The Role of Credit Ratings in the Dynamic Tradeoff Model

Viktoriya Staneva*

This study examines what costs and benefits of debt are most important to the determination of the optimal capital structure. Prior literature has identified a set of variables that help explain the variation in observed leverage ratios. In the context of the dynamic tradeoff model, where firms do not immediately adjust to their target leverage ratio due to the presence of adjustment costs, some factors will inform the optimal capital structure, while others will cause firms to deviate from it. To isolate the variation in leverage due to differences in the target from that caused by deviations, I aggregate the data across a dimension that is likely to identify firms with similar targets – credit rating category. Estimating the traditional leverage regression on the aggregated data reveals size, profitability and tangibility as the most important proxies for the determinants of the target debt ratio. However, in contrast to theoretical priors, large and profitable firms have lower targets. Further analysis shows that size and profitability proxy for firms with lower non-financial risk and the benefits of a better credit rating outweigh the costs of foregone tax shields for those firms. Furthermore, while all firm characteristics are highly significant in the traditional leverage regression, they can only jointly explain about 20% of the variation in debt ratios across firms. On the other hand, the heterogeneity in leverage across rating categories is to a much larger extent determined by our proxies as the explanatory power of the model rises to close to 90% in that dataset.

*Paul College of Business and Economics, University of New Hampshire, 10 Garrison Ave, Durham, NH 03824. Tel: (718) 210-7180; e-mail: viktoriya.staneva@unh.edu

I. Introduction

What lies behind the heterogeneity in observed capital structure choices across firms has been the topic of investigation of a myriad of studies in the corporate finance literature. Following the seminal work of Modigliani and Miller (1958), different theories of capital structure have been developed and tested. The static tradeoff model argues that observed leverage ratios are the result of firms trading off the tax benefits against the bankruptcy costs of debt financing. Empirical tests of this theory rely mainly on the association between leverage ratios and various firm characteristics and find that it is not fully consistent with firm behavior. To account for those inconsistencies, the literature has advanced a dynamic version of the tradeoff model where firms face significant recapitalization costs. The dynamic model allows for short term deviations from the optimal capital structure position with firms adjusting to target only when the value lost due to being off-target becomes higher than the costs incurred in recapitalization. Empirical evidence suggests that firms actively manage their debt ratios to maintain an optimal leverage (Graham and Harvey, 2001; Hovakimian, Opler, and Titman, 2001; Leary and Roberts, 2005; Flannery and Rangan, 2006).

Other dynamic views of capital structure have also emerged in an attempt to account for the empirical failures of the static tradeoff model. Pecking order theory (Myers, 1984; Shyam-Sunder and Myers, 1999) claims that firms face adverse selection costs of security issuance and thus prefer internal to external financing, as well as debt to equity financing when raising capital is necessary. Baker and Wurgler (2002) argue that observed leverage ratios are the result of managers' efforts to time the market. While both theories can account for certain patterns in the data, neither provides a comprehensive explanation for the observed capital structure choices of the firm, and both pecking order and market timing have faced criticism in the literature.[1] As Graham and Leary (2011) point out in their review of the empirical capital structure literature: "Any decision that a company makes can be viewed as trading off some costs and benefits. A broad enough interpretation of the tradeoff theory may then be impossible to reject. In our view, the real question is which economic forces are most important to capital structure choices."

The goal of the present study is to identify the main determinants of the optimal capital structure by reexamining the interpretation of the conventional set of explanatory variables used as proxies for the costs and benefits of debt in the context of the dynamic tradeoff theory. In the presence of significant adjustment costs, the firm's leverage ratio at any point in time is comprised of the sum of its target and the deviation from the target which has not been offset. As such, some of the explanatory variables in the traditional leverage regression will derive their significance from determining the optimal leverage and others from driving the deviation. In this study, I employ an empirical approach designed to distinguish between those two types of variables and, in doing so, address the question posed by Graham and Leary (2011).

Prior studies compare the theoretical implications of the tradeoff model to the observed correlation between leverage and the firm-level proxies to differentiate the determinants of the target from those causing the deviation. In contrast, my empirical approach aims to eliminate the cross-sectional variation in leverage that is due to the deviation by aggregating the data across a dimension identifying firms with similar targets. Estimating the traditional leverage regression on the aggregated data will provide a test of the theoretical priors and further our understanding of the costs and benefits of debt financing. I investigate two possible candidates for aggregation, industry classification and credit rating category, and find that firms with the same rating are more

[1] See e.g. Frank and Goyal (2003), Fama and French (2005), Alti (2006), Hovakimian (2006).

likely to have similar targets than firms in the same industry. Then, I examine the determinants of the variation in leverage across rating categories and find that, in contrast to the predictions of tradeoff theory, large and profitable firms with lower operating risk have lower optimal debt ratios. I also observe that, while firm characteristics can only explain approximately one fifth of the variation in leverage in the firm-year panel, they account for close to 90% of the cross-rating variation, with size and profitability being the most important determinants.

I propose an explanation for the puzzling correlation between the optimal debt ratio and firm characteristics that adds credit rating considerations to the traditional tax benefits and bankruptcy costs of debt financing. More specifically, I argue that the set of explanatory variables in the leverage regression also proxy for the non-financial risk of the firm and that rated firms with lower non-financial risk derive a benefit from limiting the use of debt in their capital structure to improve their credit rating which causes a positive correlation between target leverage and non-financial risk. Regressions of credit rating on leverage and the control variables reveal that large and profitable firms with lower operating risk are assigned better credit ratings for any level of debt and, thus, have lower non-financial risk. If those firms derive the largest benefit from being highly rated, then we could observe the negative effect of size and profitability (and positive effect of operating risk) on leverage.

As an additional test of the proposed explanation, I study the effect of non-financial risk on the financing choices of firms without a credit rating. Since the credit rating benefit is only derived by rated firm, I expect unrated firms with higher non-financial risk to have lower leverage as postulated by the traditional tradeoff theory. I derive a proxy for non-financial risk as the fitted value from the regression of ratings on leverage and firm characteristics, subtracting the effect of leverage. Confirming the implications of the proposed theory, I show that the measure of non-financial risk is strongly positively correlated to leverage in the sample of firms with credit rating while this is not the case among unrated firms.

The rest of this paper is organized as follows. Section II describes the data and empirical strategy. Section III presents the results and implications of leverage regressions in the data aggregated by credit rating and year. Section IV compares the relation between non-financial risk and leverage in the rated sample to that of the unrated sample and Section V concludes.

