NBER WORKING PAPER SERIES

CAPITAL STRUCTURE AND DEBT STRUCTURE

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Working Paper 14488
http://www.nber.org/papers/w14488

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
November 2008

We thank Doug Diamond, Anil Kashyap, Michael Roberts, Luigi Zingales, and seminar participants at Chicago GSB, Rice University, Tilburg University, Maastricht University, York University, the University of Toronto, Georgetown University, UC Berkeley, and the University of Colorado for comments. We gratefully acknowledge financial support from the Center for Research in Security Prices and the IBM Corporation. Thanks to Ram Chivukula and Adam Friedlan for excellent research assistance. A previous version of this research circulated under the title: "The Composition and Priority of Corporate Debt: Evidence from Fallen Angels"; Rauh: (773) 834 1710, jrauh@chicagogsb.edu; Sufi: (773) 702 6148, amir.sufi@chicagogsb.edu The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 14488
November 2008
JEL No. G21,G30,G32,M41

ABSTRACT

Using a novel data set that records individual debt issues on the balance sheet of a large random sample of rated public firms, we show that a recognition of debt heterogeneity leads to new insights into the determinants of corporate capital structure. We first demonstrate that traditional capital structure studies that ignore debt heterogeneity miss a substantial fraction of capital structure variation. We then show that relative to high credit quality firms, low credit quality firms are more likely to have a multi-tiered capital structure consisting of both secured bank debt with tight covenants and subordinated non-bank debt with loose covenants. Further, while high credit quality firms enjoy access to a variety of sources of discretionary flexible sources of finance, low credit quality firms rely on tightly monitored secured bank debt for liquidity. We discuss the extent to which these findings are consistent with existing theoretical models of debt structure in which firms simultaneously use multiple debt types to preserve manager and creditor incentives.

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Corporate debt is characterized by heterogeneity. While a large body of agency-based theoretical research in corporate finance argues that corporate capital structure should include multiple types of debt (e.g, Diamond (1991, 1993), Park (2000), Bolton and Freixas (2000), DeMarzo and Fishman (2007)), the grand majority of empirical research continues to treat debt as uniform. In this analysis, we focus on the following question: What novel insights into capital structure decisions can be made by recognizing that firms simultaneously use different types, sources, and priorities of debt?

Our main advantage in answering this question is a novel data set that records the type, source, and priority of every balance-sheet debt instrument for a large random sample of rated public firms. These data are collected directly from financial footnotes in firms' annual 10-K SEC filings and supplemented with information on pricing and covenants from three origination-based datasets: Reuters LPC's *Dealscan*, Mergent's *Fixed Income Securities Database*, and Thomson's *SDC Platinum*. To our knowledge, this data set is one of the most comprehensive sources of information on the debt structure of a sample of public firms: It contains the detailed composition of the stock of corporate debt on the balance sheet, which goes far beyond what is available from origination-based datasets alone.

We begin by showing the importance of recognizing debt heterogeneity in capital structure studies. We classify debt into bank debt, straight bond debt, convertible bond debt, program debt (such as commercial paper), mortgage debt, and all other debt. For almost 70% of firm-year observations in our sample, balance sheet debt comprises significant amounts of at least two of these types. Even more striking is the fact that 25% of the observations in our sample experience no significant one-year change in their total debt but significantly adjust the underlying composition of their debt. This capital structure variation is completely ignored in studies that treat corporate debt as uniform.

The drawback of treating corporate debt as uniform is further highlighted by the fact that different types of debt instruments have very different properties as far as their cash flow claims, their sensitivity to information, and their incentive properties for managers. For example, a subordinated convertible debt issue may have more in common with straight equity than a secured bank revolver, although empirical studies that focus on the dynamics of total debt ratios have traditionally treated these two financial

instruments uniformly. Consistent with this intuition, we show that many of the standard correlations shown in the literature between leverage ratios and firm characteristics vary significantly when debt components are examined separately.

After demonstrating the importance of debt heterogeneity in corporate capital structure, we focus on how debt structure varies across the credit quality distribution. Our focus on credit quality follows directly from extant theoretical research in which credit quality is the primary source of variation driving a firm's optimal debt structure (e.g., Diamond (1991, 1993) and Bolton and Freixas (2000)). Our first main finding is shown in Figure 1. As shown in Panel A, relative to high credit quality firms, lower credit quality firms "spread" the priority of their capital structure. High credit quality firms rely almost exclusively on two tiers: senior unsecured debt and equity. In contrast, lower credit quality firms use multiple tiers of debt, including both secured, senior unsecured, and subordinated issues. Panel B shows that the increase in secured debt for lower credit quality firms is driven by secured bank debt, and the increase in subordinated debt is driven by subordinated bonds and convertible debt.

To our knowledge, we are the first in the capital structure literature to show the spreading of priority as credit quality deteriorates. This finding is important for a number of reasons. First, our findings suggest that theories of capital structure that do not recognize debt heterogeneity cannot explain a substantial fraction of variation of capital structure across the credit quality distribution. Second, the simultaneous use of both secured bank debt and subordinated bonds by low credit quality firms contradicts the hypothesis that firms "choose" to use either bank debt or bonds. On a related note, these findings also dispute the hypothesis made in many theories that low credit quality firms do not use arm's length debt. Third, to the extent that conflicts of interest between managers and creditors are more severe for borrowers with a higher probability of default, the findings are broadly consistent with models in which the simultaneous use of different types and priorities of debt is optimal in the presence of agency problems (Diamond (1993), Park (2000), DeMarzo and Fishman (2007)).

Further, we find that relative to high credit quality firms, the secured bank debt of lower credit quality firms includes tight financial covenants and capital expenditure restrictions. In contrast, while the

subordinated debt of lower credit quality firms includes additional covenants, these covenants tend to be loose relative to bank covenants. Given extensive theoretical and empirical research linking covenants with bank monitoring, our findings demonstrate that the relative monitoring intensity of banks versus non-banks is greater for firms lower in the credit quality distribution.

While low credit quality firms use subordinated bonds in their capital structure, these firms lack arm's length short-term sources of liquidity. In particular, low credit quality firms do not have access to shelf registration debt, medium-term note programs, or commercial paper. Instead, they rely on bank debt with tight covenants. These findings suggest that models in which low credit quality firms do not have access to arm's length debt finance (e.g., Diamond (1991), Bolton and Freixas (2000)) are more about liquidity than capital structure. Their predictions hold for short-term flexible sources of finance, but not for longer-term bonds.

In order to mitigate the reverse causality concern that debt structure might drive credit quality, we collect an additional dataset and replicate our key specifications on "fallen angels," which are firms that are downgraded from investment grade to speculative grade by Moody's Investor Services during the sample period. The main advantage of this analysis is the availability of Moody's downgrade reports, which we use to pinpoint the exact variation that drives credit quality deterioration. We isolate the sample to fallen angels that are downgraded due to business conditions that are outside the control of the manager, and we examine their capital structure from two years before through two years after the downgrade. Our results are similar to the findings in the random sample: Before the downgrade, fallen angels have only senior unsecured debt and equity in their capital structure. Immediately after the downgrade, fallen angels spread their priority structure by increasing their dependence on both secured bank debt and subordinated bonds and convertibles.

Our empirical results are most closely related to empirical studies on debt composition (Barclay and Smith (1995), Houston and James (1996, 2001), Johnson (1997), Cantillo and Wright (2000), Hadlock and James (2002), Denis and Mihov (2003), and Gomes and Phillips (2005)). However, our findings are novel on a number of dimensions. First, as mentioned above, we are the first to show the

"spreading" of the priority structure as credit quality deteriorates. Second, by focusing on changes in balance sheet data as opposed to issuance level data, we find evidence disputing the "choice" models used in much of this literature. Firms do not appear to choose one type of debt over another. Instead, they simultaneously use multiple debt types. In addition to these important conceptual points, the level of detail in our data provides significantly more information than previous studies. For example, we are the first, to our knowledge, to separate bank revolver from bank term debt and to show balance sheet information on commercial paper, shelf debt, and medium term notes. We believe these data will be valuable to other researchers working in this area.

The rest of the paper proceeds as follows. The next section describes the data and presents summary statistics. Section II demonstrates the importance of debt heterogeneity in corporate capital structure. Section III examines debt structure across the credit quality distribution. Section IV replicates our main findings on the sample of fallen angels, and Section V concludes.

I. Data, Summary Statistics, and the Importance of Debt Heterogeneity

A. Data

The sampling universe for our random sample includes non-financial firms in *Compustat* with a long term issuer credit rating in at least one year from 1996 to 2006. Our decision to restrict the sampling universe to firms with an issuer credit rating is based on theoretical research in which credit quality is a main determinant of corporate capital structure. The empirical analysis necessitates a summary measure of credit quality, a purpose served by issuer credit ratings. Issuer credit ratings are not specific to any one debt issue by the firm, and they reflect only the probability of default, not expected loss given default. There is a very close correspondence between the universe of firms with an issuer credit rating and the universe of firms with public debt outstanding (Cantillo and Wright (2000), Houston and James (1996)).

Credit ratings may respond slowly to new information, but they are clearly a focal point for financial markets (Hand, Holthousen, and Leftwich (1992), Kisgen (2006)). While rated firms are certainly not identical to unrated firms (Faulkender and Petersen (2006)), rated firms make up a large

fraction of the asset-weighted universe of public non-financial firms. Almost 95% of the total debt (and 90% of total assets) on the balance sheet of public non-financial firms is on the balance sheet of firms rated for at least one year between 1996 and 2006.[1]

We restrict the sampling universe to years after 1996 given that the SEC mandated electronic submission of SEC filings in this year, and the availability of electronic filings significantly reduces the cost of our data collection process described below. We limit the sample to firms with at least two consecutive years of data given that much of our analysis focuses on patterns within firms over time.

The final sampling universe includes 1,889 rated firms, from which we randomly sample 305 firms (16%). For all firm-year observations for these 305 firms, we construct two datasets. The first data set is a *balance sheet issue level* data set, which is constructed by examining the debt financial footnotes contained in the annual report of the firms' 10-K SEC filings. The data on each individual debt issue are available due to two SEC reporting regulations. Regulation S-X requires firms to detail their long-term debt instruments. Regulation S-K requires firms to discuss their liquidity, capital resources, and results of operation.[2] As a result of these regulations, firms detail their long-term debt issues and bank revolving credit facilities. Firms often also provide information on notes payable within a year.

While the debt financial footnotes typically list each individual debt issue, there is often insufficient information in the footnotes alone to categorize the issue. For example, an issue labeled "9.5% notes due 2004" could be medium-term notes, public debt, term bank debt, or a private placement. To aid in the categorization of balance sheet debt issues, we also construct an *origination issue level* dataset for these 305 firms, using *Dealscan* for syndicated and sole-lender bank loans and *SDC Platinum* for private placements and public debt issues. This origination issue level dataset consists of 2,184 new

[1] An alternative would be to use market-implied probabilities of default based on Merton-type models or credit default swap (CDS) markets. However, CDS markets only exist for a much smaller fraction of the universe of public firms. Relative to market default models, credit ratings have the advantage that they do not depend on any one asset pricing model, although they do of course depend on the judgment of the rating agency. Note that while the financial crisis has called into question rating agencies' ability to assess the risks of complex instruments such as collateralized debt obligations, the ratings of corporate debt are generally perceived as more accurate and correspond closely to bond yields.

[2] See Johnson (1997), Kaplan and Zingales (1997), and Sufi (2007b) for more discussion on these regulations.

bank loans and 2,241 non-bank debt issues for a total of 4,425 issues by 303 of our 305 sample firms. We cross-check the balance sheet issue level data with the origination issue level data when there is any doubt on the type of a particular debt instrument in the financial footnotes. Origination issue level datasets are insufficient by themselves for examining debt structure because they contain no information on debt retirements or renegotiations.

Using the descriptions in the 10-K financial footnotes and the originations in *SDC Platinum* and *Dealscan*, we classify each debt issue discussed in the debt financial footnotes into one of 7 broad categories:

(1) *Bank debt:* Consists of two main categories. (i) Revolving bank debt, which includes committed revolving credit facilities or lines of credit and (ii) Term bank debt, which includes term loans, bank overdrafts, and borrowings on uncommitted lines of credit.

(2) *Bonds:* Consists of public debt issues, industrial revenue bonds, and Rule 144A private placements. [3]

(3) *Program debt*: Consists of commercial paper, shelf registration debt, and medium term notes (MTNs). These programs are often exempt from SEC registration requirements, and thus constitute "program" debt.

(4) *Private placements:* Consists of non-Rule 144A privately placed debt issues, and ambiguous notes or debentures which we cannot match to *SDC Platinum*.

(5) *Mortgage or equipment debt*: Consists of mortgage bonds, mortgage loans, equipment trust certificates, and other equipment based debt.

(6) *Convertible debt*

(7) *Other debt*: Includes acquisition notes, capitalized leases, and unclassified debt.

In the data appendix, we provide two examples of the data collection process and how we place debt issues into one of the above categories.

We also classify the priority of each issue into one of three categories: secured, senior unsecured, and subordinated. An issue is considered secured if the firm states that the issue is collateralized by any of

[3] There is substantial evidence that Rule 144A private placements are more like bonds than concentrated private placements held by one or two insurance companies (Fenn (2000) and Gomes and Phillips (2005)). Consistent with the arguments in these papers, we use the Mergent/FISD data set to calculate that at a minimum, 65% of Rule 144A private placements are subsequently registered as public bonds.

the firm's assets, or if the issue is a mortgage bond or equipment loan. An issue is considered subordinated if the issue description includes the word "subordinated". Any issue labeled senior subordinated, subordinated, and junior subordinated are included in the subordinated category. If the issue description either states the issue is senior unsecured or if the issue does not fall into the secured or subordinated categories discussed above, we classify the issue as senior unsecured. While the classification of priority based on these three categories is coarse, both academic and practitioner evidence suggest this classification is accurate.[4] For example, the Chapter 11 bankruptcy process gives significant additional cash flow and control rights to secured creditors relative to unsecured creditors.

