run a regression using a random effects tobit estimation. In this case the economic effect of having a debt rating is even larger. We find that interest coverage of a company that has a debt rating is 90% lower than of an identical company without credit rating (see Table 11, columns I-III). The regression in column IV includes the debt maturity variables for which there are some missing observations for the debt maturing

[15] The Lending Report (2009) goes on to say, "As credit markets seized up during the summer of 2007, banks were unable to sell loans. That increased the amount of corporate loans remaining on banks' balance sheets, helping to boost measured net lending by banks to businesses over the following months." (page 5)

after 5 years variable. For this reduced sample the effect of ratings on interest coverage is lower at minus 56%, although it is still statistically significant.

[INSERT TABLE 11 HERE]

5. Controlling for the Endogenous Relationship Between Leverage and Credit Rating

Endogeneity arises when the firm-level factors that affect the firm's decision of possessing a credit rating also determine its leverage. Following An and Chan (2008) the empirical tests in this section use three estimation techniques in order to control for the endogeneity of the firm's decision to possess a credit rating. These are a treatment effect model to account for self selection bias, a maximum likelihood estimation to jointly estimate the selection and treatment equations and an instrumental variables (IV) estimation.[16] The first stage of the treatment effect and the IV models is a probit regression to estimate the probability of possessing a credit rating.

5.1 Determinants of the Likelihood of Possessing a Credit Rating

Several studies have looked into the factors that are important in determining whether a firm has a credit rating (Faulkender and Petersen (2006), Liu and Malatesta (2006), An and Chan (2008), and Leary (2009)). These studies start from the premise that firms issuing public debt more often than not possess a credit rating. They go on to argue that it follows from this that the factors that affect the use of public debt should also be important in determining whether a firm has a credit rating (Liu and Malatesta, (2005)). The most common variables used in this analysis are measures of firm size, profitability, growth and asset tangibility. Several studies note that there is a large fixed cost element to issuing public debt and therefore firms need to be of a minimum size to make it cost effective to issue such debt (Faulkender and Petersen (2006), Liu and Malatesta (2006), An and Chan (2008)). All previous studies find a strong positive relationship between firm size and the likelihood of having a rating. Faulkender and Petersen (2006) report that firm size is the most important variable determining whether a firm has a credit rating. An and Chan (2006) argue that more profitable firms will have a lower demand for external funds such as public debt and therefore less need for a rating. Conversely, Lui and Malatesta (2005) argue that firms with low profit levels and therefore a high risk of default are less likely to use public debt because of the higher costs in financial distress of negotiating with wide ranging public debt holders than with a group of private debt holders. Faulkender and Petersen (2006) and Lui and Malatesta (2005) find a significant negative relationship between profitability and having a credit rating which is consistent with the demand for external funds argument.

Firms with growth options are faced with a greater degree of information asymmetry and therefore it may not be possible to communicate this information to the public debt markets. This might be because it could affect the firm's competitive advantage or because the information lacks credibility. On the other hand, it would be possible to release this information to a bank in a one-to-one private relationship. It follows from this that firms

[16] See An and Chan (2008) for a brief explanation of these estimation methods.

with growth options are less likely to issue public debt and so have less need for a credit rating. Consistent with this, both Faulkender and Petersen (2006) and Lui and Malatesta (2005) report a significant negative relationship between the market-to-book ratio and the likelihood of having a credit rating. It has also been suggested that because of the collateral value of tangible assets firms with greater asset tangibility are more likely to issue public debt and hence require a rating (An and Chan, (2008), and Lui and Malatesta (2005)). Faulkender and Petersen (2006) and Lui and Malatesta (2005) find evidence in support of this.

The probit specifications in two studies also include instrumental variables (Faulkender and Petersen (2006) and An and Chan, (2008)). In the context of this work these are variables that are related to whether a firm has a credit rating but are not related to a firm's demand for debt (Faulkender and Petersen, (2006)). Faulkender and Petersen (2006) suggest that indicators of how well a firm is known or visible are good instruments. They argue that the more known a debt issuer is the easier it is for a bank to introduce the firm to the capital markets and therefore the more likely the firm will raise public debt and thus require a credit rating.[17] In this study we use three measures of firm visibility. These are: i) whether the firm is in the top 100 UK firms according to market capitalisation; ii) whether it is cross-listed in the United States, and iii) the level of foreign sales. Measures ii) and iii) require a little explanation. A firm that is cross-listed in the US is going to be visible to potential investors in the US capital markets, which includes the world's largest public debt market. A cross-listing in the US establishes name recognition of the firm in the US capital market, thus paving the way for the firm to source new equity or debt capital in this market. Therefore as well as promoting firm visibility we would argue that firms that are listed in the US are more likely to source the US capital markets for debt funding. Furthermore, since in order to source debt funds in the US firms require a rating from a recognised credit rating agency, we would expect cross-listed firms to more likely possess a credit rating.[18] In this study we use the existence of American Deposit Receipts (ADRs) as an indicator of having a listing on the US exchanges.

For our third measure we argue that firms that are selling into or producing in foreign markets are likely to be known by more investors and in particular foreign investors, and thus as before, introducing this type of firm to the market will be relatively easier and so making a debt issue, particularly in foreign capital markets, much more likely and therefore a credit rating more likely. We employ the percent of foreign sales and sales geographic dispersion as alternative measures of firm visibility. The latter measures the degree to which sales are spread geographically across four regions (UK, US, EU and rest of the world). Foreign sales geographic dispersion is constructed with the Hirshman-Herfindahl concentration index over all the regions that a firm operates in. It is calculated using the formula in equation 1.

[17] Faulkender and Petersen (2006) use whether a firm is in the S&P 500 and whether it trades on the NYSE as proxies for firm visibility and therefore as instrumental variables.

[18] Two formal credit ratings are required to issue a public bond in the US debt markets.

$$FX\ \text{Dispersion}_{\text{i}} = 1 - \sum_{j=1}^{n} \left[\frac{Sales_{j}}{\text{Total sales}_{\text{i}}} \right]^{2} \qquad \text{eq. 1}$$

Where n is the total number of regions that firm i operates in. The value for foreign sales dispersion is close to one if the firm has sales spread evenly across the four regions and a value of zero if the firm has sales in only one country.

In line with Faulkender and Petersen (2006) and An and Chan (2008) we include variables that measure the percentage of firms in a given industry with a credit rating and the age of the firm as additional instruments. If more firms in an industry have public debt and therefore a credit rating the easier it is for firms to issue public debt because the bond market possesses greater knowledge about this industry which lowers the costs of collecting information for a bond underwriting (Faulkender and Petersen, (2006)). Older firms are better known to financial institutions and other potential investors which might facilitate access to the debt capital markets. These firms may also have longer records of using the public debt market and therefore are more likely to have a credit rating (Faulkender and Petersen, (2006) and An and Chan, (2008)).