II. Data and empirical strategy

The estimation of the firm's unobserved target is a central issue in the literature that aims to test the validity of the dynamic tradeoff theory.[2] To arrive at a proxy for the optimal debt ratio, most studies utilize the fitted value from a regression of observed leverage on a set of firm characteristics that are believed to capture the costs and benefits of debt financing as postulated by the theory. Hovakimian et.al. (2001) first regress leverage on the conventional set of variables identified as important determinants of capital structure and then exclude the ones whose coefficient has a sign that is inconsistent with theoretical predictions from the estimation of the target as those variables are assumed to proxy for the deviation from the target instead. For example, more profitable firms are likely to have more valuable assets in place and to gain more from the tax shields provided by debt financing, resulting in a higher target. On the other hand, profitability could also be related to the deviation from the target if firms passively accumulate retained earning when they are profitable. Since the coefficient on profitability is negative in the leverage regression, the variable has been assumed to proxy for the deviation. However, it is also

[2] See Hovakimian, Opler, and Titman (2001), Hovakimian and Li (2011), Fama and French (2002), Flannery and Rangan (2006), Huang and Ritter (2009), Kayhan and Titman (2007), among others.

possible for profitability to be related to an omitted variable that is negatively related to the target. I allow for that possibility by taking a different approach to the estimation of the unobserved target that allows us to reexamine the interpretation of the conventional set of firm characteristics as determinants of the optimal capital structure.

In particular, the empirical strategy employed in this study aims to isolate the cross-sectional variation in leverage that is due to differences in the target from the variation caused by deviations by aggregating the data across a dimension that identifies firms with similar targets. As firms in each target group will be either above or below their optimal leverage ratio due to adjustment costs, this deviation will cancel out in the calculation of the average(median) leverage and provide an estimate of the target debt ratio for that group. Estimating the traditional leverage regression on the aggregated data should provide us with a better understanding of how the independent variables relate to the optimal capital structure choice.

The literature identifies two candidates for classifying firms with similar targets - industry classification and credit rating category. Firms in the same business environment (industry) are subject to similar market frictions and, thus, are likely to face similar trade-offs when it comes to capital structure decisions. Prior studies have shown that industry leverage is one of the most important variables in the traditional leverage regression (Rauh and Sufi, 2012; Lemmon, Roberts, and Zender, 2008) and that firms adjust towards the industry median when making the choice between debt and equity issuance (Hovakimian et. al., 2001).

Aggregating the data based on credit rating category could also provide us with an estimate of the firm's target as evidence suggests that firms consider their target rating in the capital structure determination process (Graham and Harvey, 2001; Kisgen, 2006; Kisgen, 2009). As a measure of the probability of default, credit ratings play an important role in the investment and financing choices of the firm by affecting its cost of capital, investor base, and access to external financing. As firms balance the costs and benefits of debt financing they will choose a capital structure and, thus, probability of default that maximizes value. While shocks could drive leverage above or below the optimal ratio, if the deviation becomes significant enough to cause a downgrade or an upgrade, the firm will adjust leverage to remain within its target rating. However, we should note that firms with different targets can, theoretically, end up in the same rating category. For example, a firm with high non-financial (asset) risk and low leverage and a firm with low non-financial (asset) risk and high leverage could get the same credit rating. Then, we would observe little variation in the average leverage across ratings and aggregating the data across rating categories would not provide us with a meaningful measure of the target. It is an empirical question whether industry or rating classification is more likely to identify firms with similar targets.

The data for this study comes from Standard and Poor's Compustat database which provides annual firm-level financial statement data and the stock return data is gathered from CRSP. I require nonmissing values for all relevant variables and exclude financial firms (primary one digit SIC code of 6) as well as those with values of total assets or sales less than one million dollars from the sample. To mitigate the effect of outliers and incorrectly recorded data, I limit the range of the debt ratio to the [0,1] interval, and trim all other ratios at the top one percent and, if the variable takes on negative values, bottom one percent as well. Firms are aggregated on the industry level based on Fama and French's 49 industry classification. The credit rating category is S&P long-term issuer rating converted into numerical scale with AAA =16 and CCC=1. I pool together CCC-, CCC, and CCC+ rated firms into the lowest rating category and drop the firms with ratings indicating default. I also combine AAA and AA into the highest category, 16, as there are few firms in those two rating groups. The final dataset covers the period from 1985 to 2015 and consists of 21,443 observations for firms with credit rating and 67,024 observations for unrated firms.

The analysis presented in this study is based on the firm's book leverage ratio, *BLev,* which is the sum of long-term and short-term debt, divided by total assets.[3] The selection of the explanatory variables is informed by prior studies and includes the conventional set of firm characteristics that have been shown to be among the most reliable leverage determinants. In particular, I use the following: *Size*, measured as the natural logarithm of the inflation adjusted level of sales; *M/B*, defined as the ratio of market value of assets to total assets; *Tangibility,* which is the ratio of net property, plant and equipment to total assets; *Profitability,* calculated as operating income before depreciation to total assets; *R&D,* defined as R&D expense divided by sales; *R&D dummy*, an indicator variable equal to one when *R&D* is not missing; *Expense*, which is selling, general and administrative expense divided by sales; *Age*, measured as the natural log of the age of the firm on Compustat; and *Operating Risk*, which is the standard deviation of profitability over the past four or five years.

I begin the empirical analysis by investigating whether industry or credit rating classification is more likely to identify firms with similar targets. If we group together firms with the same optimal capital structure, we expect the variation in leverage within each group to be lower than it is in the full sample and we expect the variation in the average(median) leverage across groups to be significant. In Table I, I compare the within- and across-group variation in leverage based on either rating or industry classification. The within-rating variation in leverage is

[3] Focusing on book leverage is justified given the survey by Graham and Harvey (2001) who report that executives focus on book values when determining the capital structure of the firm. Furthermore, Barclay, Morellec, and Smith (2006) show how book leverage is theoretically preferable in regressions of financial leverage, arguing that using market values in the denominator might spuriously correlate with explanatory variables such as Tobin's q.

lower than the within-industry variation, while the standard deviation of the average (median) leverage across ratings is higher than it is across industries. Furthermore, in Table II, I compare the explanatory power of rating fixed effects to that of industry fixed effects. In column 1, I estimate a regression of leverage on the set of firm characteristics described above and find that only 21% of the variation is explained by those variables. Rating fixed effects by themselves account for 30% of the variation in leverage (column 2) and add 13% to the adjusted R-squared when added to the control variables (column 4). Industry fixed effects, on the other hand, only explain 13% of the variation in leverage by themselves (column 3) and increase the adjusted R-squared by 7% when added to the controls (column 5). Column 6 contains the R-squared of a specification that includes both industry and rating fixed effects as well as the firm-level variables. Adding industry FE to the specification in column 4 improves the explanatory power by 6%, while adding rating FE to the specification in column 5 increases the R-squared by 12%. Based on the results presented in Tables I and II, we can conclude that aggregating the data across credit rating categories will provide a better estimate of the target debt ratio of the firms in that category. The following section analyzes the aggregated data to determine how the conventional set of proxies affect the optimal capital structure choice.

III. The determinants of the optimal capital structure

The main analysis of this paper is based on the data aggregated by credit rating category. For each of the 16 rating groups, I calculate the mean and median of all relevant variables each year. Table III contains the time-series averages of the mean (Panel A) and median (Panel B) characteristics by rating category. Firms with better credit ratings have lower leverage and, as reported in the previous section, there is significant variation in the average (median) debt ratio across rating categories ranging from 0.58 for the lowest rating group to 0.14 for the highest. Furthermore, firms with higher rating are larger, older, more profitable, spend more on R&D, have higher M/B and lower operating risk.