While the majority of our analysis focuses on the balance sheet debt-instrument level data, we also use the issuance level data from *SDC Platinum*, *Dealscan*, and Mergent's *FISD* for information on covenants and maturity. We utilize the issuance level data set to examine how covenants and debt maturity vary by credit rating, given that covenants and maturity are often not detailed for individual issues in the debt footnotes of the 10-K filings.

In addition to the sample described above, we also collect these data for the sample of "fallen angels," which are firms that are downgraded from investment grade (Baa3 or better) to speculative grade (Ba1 or worse) by Moody's Investors Services at some point from 1996 through 2006.[5] There are a total of 158 fallen angels in the *Compustat* universe. We make the following three additional restrictions to the sample of fallen angels. First, we exclude firms that file for Chapter 11 bankruptcy in the year of the downgrade (6 firms), given that the pre-petition debt is not included in *Compustat* debt figures after the firm enters bankruptcy proceedings. Second, we exclude firms for which the debt financial footnotes do not provide sufficient detail on debt issues (6 firms). Third, we exclude firms that have over 50% of their debt issued by financial subsidiaries two years before the downgrade (6 firms). This latter restriction is

[4] See Table I in Barclay and Smith (1995) and Baird and Rasmussen (2006) for support of this classification.
[5] Our focus on Moody's credit ratings and credit reports instead of S&P is driven by data availability considerations: we have Moody's data that provides us with the exact date of the downgrade, and we have the credit reports that describe the reasons for the downgrade. However, Moody's and S&P downgrades are highly correlated: 83% of firms two years before the Moody's downgrade are investment grade by S&P's ratings, and 75% of firms the year after the downgrade are also speculative grade by S&P's ratings.

made given that our focus is on debt of non-financial firms, and the behavior of firms with large financial subsidiaries may be significantly different following the downgrade. This leaves 140 fallen angels. For these 140 fallen angels, we collect the data for 2 fiscal years before through 2 fiscal years after the year of the downgrade (a total of 5 years per firm).

We refer to the observations for the 305 randomly selected firms as the "random sample" and the observations for the 140 fallen angels as the "fallen angels sample". The samples overlap by 29 firms, as 29 of the firms in the random sample were downgraded from investment grade to speculative grade during the 1996-2006 period.

B. Summary Statistics

Table I presents summary statistics for the 305 firms (2,453 firm-year observations) in the random sample. The first column of Panel A presents the totals of each type of debt, scaled by total capital.[6] The average total debt to capital ratio is 50% in our sample. Bonds make up 19% of capital structure, and bank debt makes up 13% of capital structure. Bank debt is almost evenly divided between term debt and draw-downs on revolving credit facilities. Further, as the third column shows, bonds and bank debt are both used by the majority of firms in our sample. Convertible debt (5.5%), program debt (4.4%), and private placements (3.3%) make up a smaller fraction of total capital structure and are used by fewer firms.

Although every firm in our sample has an issuer credit rating at some point between 1996 and 2006, there are some firm-year observations where the firm does not have a credit rating. The second column of Table I shows the mean share of total capital for only the rated firm-years in our sample. Most of the averages are similar. However, rated firm-years utilize three percentage points more total debt as a share of total capital. Rated firms achieve this higher debt share primarily by using more bonds and program debt, consistent with Faulkender and Petersen (2006).

The bottom part of Panel A shows average priority structure of debt for sample observations. Almost 25% of capital structure consists of senior unsecured debt. Secured debt makes up 15% of capital

[6] Total capital is defined to be total debt plus the book value of shareholders' equity.

structure, and secured bank debt is over 60% of total secured debt. Subordinated debt makes up 11% of capital structure, and is dominated by subordinated bonds and subordinated convertible debt. The averages are similar for both the full sample and the sample of rated firm-years.

Panel B of Table I shows sample summary statistics on standard financial variables. Rated firm-year observations have a mean asset size of $8.0 billion and mean total capital (debt plus equity) of $5.2 billion, the difference being attributed to non-debt liabilities and net working capital. Profitability, defined as earnings before interest and taxes (after depreciation) scaled by book capital has a mean of 0.114 among rated firm-year observations, and a standard deviation of 0.133.

II. The Importance of Debt Heterogeneity in Capital Structure Studies

Most empirical capital structure studies treat debt as uniform. In this section, we use our detailed balance-sheet debt composition data to show the limitations of this approach. In Panel A and Panel B of Table II, we show that the grand majority of firms in our sample simultaneously use more than one type of debt financing. Panel A conditions the sample on firms for which 10% of their total debt comes from a given type of debt, and then examines which other types of debt are also a significant portion of total debt. For example, the top row of Panel A shows that 53% of firm-year observations in our sample utilize a significant amount of bank debt. The second row shows that, conditional on these 53% of firm-year observations that use a significant amount of bank debt, 55% also use a significant amount of bonds in their capital structure. This finding directly disputes the notion that firms rely only on bonds or bank debt: a substantial fraction utilize both.[7] Similarly, 49% of firms that use a significant amount of bonds in their debt structure also use a significant amount of bank debt.

Panel B shows the fraction of firm-year observations that use a significant amount of multiple types of debt, where significant is again defined to be 10% or more of total debt. As it shows, 68% of firm-year observations significantly utilize at least two types of debt financing. Taken together, the

[7] For example, Billett, King, and Mauer (2007) state: "…public borrowers and private borrowers tend to be distinct groups of firms … Since our sample is composed of public debt issuers, it is unlikely that these firms use large amounts of private debt" (p. 701).

findings in Panel A and Panel B demonstrate that studies that treat debt as uniform ignore a substantial fraction of variation in capital structure.

Further, as we show in Panel C, an analysis that focuses only on total debt misses a substantial fraction of variation in *changes* in capital structure. In Panel C, we split the sample into three groups: firms that experience a change in total debt scaled by lagged total capitalization of -2.5%, between -2.5% and 2.5%, and above 2.5%. The middle group includes "stable" firms that increase or decrease their total debt by less than 2.5% of lagged total capitalization. Previous studies that focus only on total debt would conclude that these firms do not adjust their capital structure.

In contrast, we examine whether these "stable" firms experience significant changes in the underlying structure of the debt, despite keeping the total amount of debt constant. We find that 26% of firms significantly alter their underlying debt structure despite keeping a relatively constant level of debt. This capital structure variation is completely missed by studies that treat debt as uniform. These findings suggest that firms adjust the securities in their capital structure even when total debt remains constant.

Studies that focus on total debt miss a substantial fraction of variation in capital structure; in Table III, we show that this variation is important in determining what factors influence capital structure. Column 1 of Panel A presents regression coefficients relating the total debt to total capitalization ratio to basic determinants of capital structure used in previous studies. The correlations match those previously found: more profitable and high market to book firms use less debt while firms with higher asset tangibility use more debt.

However, when we break out the different types of debt, we see that these correlations show substantial heterogeneity for different types of debt. For example, the strong negative correlation between profitability and leverage ratios in the cross-section is driven largely by convertible bonds and non-Rule 144A private placements. In contrast, profitability is positively correlated with the amount of bank debt in the capital structure. Similarly, the positive asset tangibility correlation is driven by program debt and bonds. Panel B presents estimates with year and 2-digit industry fixed effects, yielding similar results. The addition of firm fixed effects (not shown) removes much of the statistical significance due to a

combination of the small sample and the importance of firm fixed effects in capital structure regressions (Lemmon, Roberts, and Zender (2008)). However, our results clearly show substantial variation across different types of debt in terms of the response to the usually hypothesized cross-sectional determinants of capital structure.[8]

The findings in Table III show that even the basic correlations shown in previous studies between leverage ratios and firm characteristics mask important variation across different types of debt instruments. This reflects the fact that different types of debt are fundamentally distinct in terms of cash flow claims, sensitivity to information problems, and managerial incentive effects. Taken together, the findings in Table II and Table III highlight the importance of recognizing debt heterogeneity in capital structure studies.

III. Debt Heterogeneity, Credit Quality, and Capital Structure

A. Theoretical Motivation

The results in the section above suggest that an explicit recognition of debt heterogeneity is necessary to understand the determinants of capital structure. In this section, we motivate our empirical analysis of the relation between debt structure and credit quality by examining hypotheses from the theoretical literature on debt composition and priority.

The first group of theories hypothesizes that firms should move from bank debt to non-bank debt as credit quality improves (Diamond (1991), Chemmamur and Fulghieri (1994), Boot and Thakor (1997), and Bolton and Freixas (2000)). The seminal article is Diamond's (1991) model of reputation acquisition. In his model, firms graduate from bank debt to arm's length debt by establishing a reputation for high earnings. More specifically, the main variable that generates cross-sectional predictions is the ex-ante probability that a firm is a bad type with a bad project; this ex-ante probability is updated over periods based on earnings performance, and is interpreted as a credit rating. Bad firms have a lower history of

[8] To be clear, we are not interpreting these correlations to be consistent with any one given economic model. We are simply showing that the raw correlations between the leverage ratio and firm characteristics documented in previous capital structure studies are dramatically different if one separates the underlying debt instruments.

earnings, and a higher probability of selecting a bad project in the future. High quality firms borrow directly from arm's length lenders and avoid additional costs of bank debt associated with monitoring, medium-quality firms borrow from banks that provide incentives from monitoring, and the lowest quality firms are rationed.[9]

The model by Bolton and Freixas (2000) explores the optimal mix of bonds, bank debt, and equity. The key distinction between bonds and bank debt is the monitoring ability of banks. If current returns are low and default is pending, banks can investigate the borrower's future profitability, whereas bond holders always liquidate the borrower. In their model, high quality firms do not value the ability of banks to investigate, and therefore rely primarily on arm's length debt. Lower quality borrowers value the ability to investigate by the bank, and thus rely more heavily on bank financing.[10]

The second group of theories examines why firms structure debt into multiple classes based on priority, maturity, or type (Diamond (1993), Besanko and Kanatas (1993), Park (2000), DeMarzo and Fishman (2007), and DeMarzo and Sannikov (2006)). A particularly intuitive example is Park (2000), who examines the reasons why lenders with monitoring duties may be senior in priority. In Park's (2000) model, borrowers may undertake risky negative NPV projects, and the moral hazard problem is severe enough that external financing is possible only if a debt claimant monitors the borrower's activities.

Two main hypotheses emerge from this kind of model. First, the lender with monitoring duties (the bank) should be the most senior in the capital structure. The intuition is as follows: a bank's incentive to monitor is maximized when the bank appropriates the full return from its monitoring effort. In the presence of senior or pari passu non-monitoring lenders, the bank is forced to share the return to monitoring with other creditors, which reduces the bank's incentive to monitor.[11]

[9] Diamond (1991) interprets his model as describing the trade-off between bank debt and *commercial paper*, not necessarily all types of non-bank debt (see page 715).
[10] Bolton and Freixas (2000) also investigate the use of equity, which is used as the primary source of financing by the lowest quality borrowers.
[11] This hypothesis is not trivial. For an alternative view, see Fama (1990).

Second, the presence of junior non-bank creditors enhances the senior bank's incentive to monitor. This result follows from the somewhat counterintuitive argument that a bank has a stronger incentive to monitor if its claim is *smaller*.[12] Park (2000) describes this intuition as follows:

> … if the project continues, an impaired senior lender will get less than a sole lender simply because his claim is smaller. On the other hand, if the project is liquidated, an impaired senior lender will get the same amount as a sole lender, the liquidation value. (p. 2159).

Given its lower value in the going concern, a bank with a smaller claim actually has a stronger incentive to monitor and liquidate the firm. The presence of junior debt reduces the size of the bank's claim, which increases the amount of socially beneficial monitoring.

The intuition of this latter result is evident if one considers a bank creditor with a claim that represents a very large fraction of the borrower's capital structure. In such a situation, the bank has less of an incentive to liquidate a risky borrower, given that the bank's large claim benefits relatively more from risk-taking than a smaller claim. In other words, a large bank claim is more "equity-like" than a small bank claim given its upside potential. As a result, reducing the size of the senior bank claim by adding junior debt *improves* the banks' incentive to detect risk-shifting. Alternatively, by holding a small stake in the firm, bank lenders are able to credibly threaten borrowers with liquidation, which makes their monitoring more powerful in reducing managerial value-reducing behavior.

There are at least two ways, however, in which the existing theories do not map into our empirical design. First, theories such as Diamond (1993), Besanko and Kanatas (1993), and Park (2000) derive a priority structure as the optimal contract under incentive conflicts, but they do not explicitly derive the comparative static of how optimal priority structure should vary across a continuum of incentive conflict severity. A thought experiment close to this is provided by DeMarzo and Fishman (2007), who do examine the comparative statics of debt structure with respect to liquidation values,

[12] One caveat is that if the bank is to have any incentive to monitor, its claim must be at least large enough to be impaired by liquidation. This assumption is supported by the fact that observed bank debt recovery rates are 75% according to S&P. See Hamilton and Carty (1994). Conditional on the lender being impaired in liquidation, a smaller claim will strengthen monitoring incentives.

managerial patience, and managerial private benefits. However, their predictions are about the mix between long-term debt and lines of credit, rather than priority structure per se.