The first-stage probit results are presented in Table 12. Being in the top 100 firms and having an ADR are positively correlated with having a debt rating, and the relationship is statistically significant (Table 12, column II, p-value < 0.01). However, the economic impact of being included in the top 100 firms according to MV is slightly larger (raising the probability of having a bond rating by 25 percentage point (from 17% to 42%) than the economic impact of having ADRs (raising the probability of having a bond rating by 21 percentage point (from 18.8% to 39.5%). However, for a firm which is in the top 100 firms and has ADR, the probability of having a bond rating is 45 percent more than a firm which is not in the top 100 firms and with no ADRs.

Our results show that as more firms in a given industry have a bond rating, then the probability of a firm in that industry having a debt rating increases (see Table 12, column III). Raising the fraction of other firms in the same industry with a bond rating from 14% (25^{th} percentile) to 34% (75^{th} percentile) raises the probability of having a bond rating by 10 percentage points (from 17% to 27%). We also find that firms with greater foreign sales and a greater spread of foreign sales are more likely to have credit ratings (see Table 12, columns IV and V). Our instruments possess good statistical properties for an instrument. The results in Table 12 show that all of our instruments are highly significant and have the predicted sign. Furthermore we test for their strength and find that our instruments do not suffer from any weak instrumentation bias.

Our results show that larger and older firms are more likely to possess a credit rating. This is consistent with Faulkender and Petersen's (2006) results. However, they also find the same pattern for firms with more tangible assets and firms with less volatile assets. Our coefficient on asset tangibility is negative and not statistically significant. Although coefficients on size and firm age are statistically significant, the economic magnitude of these effects differs (see Table 12, column I). A decrease in a firm's asset volatility from the 75^{th} (17%) to the 25% (11%) raises the probability of having a bond rating by 5 percentage points (from 20.3% to

25.4 %).[19] We find that firm size has the largest economic impact. Increasing the MV of the firm's assets from the 25th to the 75th percentile raises the probability of having a credit rating by 39 percentage points (from 6% to 45%). This is consistent with a large fixed cost of issuing public bonds relative to bank debt as well as a minimum size for a public debt issue to be viable (Faulkender and Petersen, 2006).

We use Hansen's (1982) test of overidentifying restrictions to test the validity of the instruments. In unreported Hansen (1982) tests the p-values for the J statistics in the IV regressions are greater than 0.1 and therefore the null hypothesis of valid instruments is not rejected.

[INSERT TABLE 12 HERE]

5.2 Second Stage Regression Results

Table 13 reports the second stage results of the instrumental variables (IV) approach (columns II and III), the Heckman two-stage treatment effect model (columns IV and V) and the MLE two-equation treatment model (columns VI and VII). Unreported results confirm the existence of endogenous selection. In the first instance, the Hausman test based on the IV approach rejects the null of no endogeneity for the existence of credit ratings in the leverage regression at the 1% level. Second, the inverse Mills ratio from the two-stage treatment effect model is significant at the 1% level, which indicates the existence of selection bias. Third, the likelihood ratio test in the maximum likelihood estimation suggests that we can reject the null hypothesis that the two errors terms, are uncorrelated at the 1% level. This evidence suggests that unobservable firm characteristics affecting the firm's choice of having a credit rating also determine its leverage.

The first column of Table 13 contains OLS estimates (from Table 6 column V) for comparison, while the remaining columns are the second-stage estimates based on the first-stage estimation in the corresponding columns of Table 12 (columns II and III).[20] Instrumenting for having a bond rating increases the estimated coefficient from the original 0.11 to almost twice this figure (columns II, III, VIII and IX). The results for the treatment effect (columns IV and V) and maximum likelihood estimations (columns VI and VII) also show the credit rating coefficient to be in the region of 0.2. Overall, our results in columns II through to IX show that after controlling for potential endogeneity, having a credit rating increases firm leverage by around 20%.

[INSERT TABLE 13 HERE]

[19] To calculate estimated probability, we set all variables equal to their mean value except the variable of interest. We set the variable of interest equal to the 25th percentile of the distribution for all firm-years in the sample and calculate the cumulative probability of having a bond rating based on the model. Then we set the variable of interest to the 75th percentile and recalculate the cumulative probability.

[20] Following Faulkender and Petersen (2006), we use the predicted probability of first stage probit estimation as an instrument in the second stage of the estimation.

6. Conclusion

This paper examines the factors that are important in determining capital structure choices for a large sample of UK firms over an eight year period. To the best of our knowledge, this study is the first to consider the role bond market access has on influencing leverage levels in a UK setting. The current financial crises and the resulting lack of funding and liquidity in the global money and capital markets demonstrates that the availability of a diversified source of potential funding has never been more important.

We find that access to long-term bond markets as measured by the possession of a credit rating has an economically and statistically significant effect on the level of leverage for UK firms. Our results indicate that debt market access has a greater impact on leverage levels for UK firms than that observed for US firms. This difference might be in part due to differences in the composition of the samples employed in our study compared to that of Faulkender and Petersen (2006). Alternatively it might also be due to differences in the level of corporate disclosure between the UK and the US. It has been suggested that US companies have a relatively easy time raising money and enjoy a highly liquid capital market because the United States imposes fairly stringent disclosure laws. In the US the Securities and Exchange Commission (SEC) set the rules for corporate disclosure. These rules require substantial disclosure of financial information and regular reporting to the SEC. Thus, the US is a richer reporting environment with strong monitoring and regulation. Although reporting and disclosure standards in the UK are rigorous they are not as stringent as those in the US. In markets where their is less disclosure investors will be less willing to buy stock at higher prices, market liquidity is likely to be lower, and debt capital for corporate expansion will be more difficult to raise. Given that there is far greater corporate financial transparency in the US compared to the UK it follows that the additional financial information released to investors from having a rating is likely to be greater in the UK than the US. All else being equal this would result in greater debt access effects from having a rating in the UK.

Another explanation for the higher debt rating effect we find is that leverage levels on average in the UK are lower than those in the US. For example, Rajan and Zingales (1995) report that firms in the UK are "substantially less levered" than their counterparts in the US. It follows then that if UK firms are starting from a lower base the incremental impact on leverage of having a credit rating would be greater for UK than US firms.