In Table IV, I report the results from estimating the traditional leverage regression in the rating-year panel. I first look at the effect of each variable on leverage in univariate regressions and report the multivariate results in the last column of each panel. I estimate the model with either OLS (Panels A and C) or Fama-MacBeth (Panels B and D) and use either means (Panels A and B) or medians (Panels C and D). We should first note that while firm characteristics could only explain about one fifth of the variation in leverage in the firm-year panel, they account for close to 90% of the variation in the aggregated panel, with *Size* and *Profitability* being the most important determinants of the optimal leverage ratio. Furthermore, the sign of some of the explanatory variables is inconsistent with theoretical priors. Based on the traditional trade-off theory, we expect *Size*, *Profitability*, *Tangibility*, and *Age* to be positively correlated with the optimal capital structure and *M/B*, *R&D*, *Expense* and *Operating Risk* to have a negative effect.[4] While *Tangibility*, *R&D* and *Age* either have the expected sign or are insignificant, *Size* and *Profitability* enter the leverage regression with a negative and highly significant sign in all specifications. Furthermore, the remaining three variables also have a sign that is inconsistent with theoretical priors, albeit not consistently statistically significant. These puzzling results raise the question of whether our understanding of the cost and benefits of debt financing, as proxied by the explanatory variables, is complete. Next, I examine the reasons why large and profitable firms with low operating risk might have lower target debt ratios.

[4] See Hovakimian, Opler, and Titman (2001) and Hovakimian, Kayhan, and Titman (2012).

Given that the sample under investigation consists of only firms with a credit rating, a possible explanation for the results in Table IV could be derived from a theory that adds credit rating considerations to the traditional tax benefits and bankruptcy costs of debt financing – I call this the "augmented" tradeoff theory. More specifically, this study argues that size, profitability, operating risk and M/B all proxy for the non-financial risk of the firm (*NF_Risk*) and that firms with lower *NF_Risk* derive a benefit from lowering leverage to achieve a better credit rating and thus have lower targets. Firms have different levels of non-financial risk which increases the probability of default for any level of leverage. Per the traditional tradeoff model, any factor that contributes to the non-financial risk of the firm should, ceteris paribus, be negatively correlated with the optimal debt ratio as it increases the risk of bankruptcy. However, adding a credit rating benefit that is increasing as non-financial risk decreases could result in a positive correlation between *NF_Risk* and the optimal leverage ratio. The rest of this paper presents evidence in support of the "augmented" tradeoff theory.

I first show that the proxies utilized in the traditional leverage regression are correlated with the probability of default, holding leverage constant. I estimate regressions of credit rating on leverage and the control variables and report the resulting coefficients in Table V. Column 1 is estimated with OLS and column 2 with ordered probit and both control for industry and year fixed effects. As the firm's rating incorporates both the financial and non-financial factors contributing to credit risk and we control for financial risk with leverage, the coefficients represent the effect of each variable on *NF_Risk*. Consistent with expectations, *NF_Risk* is decreasing with Size, M/B, Tangibility, Profitability, Expense and Age and is increasing with R&D and Operating Risk. If we refer to the summary statistics in Table III, we see that both leverage and most of the factors comprising *NF_Risk* are decreasing as the rating improves. The positive effect of *NF_Risk* on the optimal debt ratio cannot be explained by the traditional tradeoff theory but is consistent with the hypothesized "augmented" tradeoff.

It is also possible that there is an unobserved industry-specific factor that is causing the positive correlation between non-financial risk and leverage. This could arise if highly rated firms are concentrated in low leverage industries and firms with lower credit rating come mostly from industries where high leverage is observed. If that is indeed the case, then we expect the average leverage of the unrated firms in the industry of highly rated firms to be lower than the leverage of the unrated firms in the industry of low rated firms. To examine this possibility, for each rated firm, I compute the average (median) leverage of the firms without rating in the same industry and report the mean of this variable by rating category in Table VI. The leverage of unrated firms from the same industry is stable across rating categories and, therefore, industry effects cannot account for the results presented above. In the following section, this study extends the analysis to the sample of unrated firms and compares the correlation between leverage and non-financial risk in the two subsamples.

IV. Non-financial risk and leverage – rated vs unrated firms

To compare the determinants of capital structure across firms with and without credit rating, I begin by estimating the leverage regression in the full sample, the sample of rated firms and the sample of unrated firms and report the coefficients in Table VII. While *Size* determines the firm's access to the public debt market, it is negatively correlated to leverage in the rated sample and insignificant in the unrated one. The signs of the remaining variables are consistent across the three samples.

Since unrated firms don't have the credit rating benefit consideration, their optimal leverage ratio will only be determined by the traditional tradeoff between tax benefits and bankruptcy costs. As such, the target of unrated firms will be increasing with tax benefits, decreasing with bankruptcy costs and *decreasing* with *NF_Risk*, while the optimal debt ratio of rated firms will also be increasing with tax benefits and decreasing with bankruptcy costs but *increasing* with *NF_Risk*. This statement provides a testable implication of the "augmented" tradeoff theory as it postulates differential effect of non-financial risk on the target leverage in the rated and unrated sample.

To derive a proxy for *NF_Risk* for each firm in the full sample, I first estimate a regression of credit rating on leverage and the firm-level control variables as in Table V, and then compute the fitted value for each rated and unrated firm (*PredictedRating*) using the estimated coefficients. Assuming that the explanatory variables affect the credit risk of unrated firms in the same way they do that of rated firms, the fitted value provides us with a measure of the probability of default for each firm without a credit rating. Then, for each year t and firm i, I compute a proxy for non-financial risk as:

$$(1) \qquad NF\_Risk_{i,t} = -(PredictedRating_{i,t} - \hat{\beta}_{Leverage} * Leverage_{i,t})$$

I expect the target leverage to be positively correlated to this measure in the rated sample and negatively correlated in the unrated sample. However, since I cannot isolate the target of firms without a credit rating from the deviation, I will instead examine the correlation between the *NF_Risk* measure and observed leverage in the two samples.

(2) $$BLev_{i,t}^{Rated} = \alpha^{Rated} + \beta^{Rated} * NF\_Risk_{i.t}^{Rated} + \varepsilon_{i,t}$$

(3) $$BLev_{i,t}^{Unrated} = \alpha^{Unrated} + \beta^{Unrated} * NF\_Risk_{i.t}^{Unrated} + \varepsilon_{i,t}$$

Given that the *NF_Risk* measure is a linear combination of all explanatory variables in the leverage regression, it will be correlated with the factors that drive the deviation from the target. In particular, *NF_Risk* is decreasing with profitability and M/B and, more profitable firms with higher M/B ratios are also more likely to have below target leverage. As such, the *NF_Risk* variable will be positively correlated to the deviation from the target in both samples and, thus, we could observe a positive $\beta^{Unrated}$ in model (3) even though the variable has a negative effect on the firm's *target* leverage. However, we should still find that $\beta^{Unrated} < \beta^{Rated}$.