Second, with the exception of DeMarzo and Fishman (2007) and some other recent dynamic contracting work, these theories are static in nature, and so therefore do not predict how debt structure should change with respect to the evolution of stochastic cash flows. In this sense, the theory is more relevant for our random sample cross-sectional results more than our panel results on fallen angels. Indeed, Diamond (1993), Besanko and Kanatas (1993), and Park (2000) are ex-ante models in which moral hazard explains the existence of priority structure; however, they do not consider dynamic deterioration in the firm's credit quality. In DeMarzo and Fishman (2007), agents draw down on credit lines when cash flows are insufficient to pay debt coupons. However, there are no dynamic models to our knowledge that derive both an increase in secured and subordinated debt as a percentage of total debt, i.e. the spreading of the debt structure that we find as credit quality deteriorates.

With these caveats in mind, our empirical analysis of debt structure is focused on three broad questions raised by the theoretical literature. First, when the potential cost of asset substitution is large, do firms place bank debt with a monitoring function senior to all other debt in the capital structure? Second, is the priority structure of debt particularly evident when firms are likely to face more serious agency costs of debt? Third, do firms of lower credit quality use more monitored sources of debt finance? We examine these questions below.

B. Debt Priority Results

Figure 1 in the introduction presents our first main result on the relation between credit quality and debt structure: firms lower in the credit quality distribution spread the priority structure of their debt obligations. While investment grade firms rely uniquely on senior unsecured debt and equity, speculative grade firms rely on a combination of secured bank debt, senior unsecured debt, subordinated convertibles and bonds, and equity.

Table IV presents estimates of these patterns in a regression context.[13] In Panel A, the left hand side variables are the individual types of debt amounts scaled by total debt. The omitted credit quality group is firms rated A or better. As the coefficients show, speculative grade firms have a much higher fraction of their debt in secured and subordinated obligations. The magnitude is economically significant: secured and subordinated debt as a fraction of total debt are 50% higher for firms with a B rating than for firms with a rating of A or better. The higher fraction of secured debt is driven by bank secured debt, whereas the higher fraction of subordinated debt is driven by bonds and convertible debt.

In Panel B, the left hand side variable for each regression is the individual type of debt amount scaled by total capitalization. The results are qualitatively similar to the results in Panel A: lower credit quality firms use a substantially higher fraction of secured and subordinated debt in their capital structure. Once again, the magnitudes are striking: the combination of secured and subordinated debt as a fraction of total capital structure is higher by more than 40% for B-rated firms compared to firms rated A or higher. Meanwhile, senior unsecured debt actually decreases as in the capital structure despite the fact that total debt increases. Naturally the decrease in senior unsecured is smaller when scaled by total capitalization than by total debt. This reflects the fact that lower credit quality firms use more total debt and less equity. In other words, as firms move down the credit quality distribution, they replace senior unsecured debt and equity with secured bank debt and subordinated debt. This finding is also evident in Panel A of Figure 1 in the introduction.

One potential concern with the results in Table IV is that they reflect two distinct set of firms: perhaps some low credit quality firms have more secured debt in their capital structure while others have more of subordinated debt without overlap between the two groups. To the contrary, Figure 2 shows that many low credit quality firms simultaneously use both secured and subordinated debt. Panel A illustrates that among investment grade firms, almost 60% have no significant amount of either secured or subordinated debt in their debt structure, where significant is defined to be at least 10% of total debt. In

[13] The analysis in Table IV is limited to the 1,829 firm-year observations where the firms have a credit rating. Our results are materially unchanged if we use the full sample and predict ratings using size, the market leverage ratio, profitability, and the market to book ratio.

contrast, less than 10% have both a significant amount of secured and subordinated debt. Panel B shows that among speculative grade firms, almost 35% of firms have a significant amount of both secured and subordinated debt in their debt structure. While 60% of investment grade firms have no significant amount of secured or subordinated debt, less than 15% of speculative grade firms are in the same category.

In Table V, we include firm fixed effects to non-parametrically remove omitted time-invariant firm factors that may lead to spurious correlations between credit quality and debt structure. The firm fixed effects results in Panel A show a greater use of secured bank debt and subordinated bonds and convertibles for B-rated firms than for firms rated A or better. The results for firms rated CCC or worse are more volatile, which reflects the fact that only 2.6% of the sample is in this category. The negative effect of credit quality on senior unsecured debt fraction of total debt is similar with and without firm fixed effects.

The results in Panel B show that secured and subordinated debt as a fraction of total capital structure increase sharply as firm credit quality deteriorates, even with the inclusion of firm fixed effects. The combination of secured and subordinated debt increases by 25% of capital structure as a firm moves from A to B in the credit quality distribution. As before, the increase in secured debt is driven by bank debt whereas the increase in subordinated debt is driven by bonds and convertibles.

The biggest difference in the firm fixed effects results is the effect of lower credit quality on the amount of senior unsecured debt in the capital structure. In specifications without firm fixed effects, senior unsecured debt declines as a fraction of total capital structure as one goes down the credit quality distribution. With firm fixed effects, senior unsecured debt increases sharply between A or better and BBB. It is then almost constant between BBB and CCC or below. The fixed effects specifications suggest that lower quality firms use less equity and more secured and subordinated debt relative to higher quality firms, but there is also evidence that senior unsecured debt is slightly higher. Within firms over time, the

downward effect of lower credit ratings on senior unsecured as a share of total debt is not large enough to offset the upward effect of lower credit ratings on overall debt use.[14]

One potential concern with our priority results is debt maturity. More specifically, one view is that managers have as their primary objective optimization of the maturity structure of their debt with respect to credit quality. Perhaps in this case the priority results are just an artifact of the desire to change the maturity structure. In Figure 3, we use the issuance level data to show the average maturity of debt issuances across the credit quality distribution. The top panel shows means and the bottom shows medians. The basic pattern suggests that bank debt is of longer maturity as one goes down the credit quality spectrum, whereas bonds and convertibles show a slight inverted U-shape pattern.[15] Regardless, the solid line shows the average and median maturity of all debt across the credit quality distribution, and shows that there is no strong pattern. Unlike the results on debt priority, there is no strong relation between credit quality and overall debt maturity.

The spreading of the priority structure that we document in this section is statistically robust and economically meaningful. This result has several important implications. First, the findings help dispute the hypothesis that the equilibrium debt structure conditional on credit quality consists of one type of debt for a given firm. Instead, as firm credit ratings deteriorate, debt structure shifts toward a combination of secured bank debt, subordinated bonds, and subordinated convertibles. Second, to the extent that conflicts of interest are worse for firms of poor credit quality, these findings support agency-based models of capital structure which hypothesize that firms with incentive conflicts between managers and external financiers will utilize a multi-tiered capital structure with different types of debt. Risk shifting is a more serious threat for speculative grade firms relative to investment grade firms because they are closer to the

[14] However, in Section IV below, we show that when we look at firms experiencing major downgrades from investment grade to speculative grade, senior unsecured debt does indeed fall not only as a share of total debt but also as a share of total capital.

[15] The lengthening of bank debt as credit quality deteriorates is likely an artifact of bank regulation which allows for lower capital charges for unused revolvers that are shorter than 365 days in maturity. These are disproportionately used by higher credit quality firms given that they are less likely to draw on these revolvers. In addition, Roberts and Sufi (2008a) find that over 90% of bank debt contracts with maturity over a year are renegotiated before their maturity date, so it is not obvious that the effective maturity of bank debt lengthens significantly as credit quality deteriorates.

default boundary where risk shifting benefits equity at the expense of creditors. Third, the statistically robust relationship between credit quality and debt priority shows that there are strong observable patterns in corporate capital structure that are entirely missed in studies that ignore debt heterogeneity.

C. Covenants and Monitoring

We have interpreted our results above in light of models predicting that in the presence of risk shifting incentives by managers, bank debt must be senior in a multi-tiered capital structure to preserve monitoring incentives. In this section, we examine more explicit measures of monitoring by creditors through a focus on the incidence of financial and non-financial covenants in bank and non-bank debt across the credit quality distribution.[16] The main data set employed is the origination issue level dataset, as opposed to the balance sheet issue level dataset used in the priority section above. We use the origination issue level dataset given that covenants are not always detailed in the 10-K financial footnotes. In contrast, *Dealscan* and *FISD* contain covenant information for loans and bonds, respectively.

Figure 4 examines the incidence of covenants in bank debt (Panel A) and bonds (Panel B) across the credit quality distribution. As Panel A shows, the incidence of restrictions on capital expenditures and dividends increases sharply between A and BB. There is also an increase in the incidence of borrowing base clauses, which make the availability of credit under a revolving credit facility explicitly contingent on the value of collateral (typically accounts receivable). Unsurprisingly, the evidence shows that bank monitoring is substantially stronger for firms of weaker credit quality.[17]

We examine bond covenants in Panel B. One interesting result is that there is a decline in negative pledge clauses in bond indentures as firms move from investment grade to speculative grade. This decline is consistent with the increase in the use of secured bank debt by speculative grade firms

[16] Since the seminal work on covenants by Smith and Warrner (1979), several articles argue that the existence and enforcement of covenants are indicative of monitoring by creditors. See Rajan and Winton (1995), Diamond (1991), and Park (2000) for theoretical evidence and Chava and Roberts (2007), Nini, Smith, and Sufi (2007), Roberts and Sufi (2008b), Sufi (2007b), and Mester, Nakamura, and Renault (2007) for empirical evidence.

[17] Nini, Smith, and Sufi (2008) show evidence that capital expenditure restrictions lead to lower capital expenditures and are correlated with improved future firm performance.

shown in Section III.B. This result suggests that bond indentures are designed to accommodate the higher priority of bank debt as firms' credit quality worsens.

In addition, there is a sharp increase in the use of cross-default provisions, which trigger a default on the bond if a firm defaults on any other debt obligation. The increase in cross-default provisions in subordinated bond indentures is consistent with the idea that secured bank debt takes on the main monitoring function for speculative grade firms. That is, the use of cross-default provisions for speculative grade firms suggests that bond-holders preserve value by relying on the enforcement of covenants by secured bank creditors.

There is an increase in asset sale, dividend, and stock issue restrictions in bond indentures between investment grade and speculative grade. While this evidence could be interpreted as additional monitoring by bondholders on some margins, extant research suggests that bond covenants are weaker and less likely to encourage monitoring than bank covenants. For example, Kahan and Tuckman (1993) find that, relative to bond indentures, loan agreements "more aggressively control the actions of equity holders by setting various covenants more tightly," and "provide lenders with the means to monitor borrowers more carefully." Kahan and Yermack (1998) document the almost complete absence of covenants in convertible issues, a fact which we confirm in our data. Verde (1999) compares bonds to loans for the same borrowers and notes that "… the scope of [bond] restrictions and the level of compliance required of the borrower are generally loose and add little value in protecting bondholders." Also, "… explicit protections afforded high-yield bondholders are weak in comparison to those provided to leverage loan creditors." Bond covenants may protect bondholders in extreme events but they are not set to facilitate bondholder monitoring.

Figure 5 supports this argument by examining the incidence of financial covenant violations, which are collected from annual 10-K SEC filings.[18] Financial covenant violations are perhaps the most direct evidence of monitoring intensity, given extant research on the actions taken by creditors following

[18] See Sufi (2007b) for more information on the regulations that require the reporting of financial covenant violations, and how these data are collected from the SEC filings.

violations (Chava and Roberts (2008), Roberts and Sufi (2008b), Nini, Smith, and Sufi (2008)). Figure 5 demonstrates a sharp increase in the incidence of bank financial covenant violations as firms move down the credit quality distribution. In contrast, there are almost no violations of non-bank financial covenants (Sweeney (1994)).

Taken together, these findings suggest that the relative monitoring intensity of bank debt versus bonds is much higher for firms of poorer credit quality. While the incidence of certain bond covenants also increases, the evidence suggests that bond covenants provide fewer protections and lower incentives to monitor than bank loan covenants. Together with the results on priority, these results suggest that banks simultaneously increase monitoring and acquire the first claim on assets. For lower quality firms, banks with a monitoring function move to a position where they have a small claim with first priority, an equilibrium that bears similarities to Park (2000).

D. Liquidity and Access to Arm's Length Debt

Our findings above directly dispute the argument in many theoretical models that low credit quality firms do not use arm's length debt financing. Instead, speculative grade firms rely heavily on subordinated bonds in their capital structure.

However, there are distinct patterns in the use of arm's length program debt that are supportive of these models. Figure 6 shows access to program debt across the credit quality distribution. There is a sharp drop in the use of commercial paper, medium-term notes, and shelf registration debt as firms move down the credit quality distribution. Program debt makes up almost 15% of capital structure for firms rated A or above. There is a sharp drop down to 8% for firms rated BBB, and access to program debt disappears completely when firms drop from investment grade to speculative grade.

Together with earlier results, Figure 6 provides important insight into models in which lower credit quality firms lack access to arm's length debt financing. Our findings suggest that these models are quite accurate in describing the use of arm's length program debt across the credit quality distribution. Relative to investment grade firms, speculative grade firms do not have access to arm's length program debt and are forced to rely on secured bank debt with tight covenants, as shown in Figure 1, Panel A of

Figure 4, and Figure 5. However, speculative grade firms continue to issue long-term arm's length *non-program* debt, through the issuance of subordinated bonds and convertibles.