In the current financial crises banks have significantly cut back on their holdings of debt and have also become less willing to lend to the corporate sector. Anecdotal evidence suggests that those firms that are heavily dependent on the banks for funding and who therefore find themselves financially constrained have not been able to fund all their profitable investment projects resulting in a significant diminution in firm value. However, those companies that have been able to successfully source debt funding during the current credit crisis, such as those with access to the public debt markets, should be in a strong position to fully exploit their current and future investment opportunities. It follows from this that the credit crisis might affect these two groups of firms differently, with financially constrained firms being

forced to cut back on value enhancing investment whereas those with access to the public debt markets not being greatly affected by the contraction in bank lending. If firms without a credit rating are financially constrained and the severity of this constraint is greater during the current funding crisis then it is possible that the possession of a credit rating, which provides access to the public debt markets, could give rise to a value premium during this period. Future research could exploit the current financial crisis to examine whether such a premium exists.

Finally, recent survey evidence suggests that the use of formal ratings is expected to grow substantially as previously unrated companies seek formal ratings. Whilst ratings are generally required for companies looking to raise funds in the public markets, the banks use ratings (calculated in-house if no external ratings are available) to calculate capital allocation required under Basel II regulations. A formal rating may help to make a firm a more attractive lending proposition for the bank. Future research could look into the role, if any, played by ratings in bank lending

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Appendix 1: Definition of Variables

Leverage

Leverage is measured as the ratio of the amount of debt relative to the firm's total assets. We calculate both market and book measures of leverage. We also use net debt, defined as total debt minus cash, to calculate net leverage. The formulas are:

MV Gross Leverage = Total Debt / (MV of Equity + Total Debt)

Net Leverage (MV) = Net Debt / (MV of Equity + Total Debt)

BV Gross Leverage = Total Debt / (BV of Equity + Total Debt)

Net Leverage (BV) = Net Debt / (BV of Equity + Total Debt)

Where MV stands for market value and BV stands for book value.

Firm Size

Firm size is measured by taking the natural log of the sum of total loan capital plus borrowings repayable within 1 year plus preference capital plus the market value of equity. We also employ total sales and market value of equity as additional proxies for firm size.

Firm Age

Firm age is defined as number of years since date of incorporation. Since it is expected that a one year difference in age is more important to the leverage of a young firm than to the leverage of an old (Cole (2008)) we take the natural log of one plus firm age.

Profitability

This study uses the return on invested capital (ROIC) as a measure of firm's profitability, which is calculated as follows:

$$ROIC = (Pre\text{-}tax\ Profit + Total\ Interest\ Charges) / Invested\ Capital$$

Where, *Invested Capital = Total Capital Employed + Borrowings Repayable within 1 year – Total Intangibles*

Asset Type

Several previous studies use the ratio of fixed assets (plant, property and equipment) to total assets as a measure of tangible assets (Faulkender and Petersen (2006), Rajan and Zingales (1995), Cole (2008)). In this study we follow Booth, Aivazian, Demirguc–Kunt and Maksimovic (2001) and define asset tangibility as total assets less current assets divided by total assets.

Growth Opportunities

Consistent with several previous studies (Faulkender and Petersen (2006), Graham (2000), Frank and Goyal (2007), Hovakimian, Kayhan, and Titman (2008)) we use a firm's expenditure on R&D scaled by total assets as a measure of firm's growth opportunities. We apply a log transformation to this variable. The capital structure literature has also used this variable to provide a measure of a firm's intangible assets. As an additional control for firms' intangible assets and growth opportunities we follow the literature and include the market-to-book value of equity ratio in our model specification (Rajan and Zingales (1995), Faulkender and Petersen (2006), Antoniou, Guney and Paudyal (2007)). Where the book value of equity is measured as equity capital and reserves (excluding preference capital) less goodwill and other intangibles. We also include capital expenditure scaled by total sales an as alternative measure of growth.

Tax-Shields Effects

As a measure of tax-shields effects we follow Booth, Aivazian, Demirguc–Kunt and Maksimovic (2001) and use the average tax ratio. This is calculated as the ratio of a firm's tax liability to taxable income.

Equity returns

Following Faulkender and Petersen (2006) a firm's equity return of the previous year is incorporated in the model to account for partial adjustment in the firm's debt-to-asset ratio. We define equity return as

$$Equity\ return = (Share\ Price_{\ end\ of\ the\ year} + Dividends) / Share\ Price_{\ beginning\ of\ the\ year}$$

Business Risk

We follow Faulkender and Petersen (2006) and use asset volatility as a proxy for business risk. Asset volatility of a firm is measured by multiplying the equity volatility of the firm (calculated over the previous year) by the equity-to-asset ratio.

Debt to Maturity

This study includes the fraction of the firm's debt that is due in one year or less and the fraction of the firm's debt that is due in more than five years as measures of short-term and long-term debt respectively.

Fraction of debt to maturing within 1 year = (Short-term Debt + Current Portion of Long-term Debt due within 1 year) / Total Debt

Where short-term debt = debt due within 1 year

Fraction of debt to maturing after 5 years = Debt Maturing after 5 years / Total Debt

Table 1: Summary of the key results from previous studies on credit rating and leverage.

Author	Country	Sample period	No of firms/ observations	Sample characteristics	Aim of Study	Credit rating impact on leverage/capital structure
Graham, Harvey (2001)	USA	Survey from Feb 1999	4,440 firms. 392 CFO responded, response rate of 9%.	All CFO from 1998 Fortune 500 list (both with credit rating and without one)	Examines capital budgeting, cost of capital and capital structure.	Credit rating is the 2nd most important factor affecting capital structure decisions following financial flexibility
Bancel, Mittoo (2002)	16 European countries	3 Questionnaires from Sep 2001, Nov 2001, Jan 2002	707 firms in population 87 respondents, response rate of 12.3%.	Firms that are representative of the European firms and are comparable across countries.	Examines how firms make their capital structure decisions and compares capital structures across countries	1. Credit rating is ranked as the 2nd most important determinant of debt 2. Credit rating is considered to be more important by European managers compared to US managers.
Servaes and Tufano (2006)	Global	2005	334 firms participated	Large listed and non-listed firms across the world	Examination of corporate financial policies	Credit rating considerations are the most important factor in determining the level of debt, with 57% of respondents ranking this factor as important or very important. Firms do not add more debt because they have reached their target and because this would lead to a drop in credit ratings.