Based on the estimated measure of non-financial risk, I assign rated firms into 20 portfolios and unrated firms into 20 portfolios each year. Table VIII reports the average and median leverage and firm characteristics for each portfolio. Consistent with our expectations, Panels A and B show that leverage is increasing monotonically with *NF_Risk* in the sample of firms with credit rating. In Panels C and D, we find that this is not the case among unrated firms. Leverage is mostly stable across the 20 portfolios apart from the one containing firms with the lowest *NF_Risk* where leverage is significantly lower. In the last two columns of Panel C, I also report the percentage of firms in each portfolio that do get a credit rating over the following 3 years and that have had a credit rating in any of the previous 3 years. The lowest *NF_Risk* portfolio is also the one with the highest percentage of firms to acquire a rating in the future and this could partially account for the low leverage of that category.

I proceed by estimating models (2) and (3) and report the results in Table IX. While the correlation between *NF_Risk* and leverage is positive in both the rated and unrated sample, it is significantly higher for firms with a credit rating. In fact, the $\beta^{Unrated}$ coefficient is only significant at the 10% level. Furthermore, in columns 3 and 4 (5 and 6) of the table I exclude the firms from the lowest *NF_Risk* portfolio (the two lowest NF risk portfolios) from both samples and find that the *NF_Risk* coefficient remains positive for rated firms but becomes significantly negative among the firms without a rating.

I also split the rated and unrated samples into 50 portfolios based on the *NF_Risk* variable and estimate a regression of leverage on the 50 portfolio dummies. Figure I plots those coefficients for the rated and unrated sample. Consistent with the previous findings, we see that leverage is increasing in non-financial risk in the rated sample (45 of the 50 coefficients are significantly positive and 5 are insignificant) while the leverage of unrated firms is mostly decreasing with *NF_Risk* as only 3 of the coefficients are significantly positive and 21 are significantly negative.

V. Conclusion

The capital structure literature has developed different theories that can explain the observed correlations between debt ratios and a set of firm characteristics identified as important predictors of leverage. The most comprehensive one is the dynamic tradeoff model, which postulates that firms do have an optimal debt ratio that balances the tax benefits and bankruptcy costs of debt financing, but, due to significant recapitalization costs, leverage could deviate from that optimal level and such deviations will not be offset immediately. Thus, the presence of adjustment costs could account for the fact that certain coefficients in the traditional leverage regression are not consistent with expectations. For example, the negative correlation between leverage and profitability has been explained with the tendency of firms to passively accumulate retained earnings and, thus, profitability has been assumed to proxy for the deviation from the target leverage.

In this study, I reexamine the interpretation of the conventional set of variables used as proxies for the costs and benefits of debt in the context of the dynamic tradeoff theory. To isolate the cross-sectional variation in leverage due to differences in the target from the variation caused by deviations, I aggregate the data based on credit rating category. I argue that firms with the same credit rating have similar targets and, thus, the average (median) leverage of each rating group provides an estimate of the optimal debt ratio for firms in that group and that the determinants of the cross-rating variation in leverage will improve our understanding of how firm characteristics relate to the target.

Estimating the leverage regression on the rating-year panel, I find that large and profitable firms and those with lower operating risk have lower targets, which is inconsistent with the implications of the traditional tradeoff model. I show that those variables also proxy for non-financial (asset) risk by estimating a model of credit rating on firm characteristics, holding leverage constant. Specifically, firms with the same leverage ratio have better credit ratings if they are larger, more profitable and have lower operating risk. Thus, while theoretical priors predict a negative correlation between non-financial risk and target leverage, this study finds a positive one.

I provide an explanation for this puzzling result that adds credit rating considerations to the tax benefits and bankruptcy costs of debt that the firm trades off in the determination of its capital structure. While firms from all non-financial (asset) risk classes could achieve any credit rating they desire by adjusting their leverage ratio, I find that only low risk firms choose to benefit from a better credit rating by lowering leverage and thus forgoing tax shield benefits. In other words, firms can increase value by targeting a better credit rating but this benefit exists only at the higher end of ratings or, alternatively, is increasing in the rating, and is, thus, more relevant for firms with lower non-financial risk, which size and profitability proxy for.

Furthermore, while firm characteristics in the traditional leverage regression can only jointly explain about 20% of the variation in debt ratios across firms, the heterogeneity in leverage across rating categories is to a much larger extent determined by our proxies as the explanatory power of the model rises to close to 90% in that dataset.

References:

Alti, A. (2006). How persistent is the impact of market timing on capital structure? *The Journal of Finance, 61*(4), 1681-1710.

Baker, M., & Wurgler, J. (2002). Market timing and capital structure. *The Journal of Finance, 57*(1), 1-32.

Barclay, M., Smith, J., Clifford W., & Morellec, E. (2006). On the debt capacity of growth options. *The Journal of Business, 79*(1), 37-60.

Fama, E. F., & French, K. R. (2002). Testing trade-off and pecking order predictions about dividends and debt. *The Review of Financial Studies, 15*(1), 1-33.

Fama, E. F., & French, K. R. (2005). Financing decisions: Who issues stock? *Journal of Financial Economics, 76*(3), 549-582.

Flannery, M. J., & Rangan, K. P. (2006). Partial adjustment toward target capital structures. *Journal of Financial Economics, 79*(3), 469-506.

Frank, M. Z., & Goyal, V. K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics, 67*(2), 217-248.

Graham, J. R., & Leary, M. T. (2011). A review of empirical capital structure research and directions for the future. *Annu.Rev.Financ.Econ., 3*(1), 309-345.

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics, 60*(2–3), 187-243.

Hovakimian, A., & Li, G. (2011). Is the partial adjustment model a useful tool for capital structure research? *Review of Finance,* , rfq020.

Hovakimian, A. (2006). Are observed capital structures determined by equity market timing? *The Journal of Financial and Quantitative Analysis, 41*(1), 221-243.

Hovakimian, A., Kayhan, A., & Titman, S. (2012). Are corporate default probabilities consistent with the static trade-off theory? *The Review of Financial Studies, 25*(2), 315-340.

Hovakimian, A., Opler, T., & Titman, S. (2001). The debt-equity choice. *The Journal of Financial and Quantitative Analysis, 36*(1), 1-24.

Huang, R., & Ritter, J. R. (2009). Testing theories of capital structure and estimating the speed of adjustment. *The Journal of Financial and Quantitative Analysis, 44*(2), 237-271.

Kayhan, A., & Titman, S. (2007). Firms' histories and their capital structures. *Journal of Financial Economics, 83*(1), 1-32.

Kisgen, D. J. (2006). Credit ratings and capital structure. *The Journal of Finance, 61*(3), 1035-1072.

Kisgen, D. J. (2009). Do firms target credit ratings or leverage levels? *The Journal of Financial and Quantitative Analysis, 44*(6), 1323-1344.

Leary, M. T., & Roberts, M. R. (2005). Do firms rebalance their capital structures? *The Journal of Finance, 60*(6), 2575-2619.