E. Alternative Hypotheses

In this section we address several alternative explanations for our results. Figure 6 raises the first concern, namely that due to various regulations the decline in arm's length program debt for speculative grade firms may be mechanical. For example, money market funds are not allowed to hold unrated commercial paper, and only investment grade firms are able to obtain a commercial paper rating from the credit rating agencies. There is no doubt that regulation is an important factor. However, there are no SEC imposed regulations on the use of medium-term-notes or shelf registration debt by speculative grade firms. Likewise, there are no SEC imposed regulations on the issuance of unrated commercial paper by speculative grade firms. Finally, no regulation mandates that banks must place tight covenants on the debt they extend to speculative grade firms. While regulation is clearly important, it is difficult to argue that it is the only reason why speculative-grade firms use less arm's length program debt and more secured bank debt with tight covenants relative to investment grade firms.

A second and related concern is that perhaps our results are explained by excessive conservatism on the part of regulated commercial banks. This bank conservatism hypothesis could potentially explain why the use of secured and covenant-protected bank debt increases, while subordinated debt may increase because firms need more capital than banks will give them.

While we do not test this hypothesis directly, it is important to emphasize that almost 95% of the speculative-grade firms in our sample utilize bank term debt or a bank revolving credit facility. As our results above show, speculative grade firms are able to issue private placement and convertible debt. And as we show below, firms that get downgraded from investment grade to speculative grade are actually able to increase their use of these debt types. If bank covenants simply imposed excessive restrictions on firms and did not provide valuable monitoring, speculative-grade firms should be able to eliminate bank debt from their capital structure entirely. The fact that almost every speculative-grade firm maintains a

bank credit facility supports models in which bank debt with tight covenants is an important component of optimal debt structure. In these models, banks will endogenously appear "conservative."

A third alternative hypothesis for our results is that in dealing with speculative-grade firms, banks use their information advantage relative to outsiders to extract surplus through higher interest rates, more collateral, and tighter covenants (Rajan (1992)). Two facts dispute this interpretation. First, junior non-bank claimants would be less willing to provide subordinated and convertible debt if the senior claimant is extracting a significant portion of surplus from profitable borrower projects. To the contrary, we find that subordinated and convertible non-bank debt is higher for speculative-grade firms, and in Section IV we will show that these debt sources increase for firms that are downgraded. This finding is difficult to reconcile with the bank extraction hypothesis. Second, previous research suggests that the announcement of a new bank credit facility elicits a positive equity price response, and the imposition of tighter covenants after credit quality deterioration improves the borrower's market valuations and cash flow performance (James (1987), Nini, Smith, and Sufi (2008), Demiroglu and James (2007)). These findings dispute the notion that banks inefficiently hold up borrowers of low credit quality.

IV. Fallen Angels

A. Motivation and Background

In the theoretical literature, the relation between credit quality and debt structure is a causal relation: differences in debt structure between investment grade and speculative grade firms are caused by differences in credit quality. While the correlations in the previous section are statistically robust and economically meaningful, one concern is that they do not reflect a causal relation. Perhaps the most obvious concern is one of direct reverse causality: for a reason other than credit quality, firms choose to structure their debt in a manner which causes credit rating agencies to assign them low ratings.

In this section, we focus on a different sample of firms known in the financial press as "fallen angels." These are 140 firms that are downgraded by Moody's from investment grade to speculative grade

during the period of our sample.[19] The advantage of this sample is that we know the precise reason for the downgrade from Moody's credit reports, and we can therefore focus on the set of firms for which the downgrade is likely to be exogenous from previous managerial capital structure decisions. For example, Moody's downgraded all major U.S. airlines in the aftermath of the attacks on September 11th, 2001; this credit downgrade is likely to be exogenous from capital structure decisions made before the attacks. More generally, and as we explain further below, we can isolate the sample to fallen angels for whom there is no evidence from the downgrade reports that managers have taken capital structure decisions before the downgrade that caused the downgrade.

A key question is how fallen angels differ from the random sample used in the previous section. Table VI presents the year and industry distribution of both samples. As Panel A shows, downgrades are distributed across the entire sample period, although more downgrades occur during the economic downturn from 2000 to 2002. In other words, our analysis of fallen angels is not concentrated in one or two years; there are numerous downgrades in every year of our sample. Likewise, as Panel B shows, there are no dramatic differences in the industrial composition of fallen angels and the random sample used in the results above. Fallen angels are slightly less likely to be in service industries and slightly more likely to be in manufacturing industries, but the differences are small.

In Table VII, we compare the characteristics of fallen angels two years before they are downgraded to comparably rated firms from the random sample that are not downgraded. We do this as follows. First, we show summary statistics for the standard financial variables for the fallen angel firms two years before the downgrade and for random sample firms of the same credit rating. This comparison addresses the concern that fallen angels have important differences in characteristics even before the downgrade. We then present the coefficients of a regression of each characteristic on an indicator variable for whether it is a firm that is two years before a downgrade. The regression is conducted in a sample consisting of all the random sample observations plus the observations from the fallen angels two years

[19] As explained in Section I.A., this is close to the universe of these fallen angels. Note that 29 firms in this sample also happened to be in the random sample, whereas the remaining 119 are collected separately.

before the downgrade, and it contains rating and 2-digit industry fixed effects. While there are some differences between fallen angels two years before the downgrade compared to comparably rated firms from the random sample, none of the differences are statistically significant at strong confidence levels. The differences that are marginally significant are the total capital base of the firms and the market-to-book ratio. Two years before the downgrade, fallen angels are smaller than comparably rated firms from the random sample and have slightly lower valuations relative to book value.

B. Fallen Angels Results

In order to examine whether changes in credit quality cause changes in debt structure, we focus on fallen angels for two years before the downgrade through two years after the downgrade. More specifically, we estimate the following specifications:

$$\frac{DebtType_{it}}{TotalCapital_{it}, TotalDebt_{it}} = \alpha_i + \delta_t + \boldsymbol{I}_{it}^{t-2} * \beta_1 + \boldsymbol{I}_{it}^{t} * \beta_2 + \boldsymbol{I}_{it}^{t+1} * \beta_3 + \boldsymbol{I}_{it}^{t+2} * \beta_4 + \varepsilon_{it}$$

where the **I** variables are indicator variables for two fiscal years before, the fiscal year of, and the fiscal year after the downgrade respectively. The dependent variable is the type of debt scaled by either total capital or total debt. The coefficients of interest are β_1, β_2, β_3, and β_4, which represent the within-firm change in the dependent variable for a given fiscal year *relative to the omitted category, which is the year directly before the downgrade (t-1)*. We choose as the omitted category one year before the downgrade to test whether patterns are statistically significantly different right before and immediately after the downgrade. For example, if the dependent variable is secured debt scaled by total capital, the coefficient estimate for β_3 represents the average within-firm change in secured debt scaled by total capital in the fiscal year immediately after the downgrade year relative to the fiscal year immediately before the downgrade year. The estimation in equation (1) includes firm and year fixed effects, and standard errors are clustered by firm.

Table VIII presents the results. The first important result is that almost none of the coefficients in the top row are statistically significantly different from 0 at a reasonable confidence level. In other words, from two years before to the year before the downgrade, there is no significant change in the capital

structure of fallen angels. The only significant coefficient in the top row is for subordinated debt, and it suggests a slight increase in subordinated debt from two years before to the year before the downgrade. However, the magnitude is small: the change is only 1.7% of total debt, and 1.1% of total capital.

In contrast, there are sharp changes in capital structure in the year of the downgrade. Similar to the random sample, fallen angels experience a sharp increase in both subordinated and secured debt from the year before the downgrade to the year after the downgrade. By two years after the downgrade, the total fraction of debt that is subordinated or secured increases by almost 23% (11.9% for secured debt plus 10.9% for subordinated debt). As in the random sample, the changes are driven by an increase in secured bank debt and in subordinated bonds and convertibles. In Panel B, we scale the debt types by total capital and find similar results. In terms of magnitudes, secured bank debt increases by 9% of total capital and subordinated debt increases by 7% of capital. In other words 16% of capital is refinanced into secured and subordinated debt from the year before to two years after the downgrade.

There is one additional result from Table VIII worth emphasizing. Unlike the fixed effects results with the random sample, Panel B of Table VIII shows a sharp decline in senior unsecured debt as a fraction of total capital among fallen angels. From the year before to two years after the downgrade, senior unsecured debt decreases by 7% of total capital. This result suggests that fallen angels experience a reduction of both equity and senior unsecured debt that is replaced with secured bank debt and subordinated bonds and convertibles.

In order to further mitigate concerns of reverse causality, we exploit information in the downgrade reports by Moody's. We manually read these reports, and we isolate the sample to firms for which Moody's cites only business reasons for the downgrade. We exclude any firm for which Moody's cites financial weaknesses such as leverage, coverage ratios, lower financial flexibility, or worsened credit metrics. The remaining firms are downgraded for reasons such as market conditions, cash flows, operations, operating performance, competitive environment, weakened demand, terrorism, litigation, and decreased profitability, without mention of financial factors. Table IX presents the results from isolating

the sample to this set of fallen angels. Even in this sample of only 64 borrowers, the coefficient estimates are almost identical and actually larger for subordinated debt.

In a further unreported robustness test, we isolate the sample to 34 borrowers that are downgraded in the first quarter after the end of the fiscal year before downgrade. These borrowers have less time in which to change debt structure before the downgrade. The estimates, although statistically weaker, are similar in magnitude.

Taken together, the results on the sample of fallen angels provide support for a causal interpretation: changes in credit quality lead to statistically significant and economically meaningful changes in debt structure. In both the random sample and fallen angels sample, we find remarkably consistent results: relative to higher credit quality firms, lower credit quality firms utilize a multi-tiered capital structure that includes secured bank debt with tight covenants and subordinated bonds and convertibles. The findings are similar when we examine a small set of firms for which deterioration in credit quality is independent of any previous capital structure decisions by the manager.

V. Conclusion

Using a novel data set on the debt structure of a large sample of rated public firms, we show that debt heterogeneity is a first order aspect of firm capital structure. The majority of firms in our sample simultaneously uses bank and non-bank debt, and we show that a unique focus on leverage ratios misses important variation in security issuance decisions. Furthermore, cross-sectional correlations between traditional determinants of capital structure (such as profitability) and different debt types are heterogeneous. These findings suggest that an understanding of corporate capital structure necessitates an understanding of how and why firms use multiple types, sources, and priorities of corporate debt.

We then examine debt structure across the credit quality distribution. We show that firms of lower credit quality have substantially more spreading in their priority structure, using a multi-tiered debt structure often consisting of both secured and subordinated debt issues. We corroborate these results in a separately collected dataset for firms that experience a drop in credit quality from investment grade to

speculative grade. Here too, firms spread their priority structure as they worsen in credit quality. The spreading of the capital structure as credit quality deteriorates is therefore both a cross-sectional and within-firm phenomenon. The increased secured debt used by lower quality firms is generally secured bank debt, whereas the increased subordinated debt is in the form of bonds and convertibles

The spreading of the capital structure as credit quality deteriorates is broadly consistent with models such as Park (2000) that view the existence of priority structure as the optimal solution to manager-creditor incentive problems. However, to our knowledge, the existing models do not exactly deliver the dynamics that we find. For example, they do not derive differential priority structures as a function of a continuum of either moral hazard severity or creditor quality types. Further, these models do not explain why non-bank issues after a firm is downgraded must be subordinated to existing non-bank debt or convertible to equity. Theoretical research suggests that the use of convertibles can mitigate risk shifting by making the security's value less sensitive to the volatility of cash flows (Brennan and Schwartz (1988)) or by overcoming the asymmetric information problem in equity issuance (Stein (1992)). Future research could aim to integrate these ideas about convertible debt into a conceptual framework that links debt structure and capital structure.

We close by highlighting two other avenues for future research. First, our findings suggest that recognition of debt heterogeneity might prove useful in examining the effect of financing on investment or the importance of adjustment costs in capital structure studies. Indeed, we have shown that firms frequently adjust their debt structure even when total debt remains relatively stable. This latter fact suggests that adjustment costs are not as large as an examination of total debt implies. Second, we hypothesize that our findings with regard to fallen angels may help explain the difference between bank and non-bank debt recovery rates in bankruptcy (Hamilton and Carty (1999), Carey and Gordy (2007)). According to Standard & Poor's, bank debt recovery rates are 75% whereas senior unsecured bonds recover only 37%. Our findings suggest that one can perhaps trace the bank debt recovery premium to the moment when firms move from investment grade to speculative grade debt ratings. It is at this point that banks become secured and increase the use of control-oriented covenants, both of which are likely to

increase recovery rates in the event of bankruptcy. We look forward to additional research that pursues these and other related questions.

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Table I: Summary Statistics on Debt Composition and Priority, Random Sample

Panel A of this table presents summary statistics on debt composition and priority for a random sample of 305 rated firms. In the columns "All Observations," all available fiscal years from 1996-2006 are included for each firm. In the columns "Rated Firm-Years," only those firm-years with available S&P credit ratings are included. Debt composition data were collected from the debt financial footnotes contained in the annual report of the 10-K filings. To aid in the categorization, issue level data from Dealscan and SDC Platinum were employed. Panel B shows sample summary statistics on standard financial variables as measured in Compustat. Total capital is defined as debt plus equity at book value. Profitability is defined as earnings before interest and taxes (after depreciation) scaled by lagged book capital. Debt is measured at book value.