Author	Country	Sample period	No of firms/ observations	Sample characteristics	Aim of Study	Credit rating impact on leverage/capital structure
Kisgen (2006)	USA	1987 - 2003	12,851 firm-years	All non-financial firms with a credit rating	Effect of changes in credit ratings on subsequent capital structure decisions	1. Credit rating downgrades lead to a reduction in firms' leverage; 2. Credit rating upgrades do not affect subsequent capital structure behavior
Faulkender and Petersen (2006)	**USA**	**1986–2000**	**63,272 firm-years**	**Non-financial firms with and without rating**	**Examine whether firms with access to public debt markets have are more highly levered**	**Firms that have access to the public bond markets, as measured by having a debt rating, have significantly more leverage (5 to 8% more)**
Tang (2006)	USA	Changes before and after April 1982 (yearly data covers1980-1983)	266 firms	Firms with Moody's credit rating	Examines Moody's 1982 credit rating refinement impact on firms' credit market access, financing decisions, and investment policies	Firms that are upgraded due to the refinement enjoy a greater amount of debt issuance compared to firms that are downgraded
Sufi (2006)	**USA**	**1990 -2004**	**3,453 firms (39,120 firm-years)**	**Non-financial firms with and without credit rating**	**Effect of syndicated bank loan rating on firm's financial and investment policy**	**Firms that obtain a loan rating experience increases in their leverage ratio**
Hovakimian, Kayhan, and Titman (2008)	USA	1985 - 2005	89,070 firm-years	Non-financial firms with and without rating	Examines how firms target their credit ratings	Below-target firms tend to decrease their leverage whereas above-target firms tend to increase their leverage

Author	Country	Sample period	No of firms/ observations	Sample characteristics	Aim of Study	Credit rating impact on leverage/capital structure
Byoun (2008)	USA	1971 - 2006	135,583 firm-years	Non-financial firms with and without rating	Effect of financial flexibility on firms' capital structure decisions	Negative relationship between credit rating and leverage ratio but non-rated firms have lower leverage ratios than rated firms.
Mittoo and Zhang (2008)	**Canada**	**1998-2002**	**1821 firm- years (592 Multinational firm-years 1229 Domestic firm-years**	**Non-financial firms with and without rating (excluding utility firms and firms with negative book value of assets or equity)**	**Examine the capital structure of Canadian MNCs.**	**Canadian firms with access to global bond market have 6% higher leverage than firms with no access.**

Table 2: Leverage by Bond Market Access (All-Firms Sample)

*The table reports summary statistics on firms' total debt ratios by whether they have access to the public debt markets. Whether the firm has a debt rating is used as a measure of whether it has access to the public debt markets. The sample is based on listed non-financial firms for the period between 1999 and 2006. *** indicates significance at 1% level.*

	N Valid	Mean	Percentiles 25	Median	Percentiles 75
Panel A: Market Values					
Gross Leverage					
Total sample	3189	21.20	3.55	17.19	33.25
Bond market access	860	26.91	10.96	23.63	39.00
No access	2329	19.09	1.43	13.90	31.28
Difference		7.81***	9.52	9.73	7.72
Net Leverage					
Total sample	3189	12.03	0.00	9.59	26.13
Bond market access	860	18.29	3.63	15.88	30.52
No access	2329	9.71	-1.78	7.24	24.03
Difference		8.58***	5.41	8.63	6.49
Panel B: Book Values					
Gross Leverage					
Total sample	2959	24.23	9.33	22.33	34.92
Bond market access	821	30.40	16.80	28.10	41.17
No access	2138	21.86	6.75	19.89	32.15
Difference		8.54***	10.06	8.22	9.02
Net Leverage					
Total sample	2957	11.36	-1.83	14.58	28.60
Bond market access	820	20.86	7.04	20.76	33.67
No access	2137	7.72	-6.78	11.80	26.65
Difference		13.14***	13.82	8.96	7.02

Table 3: Leverage by Bond Market Access (Sample of Firms with Positive Debt Only)

*The table reports summary statistics on firms' total debt ratios by whether they have access to the public debt markets. Whether the non-financial firm has a debt rating is used as a measure of whether it has access to the public debt markets. The sample is based on listed non-financial firms for the period between 1999 and 2006 and contains firms with positive debt only. *** indicates significance at 1% level.*

	N Valid	Mean	Percentiles 25	Median	Percentiles 75
Panel A: Market Values					
Gross Leverage					
Total Sample	2792	24.21	8.19	20.51	35.51
Bond market access	816	28.36	13.29	24.96	39.56
No access	1976	22.50	6.54	18.66	33.63
Difference		5.85***	6.75	6.30	5.93
Net Leverage					
Total Sample	2792	14.94	1.25	13.20	28.39
Bond market access	816	19.32	5.12	17.65	31.44
No access	1976	13.13	-0.34	11.24	27.16
Difference		6.19***	5.46	6.41	4.28
Panel B: Book Values					
Gross Leverage					
Total Sample	2776	25.83	12.22	23.72	36.09
Bond market access	816	30.59	16.94	28.40	41.19
No access	1960	23.84	10.10	21.75	33.79
Difference		6.75***	6.83	6.64	7.40
Net Leverage					
Total Sample	2775	14.87	2.30	16.30	29.52
Bond market access	815	21.03	7.25	20.87	33.74
No access	1960	12.30	-0.68	14.38	27.84
Difference		8.73***	7.93	6.50	5.90

Table 4. Summary Statistics of Firm Characteristics for Rated and Non-Rated Firms

*The table contains summary statistics (mean values) for the sample of firms with and without access to the public debt markets. Firms that have a debt rating are classified as having access; those without a bond rating are classified as having no access. The fifth column contains the difference in the means, followed by the t-statistic and the statistical significance of the difference. The table also reports the z-statistic for the Wilxocon-Rank-sum test (difference in median). The sample is based on listed non-financial firms for the period between 1999 and 2006. ***,**, * indicates statistical significance at 1% , 5%, and 10% level , respectively. R&D - research and development.*