Lemmon, M. L., Roberts, M. R., & Zender, J. F. (2008). Back to the beginning: Persistence and the cross-section of corporate capital structure. *The Journal of Finance, 63*(4), 1575-1608.

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review, 48*(3), 261-297.

Myers, S. C. (1984). The capital structure puzzle. *The Journal of Finance, 39*(3), 575-592.

Rauh, J. D., & Sufi, A. (2012). Explaining corporate capital structure: Product markets, leases, and asset similarity. *Review of Finance, 16*(1), 115-155.

Shyam-Sunder, L., & C. Myers, S. (1999). Testing static tradeoff against pecking order models of capital structure1. *Journal of Financial Economics, 51*(2), 219-244.

Table I
Within and across group variation in leverage

The table compares the within and across group variation in leverage where firms are grouped either by their credit rating or industry classification. The credit rating is S&P long-term issuer rating converted into numerical scale. CCC-, CCC, and CCC+ rated firms are combined in the lowest rating category and AAA and AA into the highest category, resulting in 16 groups. Industry is defined based on Fama and French's 49 industry classification and financial firms are excluded from the sample.

	St.Dev. Of leverage in the full sample	Within group St.Dev of leverage	St.Dev. Of the mean leverage across groups	St.Dev. Of the median leverage across groups	#groups
	1	**2**	**3**	**4**	**5**
Group:					
Rating	0.18	0.14	0.13	0.14	16
Industry	0.18	0.16	0.09	0.09	45

Table II
Explanatory power of different models

The table reports the adjusted R-squared from regressions of book leverage on firm characteristics (column 1); rating fixed effects (column 2); industry fixed effects (column 3) or combinations of the above (columns 4-6). The credit rating is S&P long-term issuer rating converted into numerical scale. CCC-, CCC, and CCC+ rated firms are combined in the lowest rating category and AAA and AA into the highest category, resulting in 16 groups. Industry is defined based on Fama and French's 49 industry classification and financial firms are excluded from the sample. All specifications include calendar year fixed effects.

	Controls	Rating Fixed Effects	Industry Fixed Effects	Controls and Rating Fixed Effects	Controls and Industry Fixed Effects	Controls and Rating and Industry Fixed Effects
	1	**2**	**3**	**4**	**5**	**6**
Controls	Yes	No	No	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	No	Yes	No	Yes	No	Yes
Ind. FE	No	No	Yes	No	Yes	Yes
N	21443	21443	21443	21443	21443	21443
adj. R-sq	21%	30%	13%	34%	28%	40%

Table III

Summary statistics by credit rating category

The table reports the average (Panel A) and median (Panel B) firm characteristics by credit rating category. Credit rating is S&P long-term issuer rating converted into numerical scale. CCC-, CCC, and CCC+ rated firms are combined in the lowest rating category and AAA and AA into the highest category, resulting in 16 groups.

Panel A. Mean characteristics

Rating	BLev	Size	MB	Tng	Profi	R&D	Expense	Age	Op.Risk
1-CCC	0.58	5.58	1.26	0.40	0.05	0.02	0.25	2.82	0.08
2	0.52	5.90	1.33	0.37	0.06	0.03	0.24	2.85	0.07
3	0.50	5.90	1.29	0.38	0.10	0.03	0.22	2.75	0.07
4	0.46	5.94	1.34	0.33	0.12	0.02	0.20	2.73	0.06
5	0.41	6.41	1.40	0.34	0.14	0.02	0.18	2.82	0.06
6	0.37	6.73	1.45	0.34	0.15	0.01	0.18	2.93	0.05
7	0.32	7.12	1.50	0.34	0.15	0.02	0.18	3.09	0.05
8	0.29	7.56	1.53	0.33	0.15	0.01	0.18	II1	0.04
9	0.29	7.59	1.59	0.35	0.16	0.02	0.18	III1	0.04
10	0.28	7.70	1.75	0.35	0.17	0.02	0.19	III5	0.04
11	0.25	7.88	1.82	0.34	0.17	0.03	0.20	IV3	0.04
12	0.25	8.12	1.95	0.34	0.18	0.03	0.21	V3	0.03
13	0.23	8.27	2.12	0.34	0.20	0.03	0.25	V8	0.03
14	0.21	8.56	2.26	0.35	0.21	0.03	0.22	VI3	0.03
15	0.20	8.95	2.36	0.40	0.21	0.04	0.26	V9	0.03
16-AAA	0.14	9.08	2.64	0.36	0.24	0.06	0.29	VI3	0.03

Panel B. Median characteristics

Rating	BLev	Size	MB	Tng	Profi	R&D	Expense	Age	Op.Risk
1 - CCC	0.58	5.51	1.11	0.35	0.06	0.00	0.20	2.77	0.06
2	0.51	5.85	1.14	0.33	0.07	0.00	0.19	2.83	0.05
3	0.49	5.77	1.15	0.34	0.10	0.00	0.16	2.71	0.05
4	0.46	5.84	1.18	0.28	0.11	0.00	0.17	2.71	0.05
5	0.39	6.32	1.23	0.27	0.13	0.00	0.15	2.83	0.04
6	0.34	6.68	1.28	0.27	0.13	0.00	0.15	2.94	0.04
7	0.32	7.04	1.33	0.29	0.14	0.00	0.15	I4	0.04
8	0.29	7.50	1.31	0.28	0.13	0.00	0.15	III3	0.03
9	0.28	7.44	1.40	0.30	0.15	0.00	0.15	IV7	0.03
10	0.27	7.58	1.54	0.29	0.16	0.00	0.16	V0	0.03
11	0.25	7.89	1.50	0.29	0.16	0.00	0.18	VI4	0.03
12	0.24	8.13	1.65	0.30	0.18	0.01	0.19	VI9	0.02
13	0.23	8.29	1.95	0.32	0.19	0.01	0.23	VI6	0.02
14	0.20	8.70	1.96	0.31	0.21	0.01	0.20	VI9	0.03
15	0.20	8.85	1.95	0.37	0.21	0.02	0.22	VI6	0.02
16-AAA	0.13	8.97	2.32	0.31	0.24	0.07	0.30	VII1	0.02

Table IV
The determinants of target leverage

The table presents coefficients from the traditional leverage regression estimated on data aggregated by rating and year. Credit rating is S&P long-term issuer rating converted into numerical scale. CCC-, CCC, and CCC+ rated firms are combined in the lowest rating category and AAA and AA into the highest category, resulting in 16 groups. For each of the 16 rating categories, the mean and median of all variables is calculated each year and the regression of leverage on the firm characteristics is estimated in the resulting rating-year panel either with OLS (Panels A and C) or with Fama-MacBeth procedure (Panels B and D). All OLS specifications account for calendar year fixed effects and the standard errors used to compute t-statistics (the latter reported in brackets) are robust to heteroskedasticity and clustering at the rating level. Coefficient estimates significantly different from zero at the 10%, 5%, and 1% level are identified with *, **, and ***, respectively.

