The Response of Corporate Financing and Investment to Changes in the Supply of Credit: A Natural Experiment*

Michael Lemmon
David Eccles School of Business, University of Utah

Michael R. Roberts
The Wharton School, University of Pennsylvania

First Draft: June 7, 2006
Current Draft: February 5, 2007

*We thank Andy Abel, Marshall Blume, David Chapman, Darrell Duffie, Itay Goldstein, Joao Gomes, Wei Jiang, Arvind Krishnamurthy, David Matsa, Andrew Metrick, Toby Moskowitz, Stewart Myers, Vinay Nair, Mitchell Petersen, Nick Souleles, Josh Rauh, Andreea Roman, Amir Sufi, Phil Strahan, Petra Todd, Greg Udell, Toni Whited, Rebecca Zarutskie; seminar participants at Boston College, MIT, Northwestern University, Norwegian School of Management (BI), Stanford University, University of Arizona, University of Chicago, University of Indiana, University of Pennsylvania, University of Wisconsin-Madison; and conference participants at the 2006 UBC Summer Finance Conference. Roberts gratefully acknowledges financial support from a Rodney L White Grant and an NYSE Research Fellowship. Lemmon: (801) 585-5210, finmll@business.utah.edu; Roberts: (215) 573-9780, mrrobert@wharton.upenn.edu.

The Response of Corporate Financing and Investment to Changes in the Supply of Credit: A Natural Experiment

Abstract:

We examine how and why shocks to the supply of credit impact corporate financing and investment using the collapse of Drexel Burnham Lambert, Inc., the passage of the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA), and regulatory changes in the insurance industry as an exogenous contraction in the supply of below-investment-grade credit after 1989. A difference-in-differences empirical strategy reveals that substitution to bank debt and alternative sources of capital (e.g., equity) was extremely limited and, as a result, net investment decreased almost one-for-one with the contraction in net issuing activity. Despite this sharp change in behavior, corporate leverage ratios remained relatively stable, a result of the contemporaneous decline in debt issuances and investment. Our findings illustrate that intermediary uniqueness and government regulation can generate distinctly segmented capital markets that amplify the effects of fluctuations in the supply of capital on firm behavior.

"Foreign investors are shipping gobs of cash into the U.S. At the same time, there has been an explosion of hedge funds, distressed debt traders, and others eager to buy junk-rated debt for the higher yields it offers…Together, these factors have combined to create unheard-of pools of liquidity [that have] made funding readily available [to] companies."

--BusinessWeek, January 29, 2007

As the above quote suggests, fluctuations in the supply of financial capital can be extreme. Therefore, a natural question to ask is: How do these fluctuations impact corporate behavior and, in particular, financing and investment decisions? While straightforward, this question is economically important and empirically challenging.

There is a substantial body of theoretical research in which fluctuations in the supply of (financial) capital can impact the behavior of firms. For example, firms may face capital rationing because of either adverse selection concerns arising from information asymmetry between firms and capital suppliers (e.g., Stiglitz and Weiss (1981)) or moral hazard concerns arising from private benefits of control (e.g., Holmstrom and Tirole (1997)). In either case, suppliers of capital may be unwilling to provide financing regardless of the rate of return offered by firms. As such, fluctuations in the supply of capital can impact the financing and investment behavior of marginal firms, in so far as these firms are unable to mimic the behavior of higher quality firms or are unable to generate sufficient collateral.

Additionally, capital markets may be segmented in the sense that the cost of capital varies across different sources of finance (e.g., bank debt, public debt, equity) for reasons other than risk. For example, segmentation can arise from investor preferences (e.g., Gorton and Pennachi (1990)) or government impediments (e.g., regulation), as well as from the presence of the same frictions that generate capital rationing (e.g., Bolton and Freixas (2000), Diamond (1984, 1991), and Myers and Majluf (1984)). Therefore, shocks to the supply of capital can impact the financing and investment behavior of firms in so far as segmentation makes switching sources of capital costly.

Understanding whether the supply of capital corresponds to a separate channel, independent of demand, through which market imperfections influence corporate behavior is important for several reasons. First, the supply of capital may play an important role in the transmission of monetary policy (Bernanke and Gertler (1989) and

Kashyap, Lamont, and Stein (1994)). Second, fluctuations in the supply of capital may play an important role, more generally, in determining the financial and investment policies of firms, outside of monetary policy regime changes (e.g., Faulkender and Petersen (2006), Leary (2006), and Sufi (2006)). Finally, surveys of corporate managers and financial intermediaries suggest a dichotomy in how academics and practitioners tend to view financing decisions: the former perceive decisions as governed by the demands of the users of capital, the latter perceive decisions as governed by the preferences of the suppliers of capital (Titman (2001) and Graham and Harvey (2001)).

However, identifying a linkage between the supply of capital and corporate behavior is difficult because of the fundamental simultaneity occurring between supply and demand. This task is further complicated by an inability to precisely measure investment opportunities or productivity shocks. The goal of this paper is to overcome these hurdles and identify the extent to which variations in the supply of capital influence corporate financial and investment policies. To do so, we use three near-concurrent events as an exogenous shock to the supply of credit to below-investment-grade firms after 1989: (1) the collapse of Drexel Burnham Lambert, Inc. (Drexel), (2) the passage of the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA), and (3) a change in the National Association of Insurance Companies (NAIC) credit rating guidelines. In concert, these three events led to the near disappearance of the market for below investment grade debt – both public and private placements – after 1989.

The specificity of these events to the speculative-grade debt market enables us to employ a difference-in-differences empirical approach that, in conjunction with a variety of treatment and control groups, helps to identify both the direction and magnitude of the supply shock's impact on firm behavior. Specifically, we trace the impact of the shock through firms' sources and uses accounting identities in order to quantify any substitution towards alternative sources of capital, as well as any impact on investment activities. Doing so enables us to a present novel evidence of capital market segmentation and credit rationing using an exogenous shock to the supply of capital as an identification strategy.

Further, the focus of our study is particularly topical in light of the recent surge in speculative-grade debt issuances - a trend that is reminiscent of the mid- and late-1980s.[1]

We begin by showing that capital market segmentation can be extreme, making substitution across different sources of funds prohibitively costly and, consequently, limiting investment activity. Specifically, we find that total net security issuances (debt plus equity) of below-investment-grade firms decreased by 8% of assets relative to the change experienced by firms in our control groups. Economically, this decline corresponds to a 53% decrease in net security issuances relative to pre-1990 levels and is driven entirely by a decline in net debt issuing activity. Additionally, we observe almost no substitution by below-investment-grade firms to alternative sources of financing such as equity, trade credit, or internal funds. The ultimate consequence of this reduction in debt issuing activity and lack of substitution is an almost one-for-one decline in net investment equal to 6% of assets - a 33% decline relative to pre-1990 levels.

These findings illustrate that (1) market imperfections can generate sharp distortions in the required rate of return *across* different sources of external capital, and (2) these distortions provide a mechanism by which fluctuations in the supply of capital can impact corporate behavior, consistent with the insights of Bolton and Freixas (2000). Additionally, we find that the combined effect of reduced debt issuances and investment results in relatively stable leverage ratios for below-investment-grade firms during this period, consistent with the findings of Lemmon, Roberts, and Zender (2006).

We then show how this segmentation amplifies the effects of fluctuations in the supply of intermediary capital on corporate behavior via a bank lending channel, as predicted by Holmstrom and Tirole (1997). Bank lending contracted most sharply in the Northeast part of the country during 1990 and 1991 - a consequence of eroding bank capital driven by declining real estate prices (Bernanke and Lown (1991) and Peek and Rosengren (1995)). This geographic heterogeneity in the availability of bank credit enables us to use the location of firms' headquarters as an instrument to identify the impact of the contraction in intermediary capital on firm behavior because, as Bharath et al. (2004) show, firms tend to borrow from local lenders.