Panel A: Composition and Priority of Total Debt

	Mean Share of Total Capital (D+E)		Nonzero Observations (Share of Total)	
	All Observations	Rated Only	All Observations	Rated Only
Equity (Book Value)	0.498	0.470		
Total Debt, by Type	0.502	0.530	0.967	0.985
Bonds (Non-Program, Non-Convertible)	0.192	0.230	0.651	0.777
Public	0.076	0.099	0.327	0.426
Revenue Bonds	0.008	0.009	0.207	0.237
144A Private Placements	0.108	0.122	0.338	0.400
Bank	0.132	0.119	0.679	0.689
Drawn Revolvers	0.068	0.055	0.516	0.506
Term Loans	0.064	0.064	0.413	0.432
Convertible Bonds	0.055	0.055	0.257	0.293
Program Debt	0.044	0.055	0.255	0.328
Commercial Paper (CP)	0.015	0.019	0.155	0.197
Medium Term Notes (MTN)	0.011	0.014	0.114	0.147
Shelf-Registered Debt	0.018	0.022	0.144	0.190
Private Placements (Excluding 144A)	0.033	0.027	0.200	0.222
Mortgage Debt and Equipment Notes	0.021	0.021	0.225	0.237
Other Debt	0.024	0.023	0.714	0.745
Acquisition Notes	0.003	0.002	0.077	0.073
Capitalized Leases	0.011	0.009	0.347	0.352
Unclassified	0.011	0.012	0.524	0.578
Total Debt, by Priority	0.502	0.530	1.000	1.000
Secured Debt	0.149	0.138	0.715	0.723
Bonds (Non-Convertible)	0.011	0.085	0.089	0.390
Bank	0.093	0.021	0.397	0.237
Mortgage Debt and Equipment Notes	0.021	0.012	0.225	0.104
Senior Unsecured Debt	0.238	0.270	0.797	0.856
Subordinated Debt	0.114	0.121	0.369	0.412
Bonds (Non-Convertible)	0.059	0.071	0.179	0.220
Convertible Bonds	0.043	0.042	0.183	0.204
Observations	2453	1829	2453	1829

Panel B: Sample Summary Statistics on Standard Financial Variables

	All Observations (N=2453)			Rated Only (N=1829)		
	Mean	Standard Deviation	Median	Mean	Standard Deviation	Median
Book Assets	6185	17862	1305	7950	20302	1998
Total Capital	4078	11408	926	5217	12963	1398
Profitability	0.103	0.149	0.109	0.114	0.133	0.113
Tangibility	0.513	0.347	0.465	0.532	0.346	0.488
Debt / Market Value	0.263	0.194	0.238	0.282	0.190	0.252
Debt / Total Capital	0.502	0.343	0.478	0.530	0.318	0.503
Market / Book	1.849	1.364	1.420	1.708	1.153	1.361

Table II: Importance of Debt Structure for Capital Structure

The sample is the 2371 observations (97% of the full sample) for which debt is nonzero. Panel A shows the share of observations in the sample with significant amounts of the various debt types outstanding. An amount is defined as significant if it is at least 10% of debt. The first row shows these fractions unconditionally, and the following rows show these fractions for firms with significant amounts of each of the seven debt types. Panel B shows the distribution of observations by number of different types of debt used. Panel C compares adjustments to total debt with adjustments to debt structure, where we consider significant adjustments to be those greater than 2.5% of total capital (debt plus equity at book values).

Panel A: Share of Observations With Significant Amounts of Debt Types Outstanding (>10% of Total Debt)

	Bank	Program	Bonds	Private Placements	Convertibles	Mortgage/ Equipment	Other
Unconditional	0.526	0.214	0.593	0.116	0.213	0.102	0.191
Bank > 10%	1.000	0.109	0.549	0.116	0.156	0.083	0.146
Program > 10%	0.268	1.000	0.708	0.116	0.108	0.099	0.241
Bonds > 10%	0.486	0.255	1.000	0.095	0.148	0.080	0.156
Private Placements > 10%	0.526	0.215	0.489	1.000	0.109	0.088	0.109
Convertibles > 10%	0.385	0.109	0.413	0.060	1.000	0.093	0.131
Mortgage and Equipment > 10%	0.426	0.207	0.467	0.099	0.194	1.000	0.293
Other > 10%	0.401	0.269	0.485	0.066	0.145	0.156	1.000

Panel B: Distribution of Number of Different Types of Debt (>10% of Total Debt)

Number of Types	0	1	2	3	4	5	6
Number of Observations	8	743	1076	443	96	5	0
Percent	0.3	31.3	45.4	18.7	4.1	0.2	0.0
Percent Using at Least This Many	100.0	99.7	68.3	22.9	4.3	0.2	0.0

Panel C: Adjustments to Debt Structure and Adjustments to Total Debt

	Change in Total Debt as a Share of Total Book Capitalization		
Share Making Adjustments	-2.5% or below	"Stable" (-2.5% to +2.5%)	+2.5% or above
of at Least 2.5% of Total Capital to at Least One Component	0.980	0.255	0.953

For Stable Debt Firms Only	Bank	Program	Bonds	Private Placements	Convertibles	Mortgage/ Equipment	Other
Share Increasing by >2.5% of Capital	0.058	0.045	0.067	0.011	0.016	0.016	0.023
Share Decreasing by >2.5% of Capital	0.086	0.039	0.039	0.016	0.019	0.011	0.033

Table III: Leverage Regressions by Debt Type

The sample is the full sample of 2453 observations in Table I. Each panel begins with a standard leverage regression of total debt scaled by total book capitalization (debt plus equity at book values) on the four explanatory variables. Each panel then shows regressions of each of five debt types on the same four explanatory variables. All dependent variables are scaled by total book capitalization (D+E). Profitability is operating income after depreciation scaled by total capital. Tangibility is PP&E scaled by total capital. Standard errors clustered by firm are in parentheses.
*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Panel A: Year Fixed Effects Only

		Debt Type (Share of Total Book Capital)					
	Total Debt	Bank	Program	Bonds	PPs	Convertibles	All Other
Profitability	-0.549***	0.135*	0.007	-0.069	-0.108**	-0.422***	-0.092***
	(0.149)	(0.072)	(0.031)	(0.093)	(0.055)	(0.110)	(0.031)
Tangibility	0.158***	-0.019	0.044**	0.090***	0.025*	-0.045***	0.063**
	(0.038)	(0.022)	(0.017)	(0.031)	(0.014)	(0.015)	(0.025)
M/B	-0.031**	-0.025***	0.003	-0.024***	-0.001	0.020*	-0.004
	(0.012)	(0.004)	(0.003)	(0.005)	(0.004)	(0.011)	(0.003)
ln(Sales)	-0.013	-0.026***	0.017***	-0.003	-0.005*	0.002	0.002
	(0.011)	(0.005)	(0.004)	(0.007)	(0.003)	(0.004)	(0.003)
Constant	0.550***	0.352***	-0.104***	0.150***	0.063***	0.058*	0.031
	(0.068)	(0.035)	(0.024)	(0.049)	(0.021)	(0.030)	(0.025)
R-Squared	0.14	0.08	0.12	0.05	0.03	0.16	0.06

Panel B: Industry and Year Fixed Effects

		Debt Type (Share of Total Book Capital)					
	Total Debt	Bank	Program	Bonds	PPs	Convertibles	All Other
Profitability	-0.615***	0.094	-0.001	-0.066	-0.115**	-0.441***	-0.085**
	(0.153)	(0.063)	(0.027)	(0.096)	(0.057)	(0.113)	(0.036)
Tangibility	0.230***	0.018	0.033*	0.090**	0.019	-0.026	0.096***
	(0.044)	(0.027)	(0.020)	(0.041)	(0.018)	(0.022)	(0.033)
M/B	-0.019	-0.021***	0.004	-0.021***	0.002	0.017	-0.002
	(0.012)	(0.004)	(0.003)	(0.005)	(0.004)	(0.011)	(0.002)
ln(Sales)	-0.012	-0.026***	0.018***	-0.002	-0.007**	0.006	-0.002
	(0.012)	(0.005)	(0.005)	(0.008)	(0.003)	(0.005)	(0.003)
Constant	0.124*	0.312***	-0.127***	-0.063	0.012	0.028	-0.039
	(0.065)	(0.033)	(0.024)	(0.051)	(0.023)	(0.035)	(0.033)
Adjusted R-Squared	0.21	0.17	0.23	0.12	0.13	0.24	0.28

Table IV: Priority Structure of Debt and Credit Quality with Year Fixed Effects Only

This table presents estimates from regressions of secured and subordinated debt on indicator variables for credit ratings. The sample is the random sample of rated firms summarized in Table I. Data on secured and subordinated debt are collected from 10-K filings and cross-checked with origination datasets. In Panel A, the debt measures are scaled by total debt and the sample consists of the 1802 rated firm-year observations with nonzero debt, representing 304 firms. In Panel B, the debt measures are scaled by total capital (debt plus equity at book value) and the sample is the full 1829 rated observations on 305 firms. Regressions contain year fixed effects. Standard errors clustered by firm are in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Panel A: Scaled by Total Debt

	Secured			Senior	Subordinated			
	Total	Bank	Non-Bank	Unsecured	Total	Bonds	Convertible	All Other
Rated BBB	-0.017	0.028***	-0.045*	-0.036	0.054**	0.015	0.028	0.011*
	(0.029)	(0.010)	(0.027)	(0.039)	(0.025)	(0.012)	(0.020)	(0.006)
Rated BB	0.231***	0.271***	-0.040	-0.534***	0.303***	0.181***	0.099***	0.024***
	(0.039)	(0.027)	(0.030)	(0.045)	(0.034)	(0.024)	(0.029)	(0.007)
Rated B	0.176***	0.186***	-0.010	-0.488***	0.310***	0.160***	0.136***	0.014**
	(0.039)	(0.020)	(0.034)	(0.050)	(0.042)	(0.033)	(0.037)	(0.006)
Rated CCC or Below	0.274***	0.226***	-0.048	-0.591***	0.295***	0.159**	0.114**	0.022
	(0.073)	(0.049)	(0.068)	(0.079)	(0.077)	(0.064)	(0.056)	(0.018)
Constant	0.142***	-0.021	0.162***	0.812***	0.047*	-0.001	0.037*	0.011*
	(0.032)	(0.014)	(0.030)	(0.038)	(0.026)	(0.018)	(0.021)	(0.006)
R-squared	0.14	0.22	0.02	0.37	0.21	0.13	0.06	0.02

Panel B: Scaled by Total Capital (Debt+Equity) at Book Value

	Secured			Senior	Subordinated			
	Total	Bank	Non-Bank	Unsecured	Total	Bonds	Convertible	All Other
Rated BBB	0.005	0.014***	-0.009	0.038	0.037***	0.013***	0.019***	0.005
	(0.013)	(0.005)	(0.013)	(0.035)	(0.007)	(0.004)	(0.005)	(0.021)
Rated BB	0.151***	0.149***	0.001	-0.172***	0.177***	0.112**	0.048***	0.016***
	(0.024)	(0.019)	(0.015)	(0.035)	(0.019)	(0.057)	(0.009)	(0.005)
Rated B	0.162***	0.141***	0.021	-0.094**	0.253***	0.141***	0.101***	0.011**
	(0.025)	(0.018)	(0.018)	(0.042)	(0.036)	(0.027)	(0.030)	(0.005)
Rated CCC or Below	0.361***	0.233***	0.127*	-0.091	0.386***	0.246***	0.107**	0.033
	(0.068)	(0.045)	(0.067)	(0.090)	(0.097)	(0.094)	(0.043)	(0.028)
Constant	0.056***	-0.012	0.067***	0.320***	0.019	-0.002	0.014	0.008**
	(0.017)	0.009	(0.015)	(0.029)	(0.013)	(0.011)	(0.008)	(0.004)
R-squared	0.17	0.17	0.03	0.11	0.20	0.12	0.14	0.06

Table V: Priority Structure of Debt and Credit Quality with Firm and Year Fixed Effects

This table presents estimates from regressions of secured and subordinated debt on indicator variables for credit ratings. The sample is the random sample of rated firms summarized in Table I. Data on secured and subordinated debt are collected from 10-K filings and cross-checked with origination datasets. In Panel A, the debt measures are scaled by total debt and the sample consists of the 1802 rated firm-year observations with nonzero debt, representing 304 firms. In Panel B, the debt measures are scaled by total capital (debt plus equity at book value) and the sample is the full 1829 rated observations on 305 firms. Regressions contain firm and year fixed effects. Standard errors clustered by firm are in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Panel A: Scaled by Total Debt

	Secured			Senior	Subordinated			
	Total	Bank	Non-Bank	Unsecured	Total	Bonds	Convertible	All Other
Rated BBB	-0.057**	-0.013	-0.045**	0.018	0.040	0.005	0.032*	0.003
	(0.027)	(0.016)	(0.020)	(0.042)	(0.032)	(0.026)	(0.018)	(0.004)
Rated BB	0.087*	0.117***	-0.030	-0.210***	0.124**	0.054	0.078**	-0.007
	(0.049)	(0.041)	(0.022)	(0.071)	(0.055)	(0.041)	(0.037)	(0.021)
Rated B	0.076	0.109**	-0.032	-0.210***	0.132**	0.081*	0.067	-0.016
	(0.065)	(0.050)	(0.037)	(0.080)	(0.065)	(0.048)	(0.045)	(0.023)
Rated CCC or Below	0.195**	0.194***	0.001	-0.304***	0.072	0.009	0.059	0.004
	(0.089)	(0.066)	(0.081)	(0.087)	(0.075)	(0.067)	(0.047)	(0.030)
Constant	0.228***	0.071***	0.157***	0.635***	0.136***	0.063**	0.057***	0.017**
	(0.030)	(0.020)	(0.020)	(0.048)	(0.034)	(0.030)	(0.020)	(0.007)
R-squared	0.67	0.22	0.69	0.81	0.75	0.72	0.79	0.71