Panel A. OLS regressions of the average leverage on average characteristics

	1	2	3	4	5	6	7	8	9
Size	-0.0931***								-0.0516***
	[-10.28]								[-5.30]
M/B		-0.158***							0.0237
		[-5.82]							[1.66]
Tng			0.449*						0.174*
			[1.97]						[1.86]
Profi				-2.068***					-0.785***
				[-19.04]					[-5.47]
R&D					-1.473				-0.678*
					[-1.59]				[-1.76]
Expense						-0.143			0.288***
						[-0.29]			[I4]
Age							-0.284***		-0.0179
							[-9.50]		[-0.95]
Op.Risk								6.027***	0.997**
								[22.86]	[2.94]
N	496	496	496	496	496	496	496	496	496
adj. R-sq	0.826	0.44	0.006	0.773	0.048	-0.026	0.717	0.674	0.883

Panel B. Fama MacBeth regressions of the average leverage on average characteristics									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Size	-0.0940***								-0.0591***
	[-44.52]								[-6.81]
M/B		-0.215***							0.0653***
		[-14.31]							[VI2]
Tng			0.213						0.257***
			[0.79]						[VIII0]
Profi				-2.120***					-0.908***
				[-40.01]					[-5.37]
R&D					-2.379***				-0.682*
					[-5.46]				[-2.00]
Expense						-0.396***			0.347***
						[-I9]			[2.81]
Age							-0.303***		-0.0248
							[-26.60]		[-0.82]
Op.Risk								6.369***	0.465
								[36.59]	[0.92]
N	496	496	496	496	496	496	496	496	496

Panel C. OLS regressions of the median leverage on median characteristics									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Size	-0.0922***								-0.0701***
	[-11.71]								[-10.15]
M/B		-0.168***							0.00133
		[-5.76]							[0.19]
Tng			0.421**						0.204***
			[2.24]						[IV4]
Profi				-2.154***					-0.648***
				[-17.05]					[-6.45]
R&D					-3.079***				0.329
					[-4.20]				[0.82]
Expense						-0.627			0.311***
						[-1.58]			[IX3]
Age							-0.221***		0.00768
							[-9.39]		[0.54]
Op.Risk								7.555***	1.198**
								[26.07]	[2.83]
N	496	496	496	496	496	496	496	496	496
adj. R-sq	0.813	0.448	0.033	0.759	0.241	0.055	0.659	0.625	0.881

	1	2	3	4	5	6	7	8	9
Panel D. Fama MacBeth regressions of the median leverage on median characteristics									
Size	-0.0934***								-0.0838***
	[-36.45]								[-10.09]
M/B		-0.227***							0.0325*
		[-15.74]							[1.83]
Tng			0.189						0.229***
			[0.92]						[IX9]
Profi				-2.214***					-0.862***
				[-34.94]					[-4.03]
R&D					-VI43***				0.43
					[-16.90]				[1.32]
Expense						-0.598***			0.146
						[-4.98]			[1.22]
Age							-0.240***		0.0339**
							[-22.17]		[2.25]
Op.Risk								8.285***	0.744
								[22.85]	[1.38]
N	496	496	496	496	496	496	496	496	496

Table V
The determinants of credit risk

The table presents the results of panel regressions of credit rating on leverage and firm characteristics. The dependent variable is S&P long-term issuer credit rating converted into integers with AAA=17 and CCC=1. Model (1) is estimated with OLS while Model (2) is estimated using OLS. Both specifications also include industry fixed effects based on FF49 industry classification and account for calendar year fixed effects. The standard errors used to compute t-statistics (the latter reported in brackets) are robust to heteroskedasticity and clustering at the firm level.. Coefficient estimates significantly different from zero at the 10%, 5%, and 1% level are identified with *, **, and ***, respectively.

	1	2
BLev	-5.413***	-2.783***
	[-22.34]	[-2VI7]
Size	1.068***	0.522***
	[27.21]	[22.89]
M/B	0.616***	0.284***
	[11.09]	[10.42]
Tng	1.476***	0.677***
	[5.81]	[5.44]
Profi	5.437***	2.980***
	[13.09]	[14.30]
R&D	-1.468	-0.904*
	[-1.59]	[-1.95]
R&D dummy	0.117	0.0485
	[1.11]	[0.95]
Expense	2.180***	0.946***
	[5.52]	[4.83]
Age	0.473***	0.206***
	[7.29]	[6.58]
Op.Risk	-10.26***	-5.256***
	[-1VII3]	[-14.30]
N	21443	21443
adj. R-sq	0.672	
pseudo R-sq		0.21

Table VI
Leverage of unrated firms in the same industry

The table presents the average and median leverage of unrated firms in the same industry as rated firms by rating category. Credit rating is S&P long-term issuer rating converted into numerical scale. CCC-, CCC, and CCC+ rated firms are combined in the lowest rating category and AAA and AA into the highest category, resulting in 16 groups. Industry is defined based on Fama and French's 49 industry classification and financial firms are excluded from the sample. For each rated firm the average and median leverage of the firms without rating in the same industry is computed and the table reports the means of those variables by rating category.

Rating	**Average Leverage of rated firms**	**Average Leverage of unrated in the same industry**	**Median Leverage of unrated in the same industry**
	1	2	3
1-CCC	0.58	0.24	0.21
2	0.52	0.22	0.18
3	0.50	0.22	0.18
4	0.46	0.23	0.19
5	0.41	0.21	0.17
6	0.37	0.22	0.19
7	0.32	0.22	0.18
8	0.29	0.21	0.18
9	0.29	0.22	0.18
10	0.28	0.22	0.18
11	0.25	0.22	0.19
12	0.25	0.22	0.18
13	0.23	0.22	0.18
14	0.21	0.23	0.19
15	0.20	0.23	0.20
16-AAA	0.14	0.21	0.17

Table VII

The traditional leverage regression - rated vs unrated sample

The table contains coefficients from the traditional leverage regression estimated on the full sample (column 1), the firm-years with credit rating (column 2) and the firm-years without credit rating (column 3). The specifications also include industry fixed effects based on FF49 industry classification and account for calendar year fixed effects. The standard errors used to compute t-statistics (the latter reported in brackets) are robust to heteroskedasticity and clustering at the firm level. Coefficient estimates significantly different from zero at the 10%, 5%, and 1% level are identified with *, **, and ***, respectively.

	Full Sample	**Rated firms**	**Unrated firms**
	1	**2**	**3**
Size	0.0135***	-0.0349***	0.000155
	[12.81]	[-1II2]	[0.12]
M/B	-0.0115***	-0.0166***	-0.00848***
	[-10.11]	[-4.80]	[-7.83]
Tng	0.214***	0.106***	0.232***
	[19.55]	[5.89]	[19.59]
Profi	-0.272***	-0.176***	-0.266***
	[-26.81]	[-6.89]	[-25.86]
R&D	-0.134***	-0.269***	-0.102***
	[-5.05]	[-VIII4]	[-VIII0]
R&D dummy	-0.0333***	-0.0124	-0.0324***
	[-7.36]	[-1.53]	[-6.83]
Expense	-0.0809***	-0.0248	-0.0962***
	[-7.17]	[-0.81]	[-8.59]
Age	-0.0217***	-0.0231***	-0.0182***
	[-7.75]	[-4.70]	[-5.99]
Op.Risk	0.0392*	0.230***	0.0371*
	[1.77]	[4.16]	[1.65]
N	88467	21443	67024
adj. R-sq	0.197	0.282	0.188

Table VIII
Summary statistics by *NF_Risk* portfolio

The table reports the average and median firm characteristics by *NF_Risk* portfolio. Each year the rated and unrated samples are split into 20 portfolios based on the measure of non-financial risk. Panels A and B report summary statistics for rated firms while Panels C and D for firms without credit rating.