[1] New junk bond issuances have averaged $127 billion per year since 2002, when new issuances were $62 billion according to Moodys. Leveraged loan (i.e., high yield credit agreements) issuances have tripled

We find that below-investment-grade firms with headquarters located in the Northeast experience a decline in net security issuing activity equal to 8% of assets relative to the change experienced by below-investment-grade firms located in other parts of the country. As with our previous results, the decline is concentrated almost entirely in net debt issuing activity, with little or no change in alternative sources of finance and, again, no change in leverage ratios. Consequently, we also observe a decline in net investment of similar magnitude that is concentrated in decreased acquisition activity (6% of assets) and capital expenditures (2% of assets).

Importantly, we show that these effects are found only among below-investment-grade firms; neither investment-grade nor unrated firms reveal any significant changes in financing or investment behavior as a function of geography thereby ensuring that our findings are not a consequence of geographic heterogeneity in aggregate productivity shocks or the severity of the 1990-1991 recession. Additionally, we find no difference in the use of mortgages and secured debt between below-investment-grade firms in the Northeast and the rest of the country, ensuring that weakening balance sheets of borrowers and decreased capacities for securing debt are not behind our findings.

Finally, we examine why firms did not substitute toward alternative sources of capital, as well as the welfare effects of the supply contraction. Specifically, Drexel and life insurers played a unique role in monitoring and certifying borrowers that could not be easily duplicated by other intermediaries. Coupled with relatively expensive equity in the early 1990s (Korajczyk, Lucas, and McDonald (1991, 1992)), substitution was particularly costly. However, we also find some evidence that the operating efficiency of speculative-grade firms increased after 1989, suggesting that inexpensive debt during the 1980s (Kaplan and Stein (1993)) may have led to suboptimal behavior by some firms.

An important by-product of our analysis is that it enables us to comment on *why* credit ratings appear to matter for corporate behavior (Kisgen (2006)). Our analysis suggests that credit ratings can alter the supply of capital available to firms by defining the pool of potential investors through mechanisms such as government regulations (e.g., FIRREA) and specialization (e.g., banks versus finance companies versus hedge funds, etc.). Because substitution across sources of finance is costly, fluctuations in the wealth

---

since 2002, to $480 billion last year according to S&P's LCD unit.

or preferences of a specific pool of investors can impact the financing and investment behavior of firms.

More closely related to our paper are recent studies by Faulkender and Petersen (2006), Leary (2006), and Sufi (2006). Like these studies, we find that supply fluctuations play an important role in determining debt policy. However, counter to these studies, we find that supply fluctuations have no impact on leverage ratios, suggesting that the link between the supply of capital and capital structure is still unclear. Further, we show *why* capital supply fluctuations matter for corporate behavior by linking the market segmentation to government regulations and the unique monitoring and certification roles played by intermediaries such as Drexel and life insurance companies.[2]

A more crucial distinction from these studies is that we examine the extent of capital market segmentation across sources of funds (e.g., bank debt, equity, trade credit, internal funds), revealing an almost complete lack of substitution. This finding is related to the broader financing frictions and investment literature (e.g., Fazzari, Hubbard, and Petersen (1998)) but shows that the external finance premium identified by this literature is potentially masking a great deal of variation across different sources of external funds.

Finally, our study is related to previous macroeconomic research suggesting the presence of a bank lending channel (Kashyap, Stein, and Wilcox (1993)). Our results compliment these earlier studies by showing how the capital crunch of 1990-1991, in fact, had its largest impact on those firms forced to re-intermediate their debt because of a contemporaneous collapse in speculative-grade public bond markets. Additionally, we explicitly quantify the impact of the supply shock on financial and investment policy, as opposed to identifying the sensitivity of these policies to various nontraditional determinants (e.g., measures of liquidity).

More generally, our study takes an important step in terms of disentangling supply-side and demand-side factors, which Oliner and Rudebusch (1996) suggest is the "shortcoming of most previous empirical work on the bank lending channel" (P. 308). Ultimately, the close correspondence of our results across the various treatment and control group comparisons reinforces a causal interpretation of our findings.

The remainder of the paper proceeds as follows. Section I describes the events generating the supply shock and the economic environment surrounding the shock. Section II discusses the theoretical framework motivating our study. Section III begins by introducing our data and empirical strategy, followed by a discussion of our sample selection. Section IV presents the results of our analysis pertaining to capital market segmentation. Section V presents the results of our analysis pertaining to capital rationing. Section VI presents an analysis of the specific mechanisms behind our results and the welfare implications of the supply contraction. Section VII concludes.

I. Background and Macroeconomic Environment

A. The Rise and Fall of Speculative Grade Credit

Prior to 1977, junk bonds consisted primarily of bonds originally issued as investment-grade securities that were subsequently downgraded to speculative-grade, so-called "fallen angels" (Simonson (2000)). Shortly after 1977, firms began issuing a nonnegligible amount of speculative-grade securities (Asquith, Mullins, and Wolff (1989)). Figure 1 presents the rate of issuance for speculative-grade bonds, expressed as a percentage of total stock market capitalization.[3] Evident from the figure is the rapid increase in the rate of issuance beginning in 1983 and subsequent plateau in 1986, a time when much of the issuing activity was directed at acquisitions (Holmstrom and Kaplan (2001)). After a slight decline in 1989, net issuances all but disappear in 1990 and 1991, before rebounding in 1992.

The first event contributing to the precipitous decline in junk bond issuances after 1989 was the collapse of Drexel Burnham Lambert Inc. (Drexel). Following the indictment of their chief financier, Michael Milken, in March of 1989, Drexel pled guilty in September of 1989 to six felony counts corresponding to insider trading activity, securities market manipulation, and tax evasion. This plea preceded Drexel's bankruptcy filing in February of 1990. Prior to this plea, Drexel and Milken were responsible for

[2] We also note that neither Faulkender and Petersen (2006) nor Leary (2006) examine the association between the supply of capital and investment. Sufi (2006) shows the importance of third-party certification for increasing the supply of capital to firms.

[3] We are grateful to Bengt Holmstrom and Steve Kaplan for allowing us to reproduce this figure from Holmstrom and Kaplan (2001), Figure 5.

46% of the total number and 57% of the dollar value of junk bond issuances from 1978 to 1989 (Benveniste, Singh, and Wilhelm (1993) and Simonson (2000)). Even during its last full year of operation, 1989, Drexel maintained a 38.6% market share of new issue dollars - approximately four times the market shares of their closest competitors, Shearson Lehman and Morgan Stanley (Benveniste, Singh, and Wilhelm (1993)). Thus, the departure of Drexel in 1989 created a significant gap in the origination of speculative-grade debt that was not quickly filled for reasons we discuss below.

The second event contributing to the decline in junk bond issuances was the passage of the FIRREA in 1989.[4] A response to the Savings and Loan (S&L) crisis that emerged in the 1980s, the FIRREA required financial thrifts regulated by the FDIC to liquidate their holdings of below-investment-grade debt by 1994 and prevented future investments in similar securities after 1989.[5] This regulation had a large impact on the supply of capital to below-investment-grade firms because S&Ls were responsible for purchasing a significant fraction of junk bond issuances.

Panel A of Table 1 presents the total junk bond holdings by S&Ls from 1985 to 1989 and is taken from Table 1 in Brewer and Mondeschean (1994). Also presented in Panel A is the aggregate principal amount of new issues over the same time period obtained from the SDC new issues database. All values are deflated by the GDP-deflator to year-end 1989 dollars. A casual comparison of the holdings by S&Ls and the flow of new funds suggest that S&Ls held a significant fraction of the outstanding speculative-grade debt, though we caution against a literal interpretation of the ratio of total holdings (a stock) to principal amount of new issues (a flow).[6] Nonetheless, the exclusion of S&Ls from this market by the FIRREA coincided with a meaningful decrease in the supply of capital to speculative-grade borrowers.