Panel B: Scaled by Total Capital (Debt+Equity) at Book Value

	Secured			Senior	Subordinated			
	Total	Bank	Non-Bank	Unsecured	Total	Bonds	Convertible	All Other
Rated BBB	-0.014	0.002	-0.016	0.112***	0.039**	0.008	0.030*	0.002
	(0.013)	(0.010)	(0.010)	(0.041)	(0.018)	(0.012)	(0.016)	(0.002)
Rated BB	0.075***	0.078***	-0.002	0.096	0.095***	0.043*	0.052**	0.000
	(0.025)	(0.022)	(0.011)	(0.059)	(0.028)	(0.022)	(0.024)	(0.007)
Rated B	0.102**	0.098***	0.004	0.168**	0.147***	0.086***	0.066*	-0.004
	(0.040)	(0.030)	(0.023)	(0.079)	(0.041)	(0.030)	(0.036)	(0.010)
Rated CCC or Below	0.302***	0.223***	0.079	0.121	0.259***	0.148*	0.083**	0.028
	(0.083)	(0.053)	(0.076)	(0.111)	(0.082)	(0.081)	(0.041)	(0.032)
Constant	0.095***	0.032**	0.063***	0.152***	0.045**	0.024	0.015	0.006*
	(0.017)	(0.013)	(0.010)	(0.045)	(0.021)	(0.017)	(0.019)	(0.004)
R-squared	0.70	0.67	0.68	0.68	0.78	0.80	0.79	0.71

Table VI: Year and Industry Distribution of Random Sample and Fallen Angels

Panel A shows year distributions for the random sample and the fallen angels sample. The random sample is the same as the sample summarized in Table I. The fallen angels sample consists of observations on 140 firms downgraded from investment grade to speculative grade during the 1996-2006 period, including all available observations from two years before the downgrade year to two years after the downgrade year. Panel B shows a broad industry distribution at the level of the one-digit SIC code for the two samples. Manufacturing I consists of SIC codes beginning with 2, including food, tobacco, textiles, apparel, lumber, furniture, paper and chemicals. Manufacturing II consists of SIC codes beginning with 3, including rubber, leather, stone, metals, machinery and equipment. Services I consists of SIC codes beginning with 7, including hotels, personal services, and business services. Services II consists of SIC codes beginning with 8, such as health, legal and educational services.

Panel A: Year Distribution

	Random Sample		Fallen Angels Sample	
	Count	Percent	Count	Percent
1994	—	—	6	0.9
1995	—	—	8	1.2
1996	237	9.7	13	2.0
1997	254	10.4	25	3.9
1998	253	10.3	40	6.2
1999	241	9.8	58	9.0
2000	227	9.3	82	12.7
2001	211	8.6	93	14.4
2002	214	8.7	87	13.5
2003	211	8.6	87	13.5
2004	213	8.7	72	11.2
2005	202	8.2	47	7.3
2006	190	7.8	28	4.3
Total	2453	100.0	646	100.0

Panel B: Broad Industry Distribution

	Random Sample		Fallen Angels Sample	
	Count	Percent	Count	Percent
1. Mining, Construction	217	8.9	39	6.0
2. Manufacturing I	527	21.5	156	24.2
3. Manufacturing II	560	22.8	196	30.3
4. Transportation, Communication	441	18.0	71	11.0
5. Wholesale, Retail Trade	280	11.4	114	17.7
6. Finance, Insurance, Real Estate	5	0.2	0	0.0
7. Services I	298	12.2	47	7.3
8. Services II	125	5.1	23	3.6
Total	2453	100.0	646	100.0

Table VII: Comparison of Fallen Angels Pre-Downgrade to Random Sample

The top panel of this table compares means for random sample firms of a given credit rating with means for firms that are two years before a "fallen angel" downgrade. Standard deviations are in parentheses. The final two rows of the table show coefficient estimates from a regression of the column characteristic on an indicator for whether the firm is two years before a downgrade, where the regression includes credit rating indicators, and two-digit industry fixed effects. The regression is conducted in sample that adds fallen angel observations two years before the downgrade to the random sample. The t-statistic is the test of whether the coefficient on the indicator is statistically different from zero, i.e. whether firms about to fall from investment to speculative grade are different on that characteristic than firms in the random sample within the same rating class.

Rating	Sample	Profitability	Debt / Book Value	Book Assets	Total Capital	Debt / Market Value	M/B	Count
A	Random	0.158	0.464	13490	8896	0.223	1.710	154
		(0.084)	(0.190)	(26864)	(17132)	(0.130)	(0.757)	
	Fallen at t=-2	0.149	0.349	12020	8009	0.181	2.171	13
		(0.114)	(0.194)	(10654)	(6360)	(0.150)	(1.519)	
Baa1	Random	0.141	0.439	11686	7519	0.235	1.463	94
		(0.076)	(0.134)	(21845)	(14689)	(0.114)	(0.703)	
	Fallen at t=-2	0.145	0.501	6179	3852	0.264	1.392	23
		(0.104)	(0.212)	(6210)	(3233)	(0.134)	(0.511)	
Baa2	Random	0.135	0.476	9928	6209	0.248	1.429	99
		(0.068)	(0.122)	(14891)	(10117)	(0.117)	(0.445)	
	Fallen at t=-2	0.141	0.536	5852	3424	0.278	1.403	28
		(0.103)	(0.193)	(8716)	(4647)	(0.144)	(0.706)	
Baa3	Random	0.117	0.437	7717	5807	0.252	1.460	75
		(0.064)	(0.200)	(9796)	(7783)	(0.161)	(0.476)	
	Fallen at t=-2	0.132	0.459	5733	3691	0.262	1.303	61
		(0.084)	(0.154)	(6582)	(4201)	(0.123)	(0.442)	
	Coefficient	-0.008	0.038	-2731	-2213	0.022	-0.197	
	t-Statistic	-0.61	0.96	-1.54	-1.90	1.21	-1.79	

Table VIII: Priority Structure Among Fallen Angels

This table presents estimates from regressions of secured and subordinated debt on indicator variables for time relative to downgrade. The omitted indicator is the year immediately before the downgrade. The sample consists of almost all firms downgraded by Moody's from investment grade to speculative grade during 1996-2006. In Panel A, the debt measures are scaled by total debt and the sample consists of 644 firm-year observations with nonzero debt, representing 140 firms. In Panel B, the debt measures are scaled by total capital (debt plus equity) and the sample is the full 646 observations on 140 firms. Regressions contain firm and year fixed effects. Standard errors clustered by firm are in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Panel A: Scaled by Total Debt

	Secured Debt / Total Capital (D+E)			Senior	Subordinated Debt / Total Capital (D+E)			
	Total	Bank	Non-Bank	Unsecured	Total	Bonds	Convertible	All Other
Two Years Before	-0.006	-0.009	0.003	0.023	-0.017 *	-0.006	-0.008	-0.003
	(0.015)	(0.014)	(0.009)	(0.018)	(0.010)	(0.006)	(0.008)	(0.002)
Year of Downgrade	0.089 ***	0.082 ***	0.007	-0.127 ***	0.038 ***	0.012 *	0.025 *	0.001
	(0.020)	(0.019)	(0.008)	(0.025)	(0.015)	(0.007)	(0.014)	(0.002)
Year After	0.113 ***	0.101 ***	0.012	-0.184 ***	0.071 ***	0.018 **	0.051 **	0.001
	(0.024)	(0.023)	(0.012)	(0.034)	(0.023)	(0.009)	(0.023)	(0.002)
Two Years After	0.119 ***	0.104 ***	0.015	-0.228 ***	0.109 ***	0.038 **	0.069 **	0.001
	(0.030)	(0.029)	(0.014)	(0.044)	(0.032)	(0.018)	(0.032)	(0.003)
Constant	0.114 ***	0.036	0.078 ***	0.932 ***	-0.047	-0.002	-0.053	0.009 **
	(0.037)	(0.036)	(0.014)	(0.065)	(0.051)	(0.021)	(0.053)	(0.004)
Adjusted R-Squared	0.57	0.43	0.75	0.62	0.71	0.72	0.71	0.64

Panel B: Scaled by Total Capital (Debt+Equity) at Book Value

	Secured Debt / Total Capital (D+E)			Senior	Subordinated Debt / Total Capital (D+E)			
	Total	Bank	Non-Bank	Unsecured	Total	Bonds	Convertible	All Other
Two Years Before	-0.008	-0.006	-0.002	-0.018	-0.011 *	-0.003	-0.006	-0.001
	(0.010)	(0.010)	(0.004)	(0.013)	(0.006)	(0.004)	(0.005)	(0.001)
Year of Downgrade	0.067 ***	0.059 ***	0.008 *	-0.027 *	0.024 ***	0.013 **	0.011 *	0.001
	(0.018)	(0.018)	(0.005)	(0.015)	(0.009)	(0.006)	(0.006)	(0.001)
Year After	0.077 ***	0.068 ***	0.009	-0.054 **	0.051 ***	0.013 **	0.036 **	0.001
	(0.017)	(0.017)	(0.008)	(0.022)	(0.017)	(0.006)	(0.017)	(0.001)
Two Years After	0.090 ***	0.078 ***	0.013	-0.074 ***	0.072 ***	0.023 **	0.048 **	0.001
	(0.025)	(0.025)	(0.009)	(0.028)	(0.023)	(0.010)	(0.022)	(0.001)
Constant	0.046	0.008	0.038 ***	0.409 ***	-0.012	-0.008	-0.008	0.004 **
	(0.030)	(0.030)	(0.009)	(0.036)	(0.034)	(0.013)	(0.034)	(0.002)
Adjusted R-Squared	0.51	0.37	0.70	0.57	0.51	0.65	0.45	0.65

Table IX: Priority Structure in Fallen Angels Sample Downgraded for Business Reasons Only

This table repeats the analysis of Table VIII on a subsample of 297 observations on 64 firms which we determined were downgraded from investment grade to speculative grade for non-financial reasons. The omitted indicator is the year immediately before the downgrade. We exclude any firm for which Moodys cites financial weaknesses such as leverage, coverage ratios, lower financial flexibility, or worsened credit metrics. The remaining firms are downgraded for reasons such as market conditions, cash flows, operations, operating performance, competitive environment, weakened demand, terrorism, litigation, and decreased profitability, without mention of financial factors. Regressions contain firm and year fixed effects. Standard errors clustered by firm are in parentheses.
*** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Panel A: Scaled by Total Debt

	Secured Debt / Total Capital (D+E)			Senior	Subordinated Debt / Total Capital (D+E)			
	Total	Bank	Non-Bank	Unsecured	Total	Bonds	Convertible	All Other
Two Years Before	0.020	0.021*	-0.001	0.019	-0.039**	-0.009	-0.024	-0.006
	(0.014)	(0.012)	(0.008)	(0.022)	(0.019)	(0.010)	(0.023)	(0.004)
Year of Downgrade	0.096***	0.101***	-0.004	-0.147***	0.051**	0.020	0.030	0.001
	(0.027)	(0.026)	(0.007)	(0.036)	(0.021)	(0.014)	(0.023)	(0.004)
Year After	0.117***	0.131***	-0.013*	-0.224***	0.107***	0.033*	0.071	0.002
	(0.035)	(0.034)	(0.008)	(0.050)	(0.034)	(0.018)	(0.047)	(0.005)
Two Years After	0.113***	0.122***	-0.010	-0.284***	0.171***	0.073*	0.095	0.004
	(0.038)	(0.035)	(0.014)	(0.056)	(0.042)	(0.037)	(0.071)	(0.007)
Constant	0.110**	0.009	0.102***	1.047***	-0.157**	-0.043	-0.132	0.017*
	(0.052)	(0.052)	(0.011)	(0.094)	(0.078)	(0.049)	(0.122)	(0.009)
Adjusted R-Squared	0.62	0.35	0.88	0.67	0.79	0.77	0.82	0.60

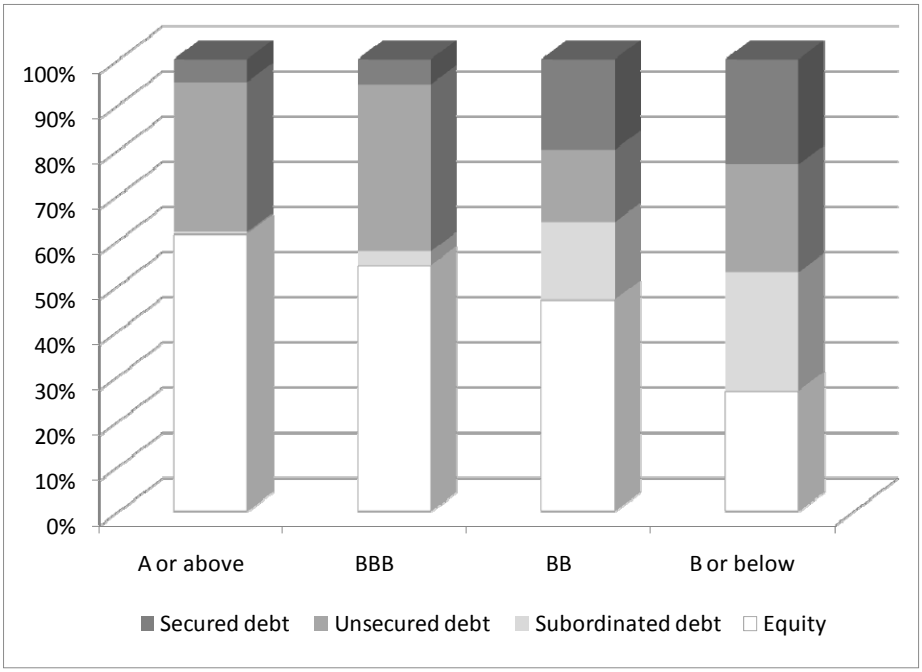
Panel B: Scaled by Total Capital (Debt+Equity) at Book Value

	Secured Debt / Total Capital (D+E)			Senior	Subordinated Debt / Total Capital (D+E)			
	Total	Bank	Non-Bank	Unsecured	Total	Bonds	Convertible	All Other
Two Years Before	0.001	0.011	-0.010	-0.022	-0.015*	-0.005	-0.007	-0.003
	(0.011)	(0.009)	(0.006)	(0.019)	(0.009)	(0.007)	(0.010)	(0.002)
Year of Downgrade	0.071**	0.074**	-0.004	-0.029	0.036**	0.023*	0.011	0.002
	(0.035)	(0.035)	(0.003)	(0.022)	(0.015)	(0.013)	(0.010)	(0.002)
Year After	0.087***	0.095***	-0.009	-0.041	0.069***	0.025*	0.041*	0.003
	(0.033)	(0.032)	(0.008)	(0.031)	(0.020)	(0.013)	(0.023)	(0.003)
Two Years After	0.095***	0.096***	-0.001	-0.064*	0.096***	0.047**	0.046	0.002
	(0.036)	(0.034)	(0.011)	(0.039)	-(0.020)	(0.022)	(0.030)	(0.003)
Constant	0.031	-0.025	0.055***	0.812***	-0.088***	-0.044	-0.053	0.009*
	(0.056)	(0.057)	-(0.007)	(0.038)	(0.034)	(0.033)	(0.049)	(0.005)
Adjusted R-Squared	0.47	0.27	0.80	0.57	0.60	0.70	0.55	0.61

Figure 1: Priority Structure of Debt and Credit Ratings

These figures show the priority structure of debt by credit rating for the 1829 rated firm-year observations on the 305 firms in the random sample.