Panel A. Rated Firms - Means

NF Risk portfolio	Blev	Size	MB	Tng	Profi	R&D	Exp	Age	Op. Risk
1 High NF Risk	0.46	4.84	1.24	0.31	0.03	0.04	0.25	2.40	0.12
2	0.44	5.29	1.26	0.32	0.10	0.03	0.22	2.54	0.08
3	0.44	5.62	1.27	0.34	0.11	0.02	0.20	2.60	0.07
4	0.42	5.90	1.27	0.35	0.12	0.02	0.19	2.71	0.06
5	0.41	6.04	1.30	0.36	0.12	0.02	0.18	2.79	0.05
6	0.41	6.27	1.31	0.37	0.13	0.02	0.18	2.82	0.05
7	0.40	6.47	1.34	0.36	0.13	0.01	0.18	2.93	0.05
8	0.36	6.68	1.39	0.37	0.14	0.02	0.18	2.97	0.05
9	0.34	6.88	1.40	0.36	0.14	0.02	0.17	3.09	0.04
10	0.34	7.00	1.49	0.35	0.15	0.02	0.18	I1	0.04
11	0.32	7.15	1.48	0.36	0.16	0.02	0.18	II1	0.04
12	0.31	7.31	1.52	0.34	0.16	0.02	0.19	II6	0.04
13	0.30	7.50	1.57	0.33	0.16	0.02	0.19	III2	0.04
14	0.30	7.67	1.59	0.35	0.16	0.02	0.20	III4	0.03
15	0.30	7.90	1.68	0.33	0.17	0.02	0.19	IV4	0.03
16	0.28	8.00	1.74	0.34	0.18	0.02	0.20	V0	0.03
17	0.26	8.28	1.80	0.35	0.19	0.02	0.20	V3	0.03
18	0.28	8.65	1.90	0.37	0.19	0.02	0.20	V7	0.03
19	0.27	8.95	2.17	0.37	0.20	0.03	0.22	VI0	0.03
20 Low NF Risk	0.24	9.36	2.95	0.37	0.24	0.05	0.29	VII2	0.03

Panel B. Rated Firms - Medians

NF Risk portfolio	Blev	Size	MB	Tng	Profi	R&D	Exp	Age	Op. Risk
1 High NF Risk	0.46	4.86	1.14	0.24	0.04	0.00	0.20	2.32	0.10
2	0.43	5.28	1.14	0.25	0.09	0.00	0.18	2.49	0.06
3	0.43	5.57	1.14	0.28	0.11	0.00	0.17	2.54	0.05
4	0.41	5.89	1.16	0.29	0.11	0.00	0.16	2.69	0.05
5	0.39	6.04	1.21	0.32	0.12	0.00	0.15	2.79	0.04
6	0.38	6.24	1.22	0.32	0.13	0.00	0.15	2.80	0.04
7	0.37	6.45	1.22	0.32	0.13	0.00	0.16	2.95	0.04
8	0.34	6.65	1.25	0.31	0.13	0.00	0.15	2.99	0.04
9	0.32	6.85	1.28	0.30	0.13	0.00	0.15	I0	0.04
10	0.31	6.99	1.34	0.30	0.14	0.00	0.15	I6	0.03
11	0.29	7.14	1.36	0.30	0.15	0.00	0.16	III0	0.03
12	0.29	7.26	1.40	0.28	0.15	0.00	0.16	III7	0.03
13	0.27	7.42	1.41	0.28	0.15	0.00	0.16	IV4	0.03
14	0.27	7.62	1.45	0.30	0.16	0.00	0.18	IV7	0.03
15	0.28	7.84	1.51	0.29	0.17	0.00	0.18	VI3	0.03
16	0.26	7.93	1.62	0.30	0.17	0.00	0.18	VII0	0.03
17	0.25	8.27	1.60	0.31	0.17	0.00	0.17	VII1	0.03
18	0.27	8.63	1.70	0.32	0.18	0.00	0.18	VII6	0.02
19	0.25	8.98	1.91	0.33	0.20	0.01	0.21	VIII0	0.02
20 Low NF Risk	0.22	9.25	2.72	0.33	0.23	0.02	0.29	IX1	0.02

Panel C. Unrated Firms - Means

NF Risk portfolio	Blev	Size	MB	Tng	Profi	R&D	Exp	Age	Op. Risk	Rated w/n the next 3 years	Rated w/n the last 3 years
1 High NF Risk	0.20	1.63	1.54	0.18	-0.18	0.11	0.58	2.34	0.19	0.00	0.00
2	0.20	2.11	1.47	0.19	-0.05	0.08	0.47	2.41	0.14	0.00	0.00
3	0.20	2.42	1.46	0.21	-0.01	0.07	0.42	2.46	0.12	0.00	0.00
4	0.20	2.70	1.51	0.21	0.02	0.07	0.39	2.48	0.11	0.00	0.00
5	0.21	2.96	1.50	0.23	0.04	0.06	0.37	2.52	0.10	0.01	0.01
6	0.21	I8	1.51	0.24	0.06	0.06	0.36	2.53	0.09	0.01	0.01
7	0.21	IV3	1.48	0.25	0.08	0.05	0.32	2.58	0.09	0.01	0.01
8	0.21	VI4	1.51	0.25	0.09	0.05	0.31	2.58	0.08	0.02	0.01
9	0.21	VIII6	1.52	0.25	0.10	0.04	0.29	2.62	0.08	0.02	0.01
10	0.22	4.07	1.55	0.26	0.11	0.04	0.29	2.62	0.08	0.03	0.02
11	0.22	4.26	1.59	0.26	0.12	0.04	0.28	2.66	0.07	0.03	0.03
12	0.21	4.45	1.62	0.27	0.13	0.04	0.27	2.67	0.07	0.04	0.03
13	0.21	4.67	1.62	0.27	0.14	0.04	0.26	2.69	0.06	0.05	0.03
14	0.21	4.87	1.65	0.28	0.15	0.03	0.26	2.75	0.06	0.06	0.03
15	0.20	5.06	1.70	0.28	0.16	0.03	0.25	2.78	0.05	0.07	0.04
16	0.20	5.31	1.76	0.29	0.17	0.03	0.24	2.80	0.05	0.07	0.05
17	0.20	5.53	1.88	0.30	0.18	0.03	0.24	2.85	0.05	0.09	0.05
18	0.18	5.82	2.00	0.31	0.20	0.03	0.24	2.93	0.05	0.09	0.06
19	0.18	6.13	2.22	0.31	0.22	0.03	0.24	2.99	0.05	0.11	0.05
20 Low NF Risk	0.13	6.58	III0	0.28	0.28	0.03	0.28	3.04	0.05	0.16	0.05