While our focus in this study is primarily on quantities, Figure 2 presents the monthly time series of yield spreads between the Merrill Lynch junk bond index and

[4] For more details on the FIRREA, see United States League of Savings Institutions (1989), Pulles, Whitlock, and Hogg (1991), and Brewer and Mondschean (1994).
[5] For a more detailed treatment of the Savings and Loan crisis see, for example, White (1991) and Brewer and Mondschean (1994).
[6] The estimates of new issuances from SDC exclude mortgage- and asset-backed issues from the computation.

seven-year constant maturity Treasuries.[7] Though yield spreads on speculative-grade bonds began rising in late 1988, there is a distinct spike that occurred in 1990. Relative to pre-1988 and post-1991 levels, yield spreads doubled in magnitude during 1990 reaching an all-time high of over 10%. Thus, Figures 1 and 2 reveal distinct quantity and price effects consistent with a contraction in the supply of below-investment-grade public debt after 1989.

Contemporaneous with the decline in speculative grade *public* debt was a similar decline in funds channeled to speculative grade *private* debt. Prior to 1990, life insurance companies were "the major investors in private placements…purchasing substantial quantities of below-investment-grade private bonds." (Carey et al. (1993), page 81) Additionally, the size of the private placement debt market during the late 1980s and early 1990s was substantial - approximately 75% that of the public debt market. Thus, privately placed debt funded by life insurance companies represented a significant source of financing for below-investment-grade firms.

By 1990, this source of funding would dry up as well because of a combination of regulatory action and weakening insurer balance sheets. The NAIC changed their ratings of corporate debt, including private placements, to more closely mimic the ratings used by Nationally Recognized Statistical Rating Organizations (e.g., Moody's, S&P, etc.). This change resulted in the reclassification of many securities from investment-grade to below-investment-grade status and, as a result, the holdings of life insurance companies that were classified as below-investment-grade increased by almost 40% from 1989 to 1990. At the same time, poorly performing commercial mortgages and increased public scrutiny of the quality of insurance companies' assets led most insurance companies to restrict further purchases of below-investment-grade private placements for fear of losing customers. Panel B of Table 1 reproduces the data from Figure 5 of Carey et al. (1993) and illustrates the sharp decline in new commitments to purchase below-investment-grade private placements after June of 1990.

In sum, these three events led to a significant decline in the flow of credit to speculative grade firms after 1989. Importantly, these events, in and of themselves, are

[7] The data and figure are taken from Figure 1 in Kwan (2001). The recent working paper by Chava and Purnanandam (2006) shows that credit supply shocks have potential equity valuation effects.

largely exogenous and independent of firms' investment opportunities. The collapse of Drexel was due to illegal activities undertaken by employees. The FIRREA arose from previous deregulation and mismanagement of S&Ls. The retreat from the below-investment-grade debt market by life insurance companies was due largely to a regulatory change coupled with public pressure.

B. The 1990-1991 Recession

While the events discussed above were largely independent of the demand for capital, demand was unlikely constant during this period. In July of 1990, the economy moved into a recession that lasted through March of 1991. As with most recessions, it is normal for the demand for credit to fall, reflecting declines in demand for producers' investment goods. Additionally, many borrowers significantly increased their leverage during the early and mid-1980s (Bernanke, Campbell, and Whited (1990)), suggesting that firms may have been "overlevered," entering 1990. Coupled with the downward pressure placed on cash flows by the recession and declining asset values, credit and investment demand would naturally be expected to fall after 1989.

In addition to weakening balance sheets, the 1990-1991 recession was marked by a significant decline in bank lending (Bernanke and Lown (1991), Peek and Rosengren (1995), and Hancock and Wilcox (1998)). According to data from the Flow of Funds Accounts, total loan growth declined by 3.6% per annum during this period. This is in contrast to previous recessions where loan growth merely slowed to an average of 6.6% per annum.[8] Despite this distinction in credit supply, credit terms for bank loans during the 1990-1991 recession behaved similarly to those in previous recessions. Nominal loan rates fell only slightly during the first two quarters of the recession before dropping more sharply in the first quarter of 1991.

The implication of the recession and the pre-recessionary behavior of firms is that the demand for credit and investment after 1989 was likely slowing. Therefore, particular care must be taken in the empirical analysis to ensure that the impact of the supply contraction is disentangled from any contemporaneous changes in demand (i.e., the

[8] The previous recessions, defined by the year of cyclical peak, (and loan growth) are: 1960 (7.5%), 1969 (4.4%), 1973 (12.2%), 1980 (3.5%), and 1981 (5.4%).

impact of the supply contraction is identified). Before turning to this task, we first discuss why the credit supply contraction might impact corporate behavior.

II. Theoretical Framework

As outlined in the introduction, fluctuations in the supply of capital can impact the behavior of firms for two reasons, broadly speaking: via capital market segmentation or capital rationing. To manage the length of our discussion and maintain focus on the salient issues, we emphasize two studies in outlining the theoretical framework for our analysis - Bolton and Freixas (2000) and Holmstrom and Tirole (1997). Though the implications that we discuss are not unique to these two studies, they provide convenient vehicles for developing our hypotheses and illustrating the theoretical motivation for our study. Where appropriate, we note other related studies for completeness.

A. Capital Market Segmentation

Bolton and Freixas (2000) propose a model of financial markets in which firm financing is segmented across equity, bank debt, and bonds. Specifically, the riskiest firms are either unable to obtain financing or are forced to turn to the equity markets because of information asymmetry between firms and investors. As a result, these firms bear an informational dilution cost, similar to that in Myers and Majluf (1984). Safer firms are able to obtain bank loans, which avoid the informational dilution cost, but carry the intermediation costs associated with debt that is relatively easy to renegotiate (Diamond (1994) and Hart and Moore (1995)). Finally, the safest firms tap the public debt markets in order to avoid internalizing the intermediation costs, which are less relevant because of the relatively low likelihood of experiencing financial distress.

The behavior and structure of Drexel and life insurance companies suggests that their role, in many ways, fell somewhere between the bank and bond sectors depicted in the Bolton and Freixas (2000) framework. For example, Jensen (1991) suggests that Drexel had a “unique” ability to restructure distressed debt and monitor borrowers, a sentiment he noted in his testimony to the House Ways and Means Committee (Jensen (1989)). Additionally, Benveniste, Singh, and Wilhelm (1993) note that Drexel’s ability

to dominate the underwriting of high-yield bonds was due to Drexel's network of repeat investors and Milken's power over those customers, which greatly eased the restructuring of distressed debt. Consistent with this view, Simonson (2000) shows that firms with bonds underwritten by Drexel exhibit significantly higher default rates compared to non-Drexel clients in the years following Drexel's guilty plea.

Similarly, life insurance companies maintained large credit departments to assess and monitor borrowers, in contrast to other capital suppliers such as pension funds and finance companies (Carey et al. (1993)). Life insurance companies also offered unique debt contracts that differed from bonds and bank debt along a number of dimensions.[9] Thus, both Drexel and life insurance companies offered services that were unique, in a sense that parallels that of banks in the Bolton and Freixas (2000) framework, but at a lower (higher) cost relative to banks (investment-grade bonds).[10]

Because investment-grade bond issuances are largely unavailable to speculative-grade firms, the disappearance of speculative grade bonds and private placements required the affected firms to switch to a higher cost source of capital.[11] Speculative-grade firms could either incur an informational dilution cost if they turn to equity, or they could incur a renegotiation premium if they turn to bank debt. Thus, in the presence of segmented capital markets, we should observed limited substitution across markets. Quantifying the extent of any limitations on substitution is one goal of our empirical analysis.

B. Capital Rationing

Holmstrom and Tirole (1997) present a model in which firms, intermediaries, and investors interact to efficiently allocate capital.[12] Firms face a moral hazard problem in that managers can extract private benefits through an appropriate choice of projects.

[9] For example, private placements had maturities falling between those of bank loans (less than seven years) and investment-grade bonds (greater fifteen years). Private placements contained fewer (more) covenants than bank loans (bonds), and had stiff prepayment penalties relative to bank loans.

[10] Indeed Benveniste, Singh, and Wilhelm (1993) discuss the disintermediation of credit for these firms.

[11] In theory, below-investment-grade firms could have just altered their status to investment-grade in order to tap the cheaper source of capital. In practice, fewer than 6% of below-investment grade firms in 1989 improved their credit rating to investment-grade status.