Panel A: Capital Structure and Priority Across Credit Quality Distribution



Panel B: Debt Structure Across Credit Quality Distribution

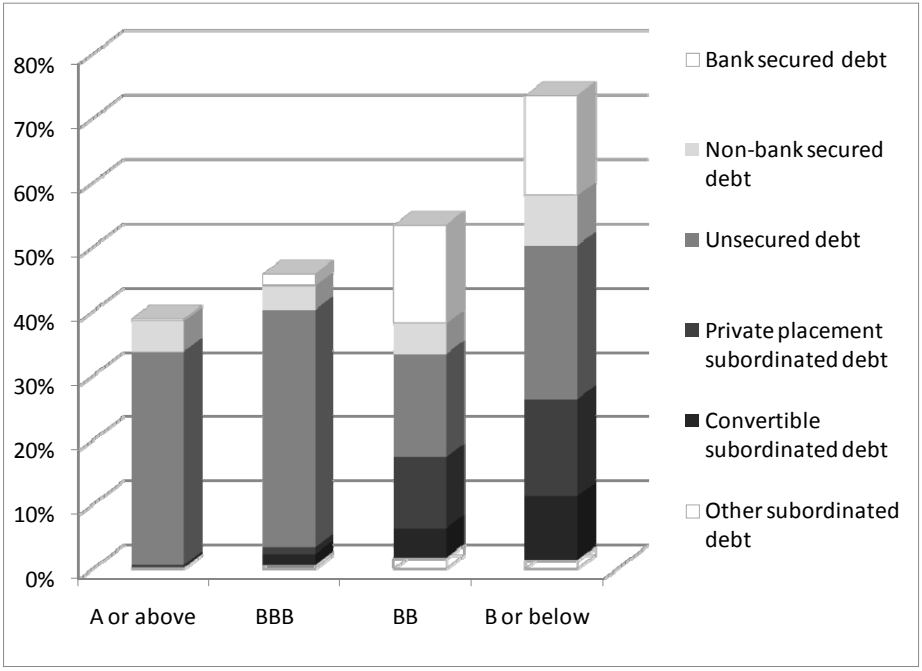
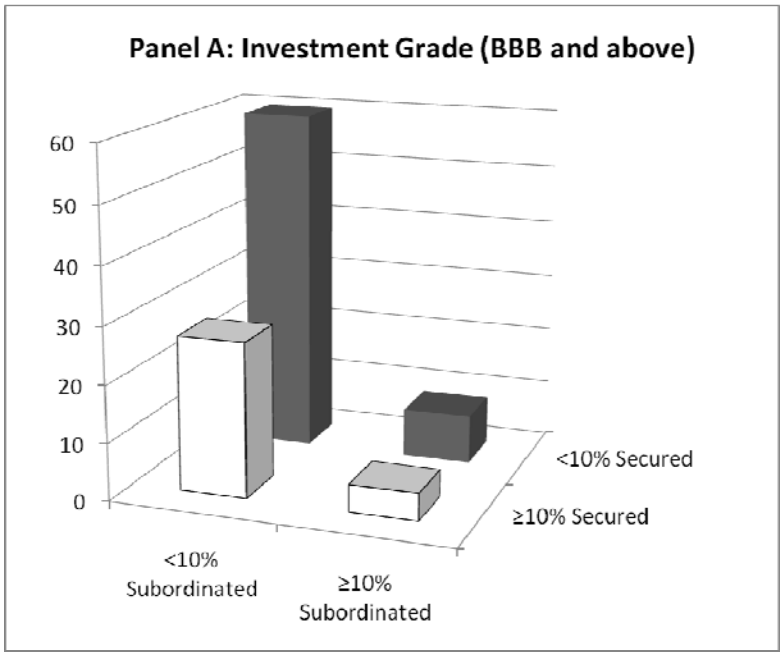


Figure 2: Fraction of Firms that Have Different Priorities of Debt, by Credit Quality

The 1829 rated firm-year observations on 305 firms are divided into investment grade and speculative grade subsamples. The investment grade subsample consists of 870 observations with S&P ratings of BBB and above. The speculative grade subsample consists of 959 observations with S&P ratings of BB and below. The figures show the fraction of firms in each of the subsamples with and without significant levels of subordinated and secured debt in their capital structure. An amount is defined as significant if it is at least 10% of total debt.



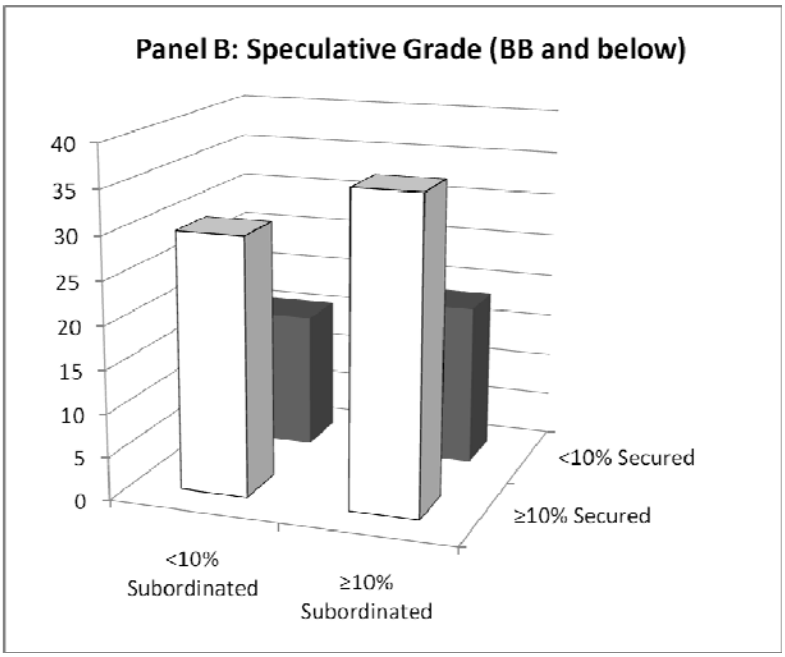
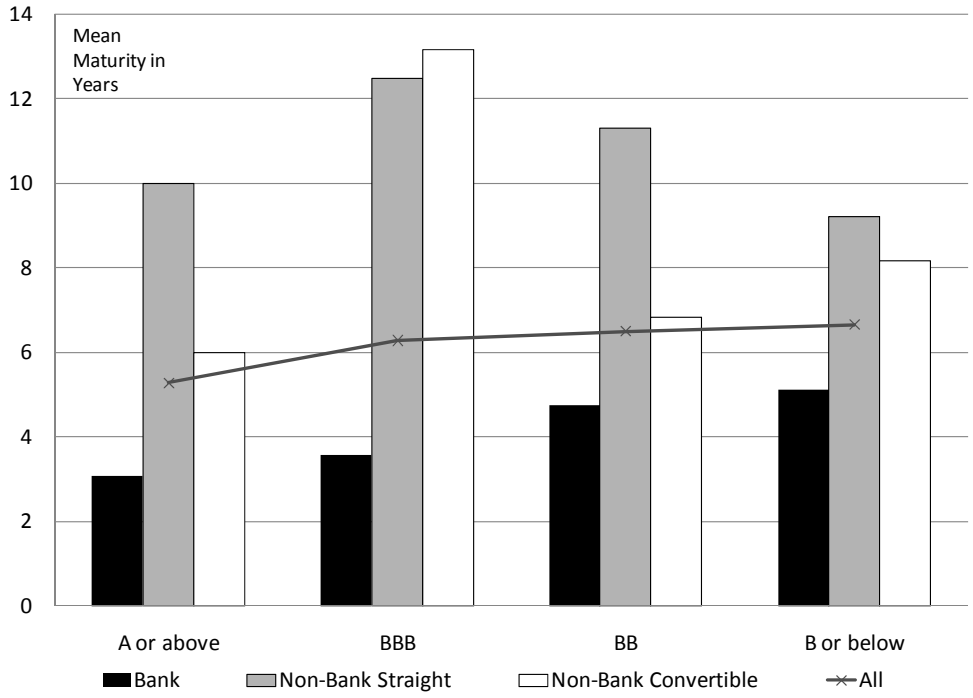


Figure 3: Maturity of New Debt Issues by Type and Credit Rating in the Random Sample

The top figure shows mean maturity of new issues in years and the bottom figure shows median maturity of new issues in years. Means and medians are both calculated in the issue-level data matched to the cross-sectional sample and weighted by the dollar value of issues proceeds. There are 1622 bank issues, 1428 non-bank straight debt issues, and 93 non-bank convertible debt issues with maturity information available for the 305 firms in the random sample.



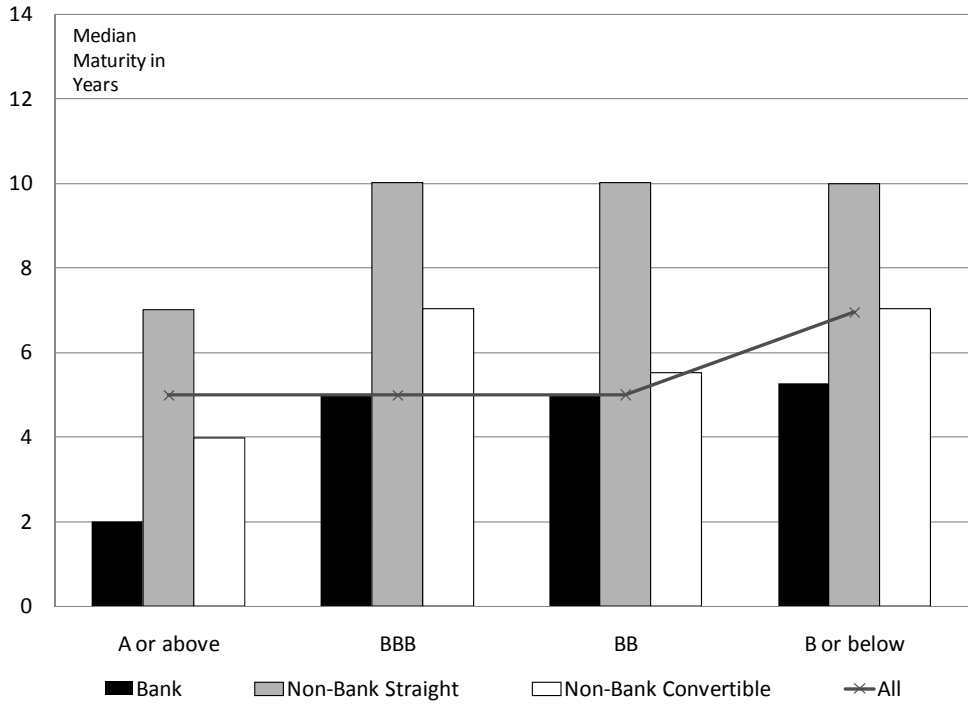
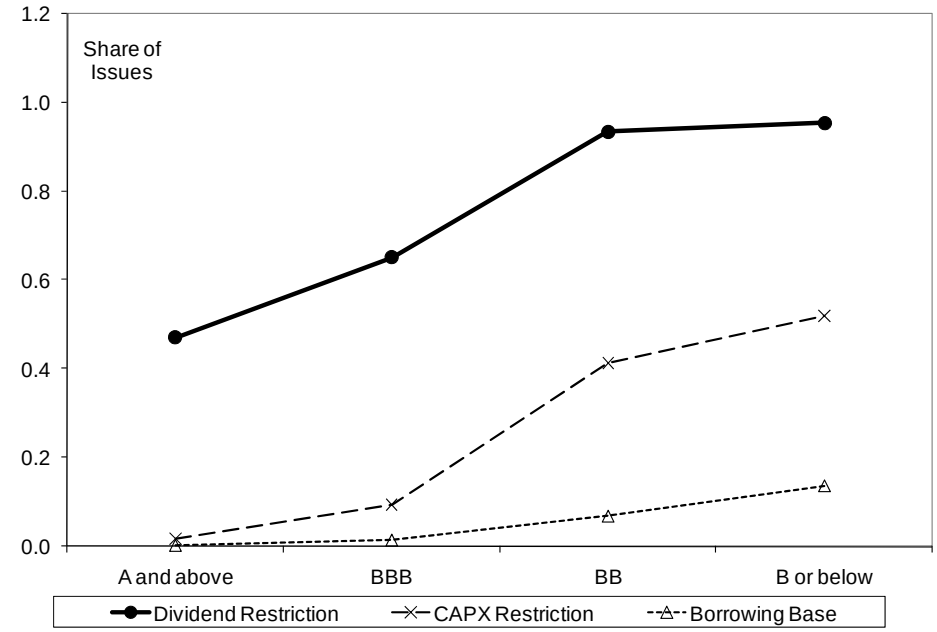


Figure 4: Terms of Bank and Non-Bank Issues by Credit Quality

Panel A presents the relation between terms of new bank issues by sample firms and credit quality. Analysis begins with the sample of all bank issues found in Dealscan for our 305 firms, a sample of 2184 issues. Data on dividend restrictions and borrowing base covenants were extracted Dealscan for these issues. Capital expenditure restrictions were taken from contracts in Nini, Smith, and Sufi (2007) and are only available for 362 issues. Panel B examines the relation between terms of new non-bank debt issues by sample firms and credit quality. Matching our sample firms to SDC Platinum resulted in 2241 debt issues over the sample period. Bond covenant terms were obtained from the Mergent Fixed Income Securities Database (FISD) and were available for 472 of these issues.