	Mean values				**Difference in means t-test**			**Difference in medians Wilcoxon rank sum test**		
Dependent variable	**Access**	**N**	**No access**	**N**	**Mean diff.**	**t-stat**	**Sig. (2-tailed)**	**Access vs No access**	**z-stat**	**P-value**
1. Firm size										
Top 100 firms according to MV	0.68	862	0.09	2358	0.59***	34.85	**0.000**	C>NC	-34.34***	**0.000**
Log of market capitalisation	14.74	619	12.55	1652	2.19***	30.53	**0.000**	C>NC	-27.16***	**0.000**
Log of MV of assets	15.09	858	12.82	2306	2.27***	38.09	**0.000**	C>NC	-32.92***	**0.000**
Log of total sales	14.70	811	12.27	2154	2.43***	39.66	**0.000**	C>NC	-32.44***	**0.000**
2.Age										
Age of firm	46.69	862	35.53	2355	11.16***	8.34	**0.000**	C>NC	-7.71***	**0.000**
Log of (1+ firm age)	1.54	862	1.42	2355	0.11***	7.55	**0.000**	C>NC	-7.71***	**0.000**
3. Asset tangibility	0.38	821	0.31	2159	0.07***	6.17	**0.000**	C>NC	-6.85***	**0.000**
4. Growth										
R&D/sales	0.02	812	0.24	2154	-0.23***	-3.03	**0.002**	C<NC	-2.59***	**0.010**
R&D to assets	0.01	821	0.03	2159	-0.02***	-9.63	**0.000**	C<NC	-1.90*	**0.058**
Market to book value	9.82	830	12.68	2186	-2.85	-1.06	0.289	C<NC	-2.07**	**0.039**
Capital expenditure to sales	0.15	625	0.24	1635	-0.09***	-2.64	**0.008**	C<NC	-3.45***	**0.001**
5. American deposit receipts (ADR)	0.54	862	0.12	2358	0.42***	23.04	**0.000**	C>NC	-25.08***	**0.000**
6. Interest cover	9.38	862	15.93	2358	-6.54***	-7.56	**0.000**	C<NC	-1.77*	0.077

7. Profit										
Return to invested capital	0.12	806	0.05	2122	0.07***	4.12	**0.000**	C>NC	-5.52***	**0.000**
Pre-tax margin	0.08	630	0.05	1677	0.03***	4.63	**0.000**	C>NC	-4.01***	**0.000**
8. Stock return										
Stock return	0.03	854	0.03	2287	0.00	0.33	0.740	C>NC	-1.62	0.105
9. Volatility										
Standard deviation of asset returns	0.13	862	0.14	2358	-0.01***	-5.58	**0.000**	C<NC	-6.31***	**0.000**

Table 5. Maturity of Debt for Rated and Non-Rated Firms

*The table reports mean debt maturities for the sample of firms with and without access to the public debt markets. Firms that have a debt rating are classified as having access; those without a bond rating are classified as having no access. The fifth column contains the difference in the means, followed by the t-statistic and the statistical significance of the difference. The table also reports the z-statistic for the Wilxocon-Rank-sum test (difference in median). The sample is based on listed non-financial firms for the period between 1999 and 2006. ***,**, * indicates statistical significance at 1% , 5%, and 10% level , respectively.*

Debt to maturity	**Access**	**N**	**No access**	**N**	**Mean diff.**	**t-stat**	**Sig. (2-tailed)**	**Access vs No access**	**z-stat**	**P-value**
Debt maturity less than 1 year	0.26	817	0.35	1984	-0.08***	-7.21	**0.000**	C<NC	-2.88	**0.004**
Debt to maturity 1-2 years	0.13	489	0.17	1168	-0.03***	-3.22	**0.001**	C<NC	-0.32	0.745
Debt maturity between 1 and 5 years	0.37	591	0.41	1522	-0.04***	-2.84	**0.005**	C<NC	-1.99	**0.047**
Debt to maturity 2-5 years	0.28	494	0.37	1173	-0.09***	-6.50	**0.000**	C<NC	-4.24	**0.000**
Debt maturity after 5 years	0.32	499	0.21	1171	0.11***	7.38	**0.000**	C>NC	-8.83	**0.000**

Table 6. Determinants of Market Leverage: Firm Characteristics (All-Firms Sample)

*The dependent variable is the ratio of total debt to the market value (MV) of the firm's assets. The explanatory variables are defined in Appendix 1. The sample is based on listed non-financial firms for the period between 1999 and 2006. ***, **, * indicates statistical significance at 1% , 5%, and 10% level , respectively. R&D - research and development.*

	I	II	III	IV	V
Firm has a debt rating (1=yes)	0.1144***	0.1144***	0.1091***	0.1008***	0.1125***
	(0.0106)	(0.0106)	(0.0107)	(0.0120)	(0.0100)
Ln (Market assests)	-0.0348***	-0.0347***	-0.0360***	-0.0437***	-0.0456***
	(0.0036)	(0.0036)	(0.0036)	(0.0044)	(0.0035)
Ln (1+Firm age)	0.0460***	0.0458***	0.0404***	0.0348***	0.0310***
	(0.0091)	(0.0091)	(0.0092)	(0.0108)	(0.0086)
Return to invested capital	-0.0415	-0.0414	-0.0436	-0.1871 ***	-0.0410
	(0.0273)	(0.0273)	(0.0276)	(0.0425)	(0.0251)
Tangible assets	0.2437***	0.2439***	0.2507***	0.2081***	0.1981***
	(0.0129)	(0.0129)	(0.0127)	(0.0164)	(0.0126)
Market to book ratio	-0.0001**	-0.0001**	-0.0001*	-0.0003***	-0.0001
	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)
Log R&D/assets	-1.5331***	-1.5333***	-1.2200***	-1.7483***	-1.3083***
	(0.1306)	(0.1307)	(0.1306)	(0.2286)	(0.1741)
Average tax ratio		-0.0008	-0.0004		
		(0.0013)	(0.0014)		
Stock return previous year			-0.0425	-0.0391	-0.0369
			(0.0330)	(0.0387)	(0.0352)
σ (asset return)			-0.4997***	-0.4241***	-0.4174***
			(0.1078)	(0.1479)	(0.1252)
% of debt due in < 1 year				-0.1826***	
				(0.0149)	
% of debt due in > 5 years				0.0282	-0.1772***
				(0.0175)	(0.0103)
# of Observations	2773	2770	2763	1473	2603
R^2	0.2789	0.2792	0.3002	0.4101	0.3634

Table 7. Determinants of Market Leverage: Firm Characteristics (Sample of Firms with Positive Debt Only)

*The dependent variable is the ratio of total debt to the market value (MV) of the firm's assets. The explanatory variables are defined in Appendix 1. The sample is based on listed non-financial firms for the period between 1999 and 2006 and contains firm with positive debt only. ***, **, * indicates statistical significance at 1% , 5%, and 10% level , respectively. R&D - research and development.*