[12] Other papers examining capital constrained lending include Jaffee and Russell (1976), Stiglitz and Weiss (1981), and He and Krishnamurthy (2006), who examine credit rationing; Diamond (1991), who examines capital-constrained borrowing; and Diamond (1984) who examines intermediation.

Intermediaries alleviate the moral hazard problem through costly monitoring, which in turn creates a moral hazard problem for the intermediaries. The moral hazard problem faced by the intermediaries requires them to inject their own capital into the firms that they monitor. Limitations on the amount of *intermediary* capital, therefore, act as a potential constraint on the financing and investment of firms.

For our purposes, the relevant empirical implications of Holmstrom and Tirole's (1997) model center on both what type of firms are forced to turn to monitors, as well as what type of firms are most likely to be affected by fluctuations in the supply of intermediary capital. Because monitoring acts as a substitute for collateral, low net worth firms or firms requiring high-intensity monitoring (i.e., informationally opaque or high risk) will be forced to turn to intermediaries in order to increase pledgeable income to a level sufficient to guarantee investors a fair return. As such, when intermediary capital is scarce, it is precisely these firms - those with low net worth and requiring high-intensity monitoring - that will be rationed from the capital markets. Thus, the financing and investment activities of these marginal firms may be reduced as a result of shortages of intermediary capital.

Below-investment-grade firms during our period of study are a good example of these marginal firms. Having disintermediated their debt by turning to either junk bonds or insurers, their reputational capital with banks would necessarily be low and their information opacity high. Indeed, prior to 1983, most speculative-grade firms were bank dependent borrowers, but for firms whose bonds had been downgraded to junk status. Additionally, a key factor in their speculative-grade status is a relatively weak balance sheet. Thus, in the wake of the capital crunch besetting the banking system after 1989, below-investment-grade firms are likely to be rationed from bank debt.

III. Data, Empirical Strategy, and Sample Selection

A. Data

The starting point for our sample begins with all nonfinancial firm-year observations in the intersection of the monthly CRSP and annual Compustat databases between 1986 and 1993. We choose this particular sample horizon in order to have a

balanced time frame around the event date and avoid artificially skewing the degrees of freedom in the pre- (1986 to 1989) and post-supply (1990 to 1993) shock eras. We also require that all firm-year observations have nonmissing data for book assets and that leverage lie in the closed unit interval. All ratios used in this study are trimmed at the upper and lower 1-percentiles to mitigate the effect of outliers and eradicate errors in the data. The construction of all variables used in the study is detailed in Appendix A.

For presentation purposes, we focus on results obtained from using financing and investment measures from the statement of cash flows. This enables us to follow the impact of the supply shock through the accounting sources and uses identity. It also enables greater resolution in terms of which financing and investment channels are affected by the supply shock. However, in unreported results, we find that alternative measures based on balance sheet information produce qualitatively similar results.

We use the Standard and Poor's long-term domestic issuer credit rating to categorize firms. This rating represents the "current opinion on an issuer's overall capacity to pay its financial obligations." (Standard and Poor's (2001)) While other issue-specific ratings are available (e.g., subordinated debt), Kisgen (2006) notes that most other ratings have a strict correspondence with the issuer rating and, therefore, little information is lost by focusing attention on this particular rating. As defined by S&P, firms rated BBB- or higher are defined as "investment-grade"; firms rated BB+ or lower are defined as "below-investment-grade" (or "speculative-grade" or "junk"); firms without an S&P rating are referred to as "unrated."

Table 2 presents summary statistics for several groups of firms differentiated by their rating status during the period 1986 to 1993. In addition to revealing the general characteristics of our sample of firms, Table 2 is also helpful in identifying along which dimensions these groups of firms differ and by how much, albeit at a coarse, aggregate level that does not distinguish between the pre- and post-shock eras. Focusing on the first three columns, we see that below-investment-grade (Junk) firms rely more on long term debt financing relative to investment-grade and unrated firms, whereas investment-grade firms rely more on cash flow and unrated firms rely more on equity financing. Investment-grade firms tend to pay out relatively more earnings in dividends than the other groups, while net investment is monotonically increasing as we progress from

investment-grade to junk to unrated categories.[13] Within the net investment category, the distribution across investment channels is not terribly different, though below-investment-grade firms do engage in relatively more acquisition activity during this time period.

Turning to a comparison of firm characteristics, we see a number of marked differences. Size, as measured by the log of sales, declines monotonically and in a significant manner as we progress from investment-grade to junk to unrated. A similar monotonic decline is observed in profitability (earnings divided by total assets), tangibility (tangible assets divided by total assets), and Altman's Z-Score (Altman (1968)), which is a linear combination of several accounting measures designed to measure the financial health of the firm (see Appendix A for further details). Higher Z-scores correspond to financially healthier firms.

B. Empirical Strategy

As noted above, because the supply shock to the junk bond market was followed by a recession and changes in the demand for capital, particular care must be taken to disentangle the supply and demand effects on corporate behavior. For example, a change in the behavior of firms accessing speculative-grade debt after 1989 may simply reflect unobserved shifts in these firms' demand for capital commensurate with the change in economic environment. Similarly, a comparison of junk bond issuers and, for example, investment-grade bond issuers after 1989 may merely reflect unmeasured differences between the two groups' demand for capital. To control for these factors, we employ a difference-in-differences empirical approach.

The difference-in-differences estimation addresses both of these concerns by subtracting the change in outcomes for a control group from the change in outcomes for a treatment, or comparison, group. In our setting, the outcomes of interest are financial (e.g., net debt issuances) and investment variables (e.g. capital expenditures). The treatment group is defined as those firms affected by the supply shock, such as below-

[13] As a brief aside, we note that the sources and uses do not add up exactly because of rounding and the suppression of several secondary channels in the uses of funds, such as declines and increases in investments in unconsolidated subsidiaries.

investment-grade bond issuers. The control group is defined as those firms not (directly) affected by the supply shock, such as investment-grade bond issuers or unrated firms.

Our strategy is to identify the change in behavior of the treatment group in response to the supply shock, using the control group to estimate the unobserved counterfactual (i.e., what would have happened to the treatment group had the supply shock not occurred). In our analysis, we follow the advice of Meyer (1995) and present several different comparisons (i.e., treatment and control groups) in an effort to ensure the validity of our identification strategy and robustness of our results.

C. Sample Selection

The results in Table 2 suggest that a simple comparison of all below-investment-grade firms to either all investment-grade or all unrated firms is suspect given the large differences in firm characteristics across the three groups. As such, our first comparison is based on a propensity score matched sample (Rosenbaum and Rubin (1983)) comparing the behavior of below-investment-grade firms to matched unrated firms. Our difference-in-differences approach mimics that discussed in Smith and Todd (2003). To ease the flow of our discussion, we present here only a heuristic description of the matching process and results, leaving the details to Appendix B.

The matching procedure that we employ effectively takes each below-investment-grade (i.e., treatment) firm and finds the unrated (i.e., control) firm that is "closest" in terms of observable firm characteristics. The characteristics on which we match are a superset of those presented in Table 2, also including industry fixed effects and measures of pre-shock (i.e., pre-1990) investment and financing behavior. Thus, corresponding to each below-investment-grade firm is an unrated firm that falls in the same industry and is statistically identical in terms of observable firm characteristics and pre-1990 investment and financing behavior.

To address potential self-selection concerns over the decision to access public debt markets (and, hence, obtain a debt rating), we incorporate the instrumental variables suggested by Faulkender and Petersen (2006), who identify several instruments distinguishing rated and unrated firms. The results presented and discussed in Appendix B (Table B1) show that the matching process is successful in the sense that the matched

sample of below-investment-grade and unrated firms show no statistically significant differences across any firm characteristics and the distribution across industries is statistically indistinguishable, as well. Additionally, the coefficient estimates on the instruments suggested by Faulkender and Petersen (2006) are jointly statistically significant in the pre-matching analysis, providing an exogenous source of variation for our analysis.