Panel D. Unrated Firms - Medians									
NF Risk portfolio	**Blev**	**Size**	**MB**	**Tng**	**Profi**	**R&D**	**Exp**	**Age**	**Op. Risk**
1 High NF Risk	0.12	1.57	1.28	0.11	-0.15	0.05	0.51	2.30	0.18
2	0.13	2.09	1.20	0.12	-0.04	0.02	0.40	2.36	0.13
3	0.13	2.39	1.21	0.13	0.00	0.02	0.36	2.42	0.11
4	0.14	2.73	1.22	0.14	0.03	0.02	0.33	2.45	0.10
5	0.15	2.98	1.21	0.15	0.05	0.01	0.31	2.48	0.09
6	0.16	I9	1.22	0.17	0.07	0.01	0.30	2.49	0.08
7	0.15	IV4	1.21	0.18	0.08	0.01	0.27	2.58	0.07
8	0.16	VI3	1.22	0.18	0.09	0.01	0.26	2.56	0.07
9	0.16	VIII7	1.24	0.18	0.10	0.00	0.25	2.61	0.06
10	0.18	4.10	1.24	0.20	0.11	0.00	0.24	2.60	0.06
11	0.17	4.28	1.27	0.21	0.12	0.00	0.23	2.62	0.06
12	0.17	4.47	1.31	0.21	0.12	0.00	0.23	2.64	0.06
13	0.17	4.69	1.32	0.22	0.13	0.00	0.22	2.66	0.05
14	0.17	4.89	1.34	0.22	0.14	0.00	0.22	2.74	0.05
15	0.17	5.08	1.39	0.23	0.15	0.00	0.21	2.80	0.04
16	0.16	5.33	1.45	0.24	0.16	0.00	0.21	2.84	0.04
17	0.16	5.53	1.56	0.24	0.17	0.00	0.21	2.89	0.04
18	0.14	5.84	1.67	0.26	0.18	0.00	0.21	2.97	0.04
19	0.15	6.19	1.85	0.26	0.20	0.00	0.21	3.04	0.03
20 Low NF Risk	0.07	6.55	2.87	0.25	0.26	0.00	0.27	I0	0.03

Table IX
Leverage and *NF_Risk* - rated vs unrated

The table reports the coefficient from regressing leverage on the NF_Risk measure in the sample of firms with and without a credit rating. The standard errors used to compute t-statistics (the latter reported in brackets) are robust to heteroskedasticity and clustering at the firm level. Coefficient estimates significantly different from zero at the 10%, 5%, and 1% level are identified with *, **, and ***, respectively.

	Rated	**Unrated**	**Rated excluding the lowest NF risk portfolio**	**Unrated excluding the lowest NF risk portfolio**	**Rated excluding the 2 lowest NF risk portfolios**	**Unrated excluding the 2 lowest NF risk portfolios**
	1	**2**	**3**	**4**	**5**	**6**
NF Risk	0.0248***	0.00122*	0.0261***	-0.00216***	0.0275***	-0.00380***
	[20.34]	[1.86]	[18.57]	[-3.03]	[18.21]	[-4.96]
_cons	0.580***	0.208***	0.591***	0.194***	0.602***	0.187***
	[48.26]	[48.20]	[44.43]	[4VI3]	[4I1]	[41.39]
N	21443	67024	20387	63689	19314	60337
adj. R-sq	0.108	0	0.095	0.001	0.091	0.002

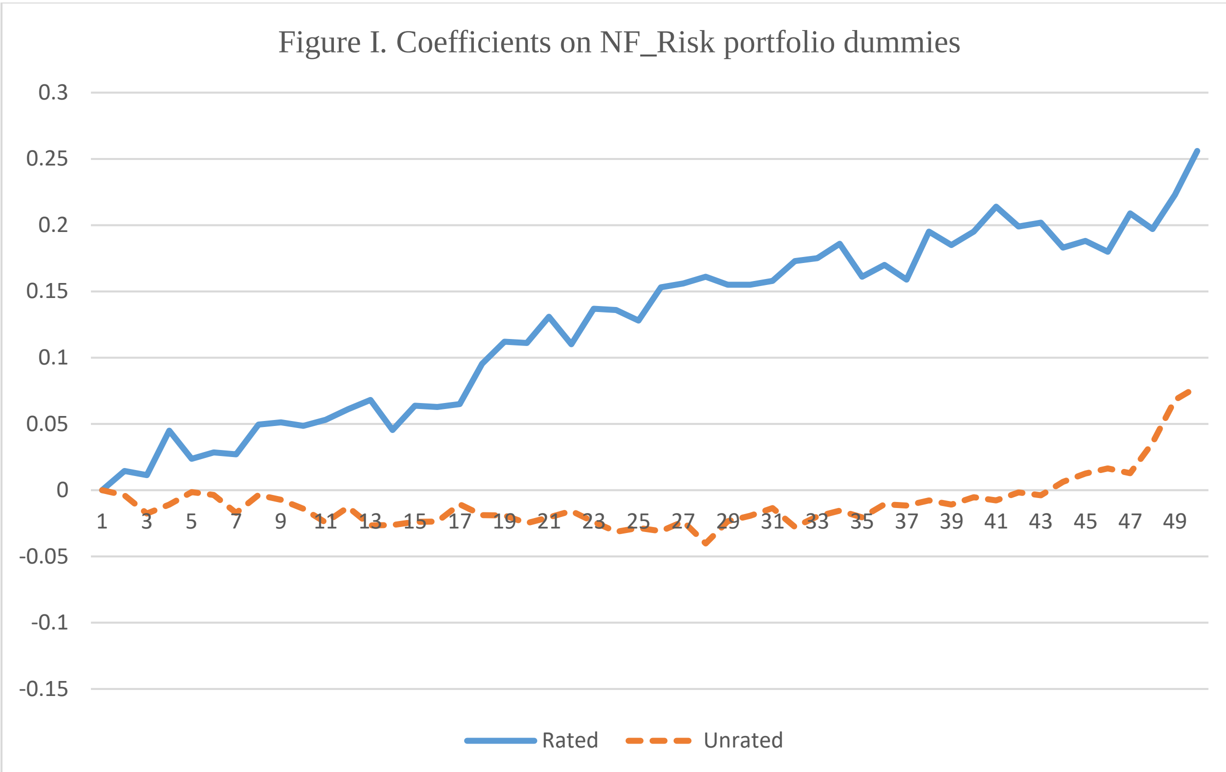

Figure I. Coefficients on *NF_Risk* portfolio dummies

The figure plots the coefficients from a regression of leverage on 50 portfolio indicators based on the *NF_Risk* measure. Each year the rated and unrated samples are split into 50 portfolios based on the measure of non-financial risk and the regression is run separately in each sample.