	I	II	III	IV
Firm has a debt rating (1=yes)	0.1165***	0.1165***	0.1130***	0.1022***
	(0.0104)	(0.0104)	(0.0106)	(0.0121)
Ln (Market assets)	-0.0412***	-0.0411***	-0.0413***	-0.0442***
	(0.0036)	(0.0036)	(0.0036)	(0.0044)
Ln (1+Firm age)	0.0352***	0.0350***	0.0327***	0.0363 ***
	(0.0091)	(0.0091)	(0.0092)	(0.0108)
Return to invested capital	-0.0368	-0.0367	-0.0391	-0.1862***
	(0.0256)	(0.0256)	(0.0262)	(0.0430)
Tangible assets	0.2372***	0.2373***	0.2438***	0.2101***
	(0.0129)	(0.0129)	(0.0129)	(0.0164)
Market to book ratio	-0.0002**	-0.0002**	-0.0002**	-0.0001
	(0.0001)	(0.0001)	(0.0000)	(0.0001)
Log R&D/assets	-1.6426***	-1.6437***	-1.4717***	-1.7216***
	(0.1654)	(0.1656)	(0.1685)	(0.2299)
Average tax ratio		-0.0004	-0.0002	
		(0.0014)	(0.0014)	
Stock return previous year			-0.0459	-0.0454
			(0.0337)	(0.0388)
σ (asset return)			-0.3407***	-0.4142***
			(0.1140)	(0.1492)
% of debt due in < 1 year				-0.1826***
				(0.0151)
% of debt due in > 5 years				0.0271
				(0.0176)
# of Observations	2602	2599	2594	1469
R^2	0.2796	0.2799	0.2887	0.4062

Table 8. Determinants of Market Leverage Panel Data Estimation (Sample of Firms with Positive Debt Only)

*The dependent variable is the ratio of total debt to the market value (MV) of the firm's assets. The explanatory variables are defined in Appendix 1. The sample is based on listed non-financial firms for the period between 1999 and 2006 and contains firm with positive debt only. Column I—within industry estimates. Column II—within firm estimates. ***, **, * indicates statistical significance at 1% , 5%, and 10% level , respectively. R&D - research and development.*

	I	II
Firm has a debt rating (1=yes)	0.1126***	0.2049***
	(0.0098)	(0.0154)
Ln (Market assets)	-0.0466***	-0.0936***
	(0.0035)	(0.0031)
Ln (1+Firm age)	0.0370***	0.0727***
	(0.0089)	(0.0175)
Return to invested capital	-0.0423*	-0.0232***
	(0.0229)	(0.0053)
Tangible assets	0.1022***	0.1763***
	(0.0154)	(0.0180)
Market to book ratio	-0.0001	0.0000
	(0.0001)	(0.0000)
Log R&D/assets	-0.8830***	-1.4081***
	(0.1980)	(0.1903)
Stock return previous year	-0.0336	-0.0293*
	(0.0339)	(0.0150)
σ (asset return)	-0.4183***	-0.1603**
	(0.1203)	(0.0453)
% of debt due in < 1 year	-0.1566***	-0.0809***
	(0.0105)	(0.0081)
# of Observations	2597	2597
R^2	0.4116	0.2543
Controls	Industry	Firm
Estimation method	Within	Within

Table 9. Determinants of Interest Coverage: Firm Characteristics (Pooled Data for All-Firms Sample)

*The dependent variable is the natural log of 1 plus the interest coverage ratio. Interest coverage is operating earnings before depreciation divided by interest expense. The dependent variable is re-coded to zero for observations with negative earnings; the model is then estimated as a tobit with a lower limit of zero (which corresponds to interest coverage of zero), except in column V. In column V, we used a lower limit of –0.69 which corresponds to interest coverage of –0.5 [–0.69 = Ln(1 – 0.5)]. The explanatory variables are defined in Appendix 1. The percent of observations that are censored also are reported in the table. White heteroscedastic consistent errors are reported in parentheses. All models also include year dummy variables and a dummy variable for the regulated utility industries (water, gas, electric and telecoms). The sample is based on listed non-financial firms for the period between 1999 and 2006. ***, **, * indicates statistical significance at 1% , 5%, and 10% level , respectively. R&D - research and development.*

	I	II	III	IV	V
Firm has a debt rating (1=yes)	-0.7987***	-0.7972***	-0.7874***	-0.4806***	-0.6421***
	(0.0840)	(0.0840)	(0.0840)	(0.0766)	(0.0720)
Ln (Market assets)	0.3155***	0.3133***	0.3106***	0.1631***	0.2786***
	(0.0243)	(0.0243)	(0.0244)	(0.0236)	(0.0212)
Ln (1+Firm age)	0.0188	0.0238	0.0066	0.0797	0.0437
	(0.0855)	(0.0855)	(0.0856)	(0.0761)	(0.0737)
Return to invested capital	0.8407***	0.8388***	0.8548***	4.4458***	0.7448***
	(0.0768)	(0.0768)	(0.0768))	(0.2133)	(0.0658)
Tangible assets	-0.3524***	-0.3540***	-0.3168***	0.0275	-0.4483***
	(0.1104)	(0.1103)	(0.1112)	(0.1052)	(0.0963)
Market to book ratio	-0.0002	-0.0002	-0.0003	-0.0001	-0.0000
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)
Log R&D/assets	-6.1443***	-6.0853***	-6.2757***	-3.5619**	-3.3255**
	(1.4318)	(1.4294)	(1.4674)	(1.7881)	(1.4601)
Average tax ratio		0.0354*			
		(0.0189)			
Stock return previous year			0.7147***	0.3451	0.5877***
			(0.2384)	(0.2466)	(0.2080)
σ (asset return)			0.4977	2.0976***	1.0196**
			(0.5577)	(0.5711)	(0.5191)
% of debt due in < 1 year				1.0690***	
				(0.0997)	
% of debt due in > 5 years				0.0144	
				(0.1060)	
# of Observations	2773	2770	2766	1473	2597
R^2	0.0594	0.0597	0.0602	0.1745	0.0661

Table 10. Determinants of Interest Coverage: Firm Characteristics (Pooled Data for Firms with Positive Debt Only)

*The dependent variable is the natural log of 1 plus the interest coverage ratio. Interest coverage is operating earnings before depreciation divided by interest expense. The dependent variable is re-coded to zero for observations with negative earnings; the model is then estimated as a tobit with a lower limit of zero (which corresponds to interest coverage of zero), except in column V. In column V, we used a lower limit of –0.69 which corresponds to interest coverage of –0.5 [–0.69 = Ln(1 – 0.5)]. The explanatory variables are defined in Appendix 1. The percent of observations that are censored also are reported in the table. White heteroscedastic consistent errors are reported in parentheses. All models also include year dummy variables and a dummy variable for the regulated utility industries (water, gas, electric and telecoms). The sample is based on listed non-financial firms for the period between 1999 and 2006 and contains firms only with positive debt. ***, **, * indicates statistical significance at 1% , 5%, and 10% level , respectively. R&D - research and development.*