We refer to this sample as the "Matched Sample" to distinguish it from our second comparison, which defines the treatment (control) group as consisting of only BB-rated (BBB-rated) firms. That is, we examine only those firms that are close or local to the investment-grade distinction. The motivation for this second comparison comes from the regression discontinuity design literature (e.g., Thistelwaite and Campbell (1960) and Hahn, Todd, and Van der Klaauw (2001), and Rauh (2006)), which suggests that such proximity moves closer toward an experimental setting in which the firms are randomly assigned to treatment and control groups. Clearly, this ideal is not achieved in our – or any other - observational study; however, an inspection of the last two columns in Table 2 suggests that this definition aids in significantly homogenizing the treatment and control groups. While differences still exist, we are more confident in accounting for these differences via control variables in our analysis. We refer to this sample as the "Local" sample.

For our analysis, we mention two additional requirements of our samples to ensure a proper interpretation of the estimated treatment effects. First, we require that firms maintain their credit rating status during the period of observation. That is, we exclude firms moving in and out of the treatment and control groups during the period of study.[14] Second, an implicit requirement of the difference-in-differences framework is that each firm contain at least one observation in the both the pre-1990 and post-1989 periods. Thus, each firm in our sample must have at least two observations and maintain its membership in the treatment or control groups, as defined above.

[14] By imposing this criterion, we are ignoring the possibility that firms were induced by the supply shock to improve their credit rating to investment-grade. While plausible, empirically, this activity occurred in fewer than 6% of our sample firms.

IV. Capital Market Segmentation: Results

A. Average Effects

Table 3 presents the results of the difference-in-differences estimation using the Matched sample. Financial policy variables are presented in Panel A and investment policy variables in Panel B. All variables are scaled by start of period book assets. Each panel presents several summary measures beginning with the average difference between the post-1989 period and the pre-1990 period for the treatment (i.e., Junk) and control (i.e., Unrated) groups. For example, Panel A shows that the average change in net long term debt issues for below-investment-grade firms was -12% of total assets. This estimate is computed by first calculating the average net long term debt issues from 1990 to 1993 and then subtracting the average net long term debt issues from 1986 to 1989 for each firm. This difference is then averaged over below-investment-grade firms to obtain -12%. A similar procedure is performed for the matched unrated firms.

We also present the standard error for each average (in parentheses). At the bottom of each panel are the difference-in-differences estimate (Dif-in-Dif) and the corresponding t-statistic of the null hypothesis that this estimate is zero (T-Stat). Note that there is no need for additional control variables since the treatment and control firms are already matched, nonparametrically, on all observable characteristics. We also note that, in unreported analysis, we also examine the corresponding median values for the treatment and control groups. The results are qualitatively similar.

Focusing first on Panel A, we see that total net security issuances (net debt plus net equity) by below-investment-grade firms decreased by 8% of assets relative to the change experienced by similar unrated firms. The average total net security issuances by below-investment-grade firms in our matched sample from 1986 to 1989 was 13%, implying a decline of 62% relative to pre-shock levels. Thus, aggregate financing activity contracted sharply for below-investment-grade firms in response to the supply shock.

The second through sixth columns of Panel A reveal that the contraction is concentrated almost entirely in net long term debt issuances. This finding implies that substitution toward bank debt was limited since this measure encompasses all forms of

credit in excess of one year in maturity (e.g., public debt, bank debt, private placements). Likewise, there was relatively little substitution toward alternative sources of financing including short-term debt, external equity, trade credit, and internal liquidity, none of which reveal a significant estimated effect. Unreported analysis also reveals that dividend policy showed little response to the supply shock, suggesting that below-investment-grade firms were not scaling back shareholder distributions to maintain financial slack. In short, net debt issues fell precipitously after 1989 for below-investment-grade firms with little accompanying substitution to alternative sources of capital.

The final two columns of Panel A show that, in spite of the precipitous decline in net debt issuing activity, leverage was unchanged. This finding is driven primarily by two forces. First, both book and market equity values declined after 1989. Indeed, the decline in equity values was so severe, that market leverage actually exhibits a slight increase for both below-investment-grade and unrated firms, separately. Second, as discussed in more detail below, investment experienced a contemporaneous contraction limiting asset growth. This leverage finding is in contrast to those in the recent literature (e.g., Faulkender and Petersen (2006), Leary (2006), and Sufi (2006)), which suggests that differences in the supply of capital play an important role in determining firms' leverage ratios.

Turning to Panel B, we see that net investment declined almost one-for-one with the decline in net debt issuing activity. Net investment by below-investment-grade firms decreased by 6% of assets relative to the change experienced by unrated firms and by 35% relative to the rate of net investment prior to the shock. The remaining columns identify the composition of the investment decline, which is primarily concentrated in slowing acquisition activity (Holmstrom and Kaplan (2001)). As an aside, we note that the sum of the estimated effects for capital expenditures and acquisitions (less the sale of PPE) do not add up to the net investment effect because of rounding error and because of unreported components, such as declines in investments in unconsolidated subsidiaries.

Table 4 presents the results using the Local sample. Because in this case the treatment (BB-rated) and control (BBB-rated) firms differ along a number of dimensions (see Table 2), estimation of the effects of the supply shock on firm behavior is carried out with the traditional difference-in-differences regression:

$$Y_{it} = \beta_0 I_{it}(\text{Post -1989}) + \beta_1 I_{it}(Treat) + \beta_2 I_{it}(\text{Post -1989}) I_{it}(Treat) + \gamma' X_{it-1} + \varepsilon_{it}, \quad (1)$$

where *i* indexes firms, *t* indexes years, *Y* is the response variable (e.g., net debt issuances, net investment, etc.), *I*(*Post-1989*) is an indicator variable equal to one if the observation occurs after 1989, *I*(*Treat*) is an indicator variable equal to one if the observation is in the treatment group (BB rated firms) and zero if the observation is in the control group (BBB rated firms), *X* is a vector of control variables, and ε is firm-year-specific effect assumed to be correlated within firms and possibly heteroskedastic (Bertrand, Duflo, and Mullainathan (2004) and Petersen (2006)). The coefficient of interest is β_2, which corresponds to - approximately - the average change in *Y* from pre-1989 to post-1989 for the treatment group minus the change in *Y* from pre-1989 to post-1989 for the control group.[15]

The results reveal a similar story to that presented in Table 3 using the Matched sample, with exception of different estimate magnitudes. Below-investment-grade firms experienced a contraction in total net issuance activity (5% of assets) driven by a decline in net long term debt issuances (7% of assets). While there is some evidence of substitution to alternative sources of capital (e.g., short-term debt) within this sample, the economic magnitude of the substitution is small. This fact is confirmed by the contraction in net investment activity, which declined by a statistically significant 3% of assets (Panel C). Finally, we again see that leverage was largely unaffected, either economically or statistically, by the supply shock (Panel B).[16]

In sum, there is very little substitution across financing sources in response to the supply shock, leading to a sharp reduction in both total net debt issuances and total net security issuances. Leverage, however, was largely unaffected by the supply shock, consistent with the long-lived stability of firms' debt ratios observed by Lemmon,

[15] The relation is only approximate because of possible correlation between the interaction term and *X*.

[16] We also address concerns over the impact of measurement error in the market-to-book ratio on the identification of other parameters (e.g., Gomes (2001)) by incorporating alternative proxies for marginal q, such as higher order polynomials of the market-to-book ratio and "macro q," defined as the sum of total debt, the market value of equity, and other assets, all divided by the start of period capital stock (Erickson and Whited (2000, 2005)). Additionally, we employ the reverse regression bounds approach of Erickson

Roberts, and Zender (2006). As a consequence of the lack of substitution to alternative forms of financing, net investment declines almost one-for-one with the decrease in net debt issuing activity. Because the decrease in investment is driven primarily by the decline in acquisition activity, it is unclear whether there were any macroeconomic consequences of the supply shock or just a redistribution of resources. What is clear, however, is that the distribution of investment at the firm level was distinctly affected by the supply shock.

B. Short-Run and Long-Run Effects

Tables 3 and 4 present average effects in that they aggregate the effect of the supply shock over the subsequent four years: 1990 to 1993. However, in order to move toward understanding why the supply shock impacted corporate behavior it is important to know whether the supply shock had a short-term or long-term impact. Additionally, it is not obvious why the estimated effects found in the Local sample are smaller than those found in the Matched sample. As such, we look at changes between the post and pre-shock eras, where we define the post-shock era as either 1990 to 1991 (short-run) or 1992-1993 (long-run).