Panel A: Bank Issues



Panel B: Non-Bank Issues

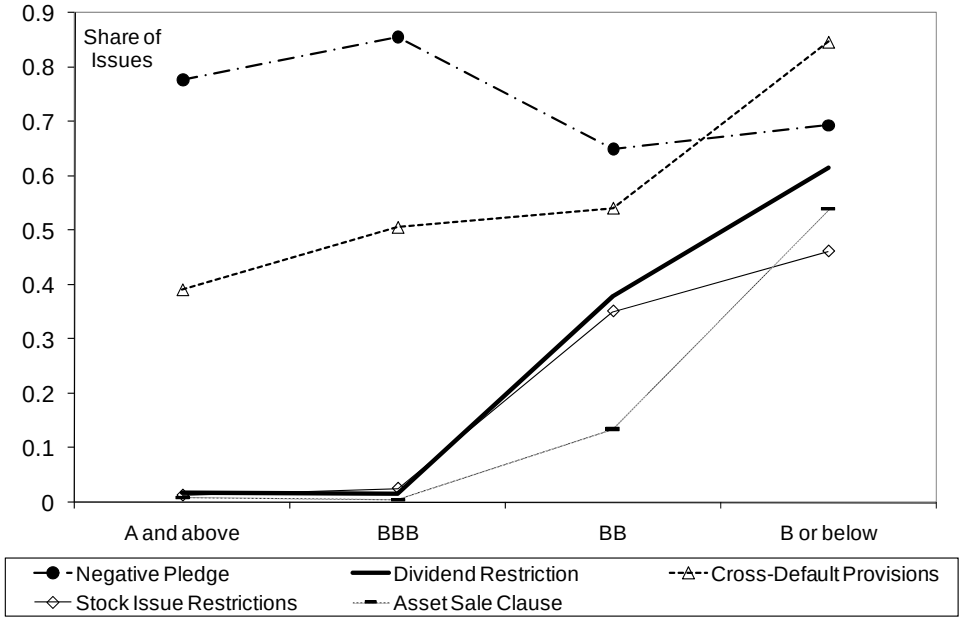


Figure 5: Covenant Violations

The figure shows the share of sample firm observations with covenant violations, by S&P credit rating.

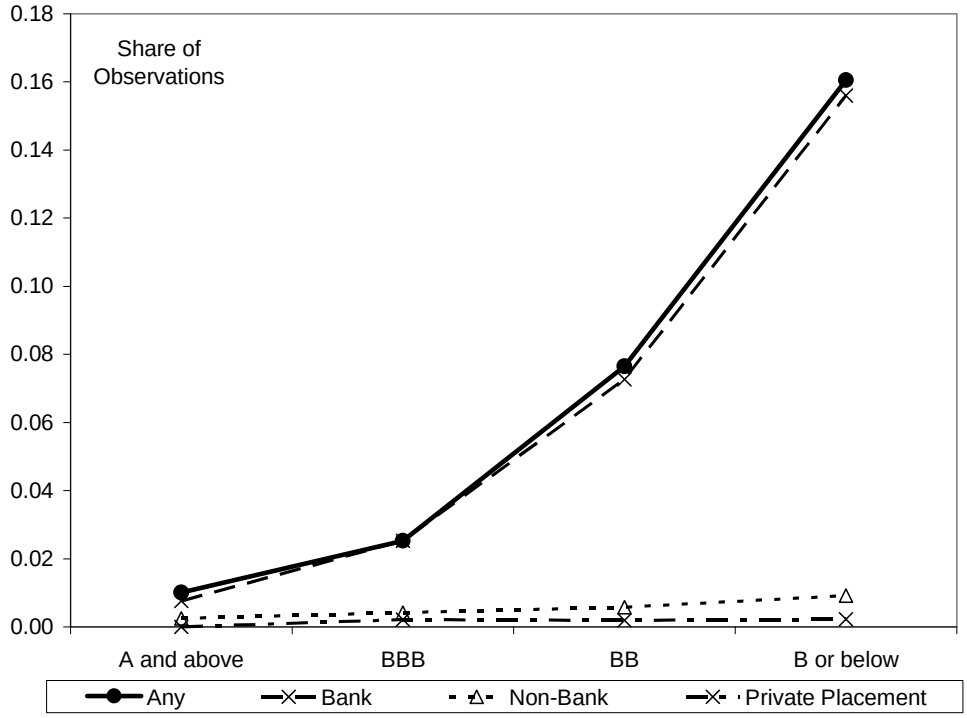
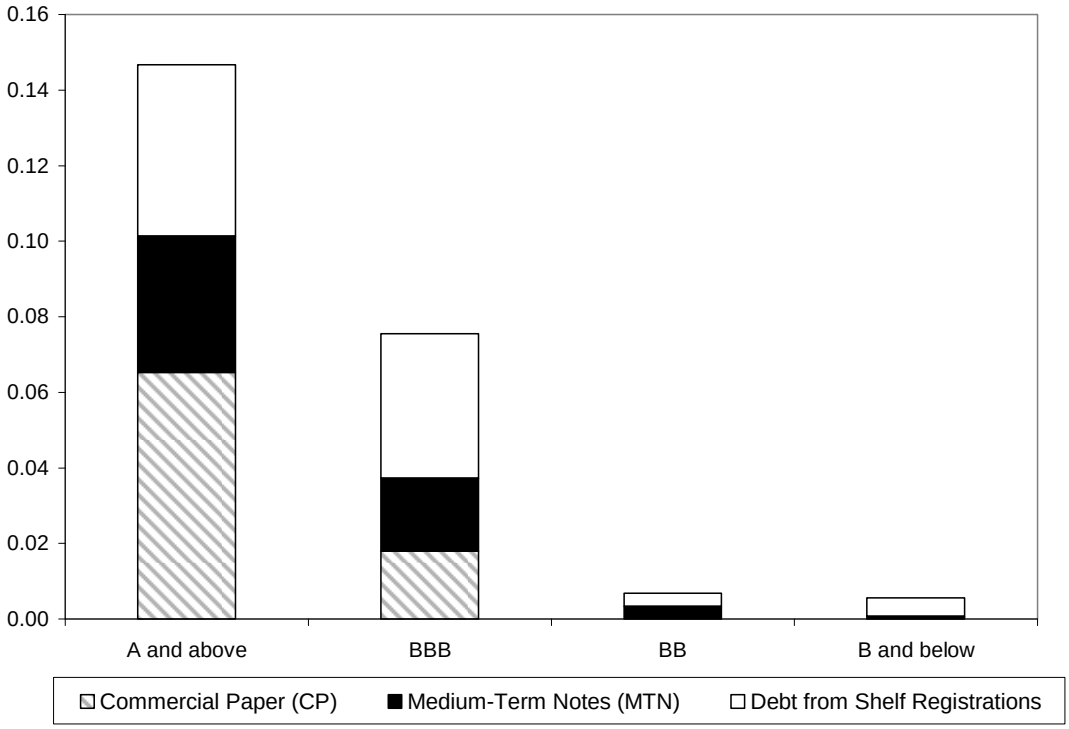


Figure 6: Access to Program Debt by Credit Quality

The figure shows the share of sample firm observations with program debt in the capital structure, by credit rating. Program debt consists of commercial paper (CP), medium-term notes (MTN), and debt from shelf registrations.



Data Appendix
Classification of Debt Issues from 10-K Financial Footnotes

Example 1: Ashland Inc., 10-K filing dated September 30, 2005.

Website: http://sec.gov/Archives/edgar/data/1305014/000130501405000152/form10k2005.txt

The financial footnote on debt has the following information:

NOTE G - DEBT

Medium-term notes, due 2005-2019, interest at a weighted average rate of 7.9% at September 30, 2005 (7.1% to 9.4%)	$ 42
8.80% debentures, due 2012	20
6.86% medium-term notes, Series H, due 2009	17
6.625% senior notes, due 2008	3
Other	12
Total long-term debt	94
Current portion of long-term debt	(12)
Long-term debt (less current portion)	$ 82

Aggregate maturities of long-term debt are $12 million in 2006, $12 million in 2007, $5 million in 2008, $20 million in 2009 and $3 million in 2010. The weighted average interest rate on short-term borrowings outstanding was 2.7% at September 30, 2004. No short-term borrowings were outstanding at September 30, 2005.

Ashland has a revolving credit agreement that expires on March 21, 2010, which provides for up to $350 million in borrowings. The borrowing capacity under this facility was reduced by $102 million of letters of credit outstanding at September 30, 2005. While the revolving credit agreement contains a covenant limiting new borrowings based on Ashland's stockholders' equity, the agreement would have permitted an additional $5.5 billion of borrowings at September 30, 2005. Additional permissible borrowings are increased (decreased) by 150% of any increase (decrease) in stockholders' equity.

Our classification of the debt of Ashland, Inc. for this year is as follows:

FINANCIAL FOOTNOTE DESCRIPTION	AMOUNT	OUR CLASSIFICATION	PRIORITY	CROSS-REFERENCE
Medium-term notes, due 2005-2019	42	MTNs	Senior Uns	
8.80% debentures, due 2012	20	Public debt	Senior Uns	SDC Platinum
6.86% medium-term notes, due 2009	17	MTNs	Senior Uns	
6.625% senior notes, due 2008	3	Private placement 144A	Senior Uns	SDC Platinum
Other	12	Unclassified	Senior Uns	
Revolving credit agreement-used	0	Bank revolver	Senior Uns	
Revolving credit agreement-unused	248	Bank revolver	Senior Uns	

Example 2: Mastec Inc., 10-K filing dated December 31, 2000.

Website: http://sec.gov/Archives/edgar/data/15615/000001561501000001/0000015615-01-000001.txt

The financial footnote on debt has the following information:

	2000
Revolving credit facility at LIBOR plus 1.25% for 1999 and 1.0% for 2000 (6.98% at December 31, 1999 and 7.64% at December 31, 2000)	7,000
Other bank facilities at LIBOR plus 1.50% (7.32% at December 31, 1999 and 8.06% at December 31, 2000)	517
Notes payable for equipment, at interest rates from 7.5% to 8.5% due in installments through the year 2004	6,161
Notes payable for acquisitions, at interest rates from 7.0% to 8.0% due in installments through February 2001	2,362
7.75% senior subordinated notes due February 2008	195,805
Total debt	211,845
Less current maturities	(5,685)
Long-term debt	$ 206,160

We have a credit facility that provides for borrowings up to an aggregate of $100 million. Amounts outstanding under the revolving credit facility mature on June 9, 2002. We are required to pay an unused facility fee ranging from .25% to .50% per annum on the facility, depending upon certain financial covenants. The credit facility is secured by a pledge of shares of certain of our subsidiaries. Interest under the credit facility accrues at rates based, at our option, on the agent bank's base rate plus a margin of up to .50% depending on certain financial covenants or 1% above the overnight federal funds effective rate, whichever is higher, or its LIBOR Rate (as defined in the credit facility) plus a margin of 1.00% to 2.25%, depending on certain financial covenants. As of December 31, 2000, we had outstanding $8.4 million in standby letters of credit.

Our classification of the debt of Mastec Inc. for this year is as follows:

FINANCIAL FOOTNOTE DESCRIPTION	AMOUNT	OUR CLASSIFICATION	PRIORITY	CROSS-REFERENCE
Revolving credit facility	7	Bank revolver	Secured	
Other bank facilities	0.517	Bank term	Senior Uns	
Notes payable for equipment	6.161	Equipment notes	Senior Uns	
Notes payable for acquisitions	2.362	Acquisition notes	Senior Uns	
7.75% senior subordinated notes	195.805	Private placement 144A	Subordinated	SDC Platinum
Revolving credit agreement-unused	84.6	Bank revolver	Secured	