	I	II	III	IV	V
Firm has a debt rating (1=yes)	-0.6543***	-0.6528***	-0.6421***	-0.4771***	-0.5054***
	(0.0720)	(0.0720)	(0.0720)	(0.0762)	(0.0612)
Ln (Market assets)	0.2820***	0.2799***	0.2786***	0.1634***	0.2076***
	(0.0212)	(0.0212)	(0.0212)	(0.0236)	(0.0177)
Ln (1+Firm age)	0.0260	0.0210	0.0437	0.0764	0.0210
	(0.0737)	(0.0737)	(0.0737)	(0.0758)	(0.0633)
Return to invested capital	0.7281***	0.7261***	0.7448***	4.4113***	0.5890***
	(0.0658)	(0.0658)	(0.0658)	(0.2145)	(0.0556)
Tangible assets	-0.4550***	-0.4566***	-0.4483***	0.0305	-0.5097***
	(0.0951)	(0.0950)	(0.0963)	(0.1046)	(0.0827)
Market to book ratio	-0.0001	0.0001	0.00001	-0.0001	0.0001
	(0.0005)	(0.0005)	(0.0005)	(0.0004)	(0.0004)
Log R&D/assets	-3.0861***	-3.0056**	-3.3255**	-3.3390*	-0.5753
	(1.4487)	(1.4457)	(1.4601)	(1.7836)	(1.1350)
Average tax ratio		0.0314**			
		(0.0158)			
Stock return previous year			0.5877***	0.3362	0.4125**
			(0.2080)	(0.2453)	(0.1755)
σ (asset return)			1.0196*	2.1285***	1.1195***
			(0.5191)	(0.5734)	(0.4252)
% of debt due in < 1 year				1.0628***	
				(0.0996)	
% of debt due in > 5 years				-0.0122	
				(0.1056)	
# of Observations	2602	2599	2795	1469	2597
R^2	0.0648	0.0652	0.0520	0.1735	0.0561

Table 11. Determinants of Interest Coverage: Firm Characteristics (for Firms with Positive Debt Only)

*The dependent variable is the natural log of 1 plus the interest coverage ratio. Interest coverage is operating earnings before depreciation divided by interest expense. The dependent variable is re-coded to zero for observations with negative earnings; the model is then estimated as a tobit with a lower limit of zero (which corresponds to interest coverage of zero), except in column V. In column V, we used a lower limit of –0.69 which corresponds to interest coverage of –0.5 [–0.69 = Ln(1 – 0.5)]. The explanatory variables are defined in Appendix 1. The percent of observations that are censored also are reported in the table. White heteroscedastic consistent errors are reported in parentheses. All models also include year dummy variables and a dummy variable for the regulated utility industries (water, gas, electric and telecoms). The sample is based on listed non-financial firms for the period between 1999 and 2006 and contains firms only with positive debt. ***, **, * indicates statistical significance at 1% , 5%, and 10% level , respectively. R&D - research and development.*

	I	II	III	IV	V
Firm has a debt rating (1=yes)	-0.9125***	-0.9055***	-0.9092***	-0.5669***	-0.7409***
	(0.1304)	(0.1302)	(0.1304)	(0.1198)	(0.1112)
Ln (Market assets)	0.4267***	0.4226***	0.4182***	0.2398***	0.3181***
	(0.0315)	(0.0315)	(0.0315)	(0.0331)	(0.0258)
Ln (1+Firm age)	-0.0889	-0.0858	-0.0452	0.1152	-0.0643
	(0.1443)	(0.1441)	(0.1448)	(0.1260)	(0.1237)
Return to invested capital	0.5190***	0.5173***	0.5292***	2.9724***	0.4153***
	(0.0554)	(0.0553)	(0.0554)	(0.1917)	(0.0467)
Tangible assets	-0.2845*	-0.2875*	-0.2590	-0.0347	-0.3162**
	(0.1607)	(0.1605)	(0.1610)	(0.1531)	(0.1376)
Market to book ratio	-0.0001	-0.0001	-0.0001	0.0000	-0.0000
	(0.0004)	(0.0004)	(0.0004)	(0.0003)	(0.0003)
Log R&D/assets	-2.9985	-2.9895	-3.2808	-2.1476	0.0148
	(2.0366)	(2.0330)	(2.0526)	(2.4739)	(1.5109)
Average tax ratio		0.0164			
		(0.0114)			
Stock return previous year			0.3503**	0.0715	0.2622**
			(0.1575)	(0.1928)	(0.1332)
σ (asset return)			0.8210*	1.0896*	0.7424*
			(0.4774)	(0.5699)	(0.3965)
% of debt due in < 1 year				0.7552***	
				(0.0981)	
% of debt due in > 5 years				0.0753	
				(0.0922)	
# of Observations	2602	2599	2597	1469	2597
R^2	0.0511	0.0514	0.0520	0.1645	0.0755

Table 12. Determinants of Bond Market Access (First Stage of Instrumental Variable Regression)

*The table contains estimates from a probit model where the dependent variable is whether the firm has a bond rating (access to the public debt markets). The explanatory variables are defined in Appendix 1. Positive coefficients imply that increases in the variable are associated with a higher probability of a bond rating. White heteroscedastic consistent errors are reported in parentheses. The Pseudo-R^2 is the log-likelihood of the maximum likelihood minus the log-likelihood when only the constant is included. The instruments are (i) whether the firm is in the Top 100 according to market value [MV] (0 or 1); (ii) whether the firm's has ADRs (0 or 1); (iii) proportion of firms in an industry with a rating; (iv) percentage of foreign sales (foreign sales dispersion). All specifications include year fixed effects and a dummy for the utility sector. The sample is based on listed non-financial firms for the period between 1999 and 2006. Since we include the debt maturity variable in all specifications the sample effectively excludes firms with zero debt. ***, **, * indicates statistical significance at 1% , 5%, and 10% level , respectively. R&D - research and development.*