Table 5 presents evidence on the short-run and long-run effects of the supply shock using the Matched sample. The short-run difference for each firm is computed as the average net long term debt issues, for example, over the 1990 and 1991 period minus the corresponding average over the 1986 to 1989 period. These short-run results are presented in Panels A (Financial Policy) and B (Investment Policy). The long-run results are computed analogously, only using the average over the period 1993 and 1992 as the post-shock response. These results are presented in Panels C and D.

The impact of the supply shock on below-investment-grade firms relative to unrated firms was pronounced in both the 1990-1991 era, as well as the 1992-1993 era. Panels A and C show that net long term debt issuing activity declined by 8% and 9% of assets in both eras, respectively. We see little substitution immediately following the supply shock but a slight offsetting decline in cash holdings and increases in trade credit

---

and Whited (2005) in order to ensure the robustness of the sign of our estimate. All of these results suggest that our estimated treatment effects are robust to measurement concerns and, consequently, are suppressed.

and equity during the 1992-1993 era. However, these actions fell well short of compensating for the decline in net debt issuing activity, as suggested by the 7% and 5% decline in net investment in the 1990-1991 and 1992-1993 eras, respectively. Thus, the impact of the supply shock on below-investment-grade firms, as a whole, appears to be long-lived.

In light of Figures 1 and 2, these results might appear puzzling. Figure 1 shows that junk bond issuances increased sharply in 1992 and, in 1993, exceeded all pre-1990 relative issuance levels. Similarly, credit spreads for speculative-grade bonds fell to almost 5% in 1992, a 50% decline from the 1990 peak of 10%. However, these figures are somewhat misleading because the firms issuing junk bonds in 1992 and 1993 were not the same firms issuing junk bonds prior to 1990. Fridson (1994) notes that:

> "…1993 was far from a replay of the…1980s. Bottom-tier paper (the proportion rated B- or lower) represented only 16% of the principal amount of high yield debt floated. During 1987-1988, by contrast, the ratio exceeded 60%." (Page 89)

To examine this issue, Table 6 presents results from the Local sample, which includes only the firms with ratings just below investment grade (BB plus to BB minus) in the treatment group. To differentiate between short-run and long-run effects in a manner analogous to that performed for the matched sample, we alter the specification of equation (1) in the following manner:

$$\begin{aligned} Y_{it} = {} & \beta_0 I_{it}(\text{Post -1989}) + \beta_1 I_{it}(Treat) + \beta_2 I_{it}(Year \in \{1990,1991\}) I_{it}(Treat) \\ & + \beta_3 I_{it}(Year \in \{1992,1993\}) I_{it}(Treat) + \gamma' X_{it-1} + \varepsilon_{it}. \end{aligned} \tag{2}$$

Equation (2) breaks out the treatment effect into two pieces corresponding to the two interaction terms. The first term measures the response in the first and second year after the shock and the second term measures the response in the third and fourth year. All other elements of the specification remain unchanged from equation (1).

For brevity, we present only the results obtained with the full specification that includes firm characteristics and macroeconomic measures as control variables. The results show that BB-rated firms experience a less protracted contraction in net security issuances and net investment. Specifically, Panel A reveals that the decline in net long-term debt issuing activity in the 1992-1993 era (4%) was less than half of that experienced in the first two years following the supply shock (9%). Consequently, the decline in total net security issuances fell from 8% of assets in 1990-1991 to only 2% of assets in 1992-1993, a statistically insignificant effect. Panel B shows that although net investment decreased by 6% of assets during 1990 and 1991, the decrease in 1992 and 1993 was 1% and statistically insignificant. Thus, among below-investment-grade firms, it was the lower rated firms (i.e., below BB minus) that experienced a more protracted contraction in the aftermath of the supply shock.

In summary, our results are consistent with the main implications from Bolton and Freixas (2000) and quantify the impact of financing frictions across different sources of capital. Substitution of capital across sources was mostly non-existent immediately following the contraction in the supply of credit, suggesting that external financing premiums can exhibit significant heterogeneity across various sources of capital. Consequently, net investment declined almost one-for-one with the contraction in net issuing activity because of sharply segmented capital markets. Closer inspection reveals that the impact of the contraction affected all below-investment-grade firms immediately following the shock; however, there was significant variation in the duration of the shock's impact on the cross-section of below-investment-grade firms. In particular, the effects of the supply contraction were more persistent among relatively lower-rated firms, i.e., riskier, more informationally-opaque firms. Thus, for firms that were more likely to need to restructure debt, capital constraints were slow to relax as qualified institutions built up the knowledge and expertise previously limited to Drexel and life insurers.

V. Capital Rationing: Results

While the above results speak to the uniqueness of different forms of capital, they do not speak directly to the importance of intermediary capital (bank capital, specifically)

in the financing and investment behavior of firms - Holmstrom and Tirole (1997). To examine this hypothesis, we use the geographic heterogeneity in the capital crunch of 1990-1991 to identify the effects of fluctuations in intermediary capital on firm behavior.

As discussed earlier, the 1990-1991 recession was accompanied by a sharp contraction in bank lending that was concentrated in the Northeast region of the country (Bernanke and Lown (1991), Peek and Rosengren (1995), and Hancock and Wilcox (1998)).[17] This localized contraction is primarily attributed to an erosion of bank capital driven by declining real estate prices and, therefore, this event is sometimes referred to as a "capital crunch" (Wojnilower (1980), Bernanke and Lown (1991), and Peek and Rosengren (1995)).

In so far as the geographic location of corporate headquarters within the US is exogenous to the financing demand and investment opportunities of firms, we can use location as an instrument to identify the impact of the loan-supply shock on firm behavior. The assumption implicit in this strategy is that firms, on average, tend to borrow from local banks. Bharath et al. (2004) show a strong propensity of public firms to borrow from local lenders; however, any deviation form this tendency will tend to attenuate our results.

Our empirical strategy follows the difference-in-differences approach implied by equation (1). Only now, we define the treatment group as consisting of all below-investment-grade firms with headquarters located in the Northeast and the control group as all below-investment-grade firms with headquarters located elsewhere in the country. We refer to this sample as the Geography sample. If the availability of bank credit was more constrained in the Northeast, then we should observe that below-investment-grade firms located in this region responded more severely to the collapse of the junk bond market compared to firms located in other parts of the country. In addition to examining the implications of credit rationing theories, this analysis acts as a third comparison and yet another robustness check of our identification strategy.

The results are presented in Table 7. Panel A reveals that the net security issuance activity of below-investment-grade firms in the Northeast part of the country experienced

[17] The Northeast region of the US is comprised of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania.

a significant decline relative to the change experienced by below-investment-grade firms in other parts of the country. Specifically, net long-term debt issuances of firms in the Northeast region fell by 8% of assets relative to firms located in other regions. Similar to our earlier results, there is no evidence that firms in the Northeast fill the decline in debt issuances with other forms of financing. We also note that, yet again, the precipitous decline in net debt issuing activity was accompanied by no significant change in corporate leverage ratios. Panel B shows that the decline in financing activity led to a corresponding decline in net investment (11%) that is concentrated in acquisition activity (6%), though capital expenditures also fell by a statistically significant amount (2%). This evidence is consistent with the view that the slowdown in bank lending driven by the contraction in intermediary capital among Northeast banks effectively closed the bank lending channel for below-investment-grade firms in that area (Holmstrom and Tirole (1997)).

One potential concern with this interpretation is that accompanying the larger decline in real estate values in the Northeast was a relatively more severe recession that simply reduced aggregate demand in that part of the country relative to the rest of the country. However, if this was indeed the case, then we should find similar results if we examine investment-grade or unrated firms stratified by the geographic location of their headquarters. To test this hypothesis, we re-estimate equation (1) for all of the financing and investment variables on the sample of investment-grade (and unrated) firms differentiated only by the location of their headquarters. The results, not reported, reveal no significant treatment effects in financing or investment behavior for either of these two samples, suggesting that geographic heterogeneity in the severity of the recession is not behind our findings in Table 7.