	I	II	III	IV	V
Top 100 firms according to MV		0.7151***	0.7382***	0.6431***	0.6393***
		(0.1221)	(0.1217)	(0.1165)	(0.1165)
American deposit receipts		0.6256***	0.5937***	0.5266***	0.5276***
		(0.0816)	(0.0826)	(0.0877)	(0.0863)
Proportion of firms in industry with a rating			1.5986***	1.8276***	1.8393***
			(0.2414)	(0.2588)	(0.2593)
Foreign sales (col. IV) Foreign sales dispersion (col. V)				0.0023**	0.4343***
				(0.0011)	(0.1399)
Ln (Market assets)	0.6925***	0.3928***	0.3611***	0.4032***	0.4023***
	(0.0350)	(0.0516)	(0.0512)	(0.0442)	(0.0442)
Ln (1+Firm age)	0.2376***	0.1620*	0.2196**	0.2148**	0.2042**
	(0.0857)	(0.0893)	(0.0915)	(0.1007)	(0.1001)
Return to invested capital	0.0178	0.0454	0.0043	0.0215	0.0176
	(0.1319)	(0.1028)	(0.0908)	(0.0768)	(0.0772)
Tangible assets	-0.0814	0.0201	-0.1458	-0.1504	-0.1282
	(0.1145)	(0.1157)	(0.1216)	(0.1357)	(0.1361)
Market to book ratio	-0.0002	-0.0002	-0.0001	0.00002	0.00002
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
σ (asset return)	-2.4819***	-2.8694***	-2.2660***	-1.9758**	-1.7590**
	(0.9372)	(0.8636)	(0.8641)	(0.8164)	(0.8239)
Log R&D/assets	-6.2745**	-9.4367***	-5.9237**	-6.4656**	-7.2084**
	(3.4235)	(3.7319)	(2.939)	(2.9806)	(3.0611)
Stock return previous year	-0.2269	-0.1609	-0.0857	-0.3705	-0.3681
	(0.4155)	(0.3751)	(0.3854)	(0.3034)	(0.3040)

% of debt due in < 1 year	-0.0214	-0.0892	-0.1267	-0.1739	-0.1861
	(0.1164)	(0.1126)	(0.1126)	(0.1256)	(0.1257)
# of Observations	2603	2603	2603	2475	2473
Pseudo R^2	0.3724	0.4082	0.4224	0.4228	0.4275

Table 13. Determinants of Market Leverage (Second Stage of Instrumental Variable Regression, Heckman Two Step and MLE):

*This table reports results of regressions of leverage on a credit rating dummy and control variables. The dependent variable is the ratio of total debt to the market value (MV) of the firm's assets. The explanatory variables are defined in Appendix 1. Three estimation procedures are employed: IV approach, Heckman two-stage treatment effect model and MLE. The table contains second stage estimates, except for column I. In column I, the OLS estimates from Table 6, column V are reproduced. The instruments used in each estimation procedure are the ones used in columns II–V of Table 12. The instruments are (i) whether the firm is in the Top 100 according to MV (0 or 1); (ii) whether the firm's has ADRs (0 or 1); (iii) proportion of firms in an industry with a rating; (iv) percentage of foreign sales (foreign sales dispersion). All specifications include year fixed effects and a dummy for the utility sector. White heteroscedastic consistent errors are reported in parentheses. The sample is based on listed non-financial firms for the period between 1999 and 2006. Since we include the debt maturity variable in all specifications the sample effectively excludes firms with zero debt. ***, **, * indicates statistical significance at 1% , 5%, and 10% level , respectively. R&D - research and development.*

	I	II	III	IV	V	VI	VII	VIII	IX
Firm has a debt rating (1=yes)	0.1125***	0.2038***	0.1963***	0.2236***	0.2059***	0.2130***	0.2059***	0.2002***	0.2008***
	(0.0100)	(0.0269)	(0.0248)	(0.0214)	(0.0218)	(0.0223)	(0.0218)	(0.0201)	(0.0200)
Ln (Market assests)	-0.0456***	-0.0609***	-0.0597***	-0.0645***	-0.0605***	-0.0627***	-0.0605***	-0.0605***	-0.0606***
	(0.0035)	(0.0059)	(0.0056)	(0.0041)	(0.0039)	(0.0051)	(0.0039)	(0.0039)	(0.0039)
Ln (1+Firm age)	0.0310***	0.0251***	0.0255***	0.0289***	0.0283***	0.0303***	0.0283***	0.0264***	0.0262***
	(0.0086)	(0.0087)	(0.0087)	(0.0009)	(0.0090)	(0.0089)	(0.0090)	(0.0090)	(0.0090)
Return to invested capital	-0.0410	-0.0381*	-0.0383*	-0.0379***	-0.0388***	-0.0383*	-0.0388***	-0.0365***	-0.0364***
	(0.0251)	(0.0222)	(0.0224)	(0.0076)	(0.0075)	(0.0198)	(0.0075)	(0.0078)	(0.0078)
Tangible assets	0.1981***	0.1993***	0.1992***	0.1071***	0.1100***	0.1077***	0.1100***	0.1900***	0.1901***
	(0.0126)	(0.0129)	(0.0128)	(0.0137)	(0.0136)	(0.0156)	(0.0136)	(0.0121)	(0.0121)
Market to book ratio	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001	-0.0001*	-0.0001*
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.000056)	(0.000056)
Ln R&D/assets	-1.3083***	-1.3479***	-1.3446***	-0.9379***	-0.9477***	-0.9453***	-0.9477***	-1.3200***	-1.3196***
	(0.1741)	(0.1658)	(0.1661)	(0.1687)	(0.1672)	(0.1847)	(0.1672)	(0.1590)	(0.1591)
Stock return previous year	-0.0369	-0.0293	-0.0300	-0.0259	-0.0291	-0.0264	-0.0291	-0.0164	-0.0164
	(0.0352)	(0.0350)	(0.0349)	(0.0239)	(0.0237)	(0.0338)	(0.0237)	(0.0252)	(0.0252)
σ (asset return)	-0.4174***	-0.3822***	-0.3851***	-0.3867***	-0.4047***	-0.3905***	-0.4047***	-0.3733***	-0.3732***
	(0.1252)	(0.1213)	(0.1213)	(0.0586)	(0.0578)	(0.1148)	(0.0578)	(0.0599)	(0.0599)
% of debt due in < 1 year	-0.1772***	-0.1774***	-0.1774***	-0.1547***	-0.1569***	-0.1551***	-0.1569***	-0.1780***	-0.1780***
	(0.0103)	(0.0103)	(0.0103)	(0.0104)	(0.0099)	(0.0105)	(0.0099)	(0.0106)	(0.0106)
# of Observations	2603	2603	2603	2603	2603	2603	2603	2475	2473
R^2	0.3634	0.3340	0.3386					0.2999	0.3003
Estimation method	OLS	IV	IV	Heckman 2-	Heckman 2-	MLE	MLE	IV	IV
Corresponding col. in Table 12		(col II)	(col III)	stage (col II)	stage (col III)	(col II)	(col III)	(col IV)	(col V)