Another potential concern is that the decline in real estate values in the Northeast led to relatively weaker balance sheets of firms in the Northeast and a more difficult time in securing debt. To test this alternative hypothesis, we examine the impact of the supply shock on the use of mortgages and secured debt. Estimating equation (1) using net issuances of mortgages and secured debt as a fraction of assets as the dependent variable reveals no significant treatment effect, suggesting that the decline in net debt issuances

among below-investment-grade firms in the Northeast was *not* concentrated in secured debt or, more specifically, debt secured by real estate.

Ultimately, our results suggest that substitution toward bank debt was limited by a concurrent contraction in the supply of bank loans by lenders in the Northeast. This finding suggests a potentially interesting side effect associated with the credit channel of monetary policy transmission (Bernanke and Gertler (1989), Kashyap, Lamont, and Stein (1994)). Specifically, the bank loan contraction occurring during the recession of 1990 and 1991 affected not only bank-dependent borrowers, but also non-bank dependent borrowers who, as a consequence of the exodus of capital from the below-investment-grade debt market, suddenly became bank-dependent and were forced to re-intermediate their debt. The fact that the bottom-tier (B-minus rated and lower) firms were most severely affected by the supply shock (see the Tables 5 and 6) is consistent with the predictions of Holmstrom and Tirole (1997), who suggest that firms with weaker balance sheets are more likely to be rationed from the capital markets.

VI. Discussion

While the previous two sections illustrate how fluctuations in the supply of capital can impact corporate behavior, three additional questions arise from these results. First, why did speculative-grade firms not turn to the equity market? Second, why did other capital suppliers (e.g., pension funds, financing companies, investment banks) not fill the void left by Drexel and life insurers? Finally, what were the efficiency implications of the supply contraction? While space considerations limit our investigation into these issues, we present a brief discussion and analysis of these issues in this section.

Beginning with the first question, there are at least two factors limiting the issuance of equity by speculative-grade firms in the wake of the supply shock. First, these firms are informationally opaque and, consequently, require a relatively high degree of monitoring (Jensen (1989, 1991) and Wruck (1990)). This factor suggests that the information dilution cost associated with issuing equity is likely to be relatively high for these firms (Myers and Majluf (1984) and Bolton and Freixas (2000)). Second, according to Korajczyk, Lucas, and McDonald (1991, 1992) and Choe, Masulis, and Nanda (1993),

the 1990 and 1991 recessionary period coincided with a particularly high adverse selection premium, in general, as these authors document sharp increases in the information dilution cost associated with equity during recessionary periods. Thus, equity financing for below-investment-grade firms after 1989 would have been a particularly expensive form of financing, a fact also consistent with the broader segmentation hypothesis of Bolton and Freixas (2000).

Turning to the second question, why other capital suppliers did not fill the void left by Drexel and life insurers, it is important to recall the "specialness" of these intermediaries discussed earlier in Sections II and III. Drexel and life insurers dominated the public and private below-investment-grade debt markets precisely because of their unique nature, respectively. One can view this uniqueness as a consequence of different technologies or high entry costs. Specifically, as mentioned earlier, Drexel possessed a unique ability to monitor borrowers and restructure distressed debt – an ability not easily replicated by other investment banks even after Drexel's exit from the market.

Similarly, life insurers were responsible for the screening and monitoring of borrowers (Carey et al. (1993)). Any financial intermediary wishing to enter the private placement market must, therefore, face the startup costs associated with establishing the infrastructure to assess and monitor high-risk borrowers. Further, a potential entrant must have the preferences for the risk-return profile afforded by these firms (Gorton and Pennachi (1990)), which precludes finance companies, who prefer to arrange secured, hybrid lending agreements containing equity options (Carey et al. (1993)), and pension funds, who lack the necessary infrastructure and expertise.

The final question concerns the welfare implications of the supply contraction. There are two views on this issue. The first view is that the supply contraction eliminated wasteful overinvestment by firms. The second view is that the supply contraction led to inefficient underinvestment by preventing the financing of positive NPV projects. While no proxy for efficiency is perfect, we examine three proxies of operating efficiency: return on assets (operating income divided by assets), asset turnover (sales divided by assets), and return on equity (operating income divided by book equity).

Table 8 presents the response of these measures to the supply shock. Panel A reveals that the return on assets and the return on equity for below-investment-grade

firms increase significantly, economically and statistically, relative to otherwise comparable unrated firms. Asset turnover reveals a similar increase, albeit a statistically insignificant one. Panel B reinforces these results with similar findings among below-investment-grade firms in the local sample. The return on assets and asset turnover experience economically and statistically large increases after the supply contraction. The return on equity also reveals a positive, but statistically insignificant, change after the supply shock. Thus, there is some evidence to suggest that speculative-grade firms may not have been operating efficiently prior to 1990, a period characterized by overheated buyouts and cheap debt according to Kaplan and Stein (1993).

VII. Conclusion

We use the shock to the supply of below-investment-grade debt precipitated by the fall of Drexel, the enactment of the FIRREA, and changes in the insurance industry in late 1989-early 1990 to examine the impact of fluctuations in the supply of capital on the distribution of financing and investment. The specificity and exogenous nature of these events enable us to employ a difference-in-differences research design aimed at disentangling supply-side from demand-side forces.

Our results show that capital inflows and investment decline almost dollar-for-dollar with the decrease in net debt issuances brought on by the supply shock. We interpret this evidence as consistent with a sharp segmentation of capital markets and prohibitively high switching costs brought about by the unique monitoring and certification skills of certain intermediaries, coupled with government regulation. We also show that this segmentation generates a role for fluctuations in the supply of *intermediary* capital in shaping corporate financial and investment policies via a bank lending channel. However, the combination of declining debt issuances and investment leads to relatively stable corporate leverage ratios, suggesting that the role of the supply of capital in determining capital structure is unclear.

While the events contributing to the contraction in credit supply after 1989 were unique - enabling identification of the supply effect - one cannot help but draw parallels between the influx of money into the high yield market in the 1980s and the influx of

money into venture capital in the late 1990s and, especially, the high yield market today. Whether today's speculative-grade firms experience outcomes similar to those of their predecessors remains to be seen. As such, we look forward to future research that examines the impact of this, and other, supply effects on corporate behavior.

References

Altman, Edward I., 1968, Financial ratios, discriminant analysis, and the prediction of corporate bankruptcy, *Journal of Finance* 23: 589–609

Asquith, Paul, Robert Gertner, and David Scharfstein, 1994, Anatomy of financial distress: An examination of junk-bond issuers, *Quarterly Journal of Economics* 109: 626-658

Asquith, Paul, David Mullins, and E. Wolff, 1989, Original issue high yield bonds: Aging analyses of defaults, exchanges, and calls, *Journal of Finance*44: 923-952

Benveniste, Lawrence M., M. Singh, and W. Willhelm, 1993, The failure of Drexel Burnham Lambert: Evidence on the implications for commercial banks, *Journal of Financial Intermediation* 3: 104-137

Bernanke, Ben S., John Y. Campbell, and Toni M. Whited, 1990, U.S. corporate leverage: Developments in 1987 and 1988, *Brookings Papers on Economic Activity* 1: 255-278

Bernanke, Ben and Mark Gertler, 1989, Agency costs, net worth and business fluctuations, *American Economic Review* 79: 14-31

Bernanke, Ben S., and Cara S. Lown, 1991, The credit crunch, *Brookings Papers on Economic Activity* 2: 205-247

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, 2004, How much should we trust differences-in-differences estimates? *Quarterly Journal of Economics* 119: 249-275

Bharath, Sreedhar, Sandeep Dahiya, Anthony Saunders, and Anand Srinivasan, 2004, So what do I get? The bank's view of lending relationships, *Working Paper*, University of Michigan

Bolton, Patrick and Xavier Freixas, 2000, Equity, bonds, and bank debt: Capital structure and financial market equilibrium under asymmetric information, *Journal of Political Economy* 108: 324-351

Brewer, Elijah and Thomas H. Mondeschean, 1994, An empirical test of the incentive effects of deposit insurance, *Journal of Money, Credit, and Banking* 26: 146-164

Carey, Mark S., Stephen D. Prowse, John D. Rea, and Gregory F. Udell, 1993, Recent developments in the market for privately placed debt, *Federal Reserve Bulletin*, 79: 77-92

Carpenter, Robert E, Steven M. Fazzari, and Bruce C. Petersen, 1994, Inventory investment, internal-finance fluctuations, and the business cycle, *Brookings Papers on Economic Activity* 75-138

Chava, Sudheer and Amiyatosh Purnanandam, 2006, The effect of banking crisis on bank-dependent borrowers, *Working Paper* University of Michigan

Choe, Hyuk, Ronald Masulis, and Vikram Nanda, 1993, Common stock offerings across the business cycle: Theory and evidence, *Journal of Empirical Finance* 1: 3-31

Diamond, Douglas, 1984, Financial intermediation and delegated monitoring, *Review of Economic Studies* 51: 393-414

Diamond, Douglas, 1991, Monitoring and reputation: the choice between bank loans and directly placed debt, *Journal of Political Economy* 99: 688-721

Diamond, Douglas, 1994, Corporate capital structure: The control roles of bank and public debt with taxes and costly bankruptcy, *Federal reserve Bank Richmond Economics Quarterly* 80: 11-37

Erickson, Timothy and Toni Whited, 2000, Measurement error and the relationship between investment and q, *Journal of Political Economy* 108: 1027-1057

Erickson, Timothy and Toni Whited, 2005, Proxy quality thresholds: Theory and applications, *Finance Research Letters* 2:131-151

Fama, Eugene, 1985, What's different about banks? *Journal of Monetary Economics* 15: 29-36

Faulkender, Michael and Mitchell A. Petersen, 2006, Does the source of capital affect capital structure? *Review of Financial Studies* 19: 45-79

Fazzari, Steven M, Glenn R. Hubbard, and Bruce C. Petersen, 1988, Financing constraints and corporate investment, *Brookings Papers on Economic Activity* 141-195

Financial Institutions Reform, Recovery & Enforcement Act of 1989, 1989, Chicago, IL: United States League of Savings Institutions, 9 Volumes.

Fridson, Martin S., 1994, The state of the high yield bond market: Overshooting or return to normalcy? *Journal of Applied Corporate Finance*7: 85-97

Gertler, Mark and Simon Gilchrist, 1994, Monetary policy business cycles, and the behavior of small manufacturing firms, *Quarterly Journal of Economics* 109: 309-340

Gomes, Joao, 2001, Financing investment, *American Economic Review* 91: 1263-85

Gorton, Gary and George Pennacchi, 1990, Financial intermediaries and liquidity creation, *Journal of Finance* 45: 49-71

Graham, John R. and Campbell R. Harvey, 2001, The theory and practice of corporate finance: Evidence from the field, *Journal of Financial Economics* 60: 187-243

Hahn, Jinyong, Petra Todd and Wilbert van der Klaauw, 2001, Estimation of treatment effects with a quasi-experimental regression-discontinuity design, *Econometrica* 69: 201-209

Hancock, Diana and James A. Wilcox, 1998, The "credit crunch" and the availability of credit to small business, *Journal of Banking and Finance* 22: 983-1014

Hart, Oliver and John Moore, 1995, Debt and seniority: An analysis of the role of hard claims in constraining management, *American Economic Review* 85: 567-585

He, Zhiguo and Arvind Krishnamurthy, 2006, Intermediation, capital mobility, and asset prices, *Working Paper* Northwestern University

Heckman, James, Hidehiko Ichimura, and Petra Todd, 1998, Matching as an econometric evaluation estimator, *Review of Economic Studies* 65: 261-294

Holmstrom, Bengt and Jean Tirole, 1997, Financial intermediation, loanable funds, and the real sector , *Quarterly Journal of Economics* 112: 663-692

Holmstrom, Bengt, and Steven N. Kaplan, 2001, Corporate governance and merger activity in the United States: Making sense of the 1980s and 1990s, *Journal of Economic Perspectives* 15: 121-144

Jaffee, Dwight and T. Russell, 1976, Imperfect information, uncertainty, and credit rationing, *Quarterly Journal of Economics* 90: 651-666

Jensen, Michael, 1989, Active investors, LBOs, and the privatization of bankruptcy, *Journal of Applied Corporate Finance* 4: 13-33

Jensen, Michael, 1991, Corporate control and the politics of finance, *Journal of Applied Corporate Finance* 4: 13-33

Kaplan, Steven N. and Jeremy C. Stein, 1993, The evolution of buyout pricing and financial structure in the 1980s, *Quarterly Journal of Economics* 108: 313-358

Kashyap, Anil, Own A. Lamont, and Jeremy C. Stein, 1994, Credit conditions and the cyclical behavior of inventories, *Quarterly Journal of Economics* 109: 565-592

Kashyap, Anil, Jeremy C. Stein, and David W. Wilcox, 1993, Monetary policy and credit conditions: Evidence from the composition of external finance, *American Economic Review* 83: 78-98

Kisgen, Darren, 2006, Credit ratings and capital structure, *Journal of Finance* 61: 1035-1071

Korajczyk, Robert, Deborah Lucas and Robert McDonald, 1991, The effect of information releases on the pricing and timing of equity issues, *Review of Financial Studies* 4: 685-708

Korajczyk, Robert, Deborah Lucas and Robert McDonald, 1992, Equity issues with time-varying asymmetric information, *Journal of Financial and Quantitative Analysis* 27: 397-417

Kwan, Simon, 2001, Rising junk bond yields: Liquidity or credit concerns? *FRBSF Economic Letter* 16

Leary, Mark T., 2006, Bank loan supply, lender choice, and corporate capital structure, *Working Paper* Cornell University

Lemmon, Michael, Michael R. Roberts, and Jamie F. Zender, 2006, Back to the beginning: Persistence and the cross-section of corporate capital structure, *Working Paper*, University of Pennsylvania

Meyer, Bruce D., 1995, Natural and quasi-experiments in Economics, *Journal of Business and Economic Statistics* 13: 151-161

Myers, Stewart and Nicholas Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics* 13: 187-221

Oliner, Stephen D. and Glenn D. Rudebusch, 1996, Monetary policy and credit conditions: Evidence from the composition of external finance: Comment, *American Economic Review* 86: 300-309

Peek, Joe and Eric Rosengren, 1995, The capital crunch: Neither a borrower nor a lender be, *Journal of Money, Credit, and Banking* 27: 625-538

Petersen, Mitchell, 2006, Estimating standard errors in finance panel data sets: Comparing approaches, *Working Paper* Northwestern University

Pulles, Gregory, Robert Whitlock, and James Hogg, 1991, *FIRREA: A Legislative History and Section – by – Section Analysis of the Financial Institutions Recovery, Reform and Enforcement Act*, Colorado Spring, CO: Shepard's McGraw-Hill, Inc.

Rauh, Joshua D., 2006, Investment and financing constraints: Evidence from the funding of corporate pension plans, *Journal of Finance* 61: 33 - 71

Rosenbaum, Paul and Donald Rubin, 1983, The central role of the propensity score in observational studies for causal effects, *Biometrika* 70: 41-55

Shliefer, Andrei and Robert Vishny, 1992, Liquidation values and debt capacity: a market equilibrium approach, *Journal of Finance* 47: 1343-1366

Simonson, Mark, 2000, The fall of Drexel Burnham Lambert and the value of its junk bond-issuing clients, *Working Paper*, Arizona State University

Smith, Jeffrey and Petra Todd, 2003, Does matching overcome Lalonde's critique of nonexperimental estimators? *Working Paper #2003-5* The University of Western Ontario

Standard and Poor's, 2001, *Corporate Ratings Criteria*, New York: McGraw-Hill.

Stiglitz, Joseph and Andrew Weiss, 1981, Credit rationing in markets with imperfect information, *American Economic Review* 71: 393-410

Sufi, Amir, 2006, The real effects of debt certification: Evidence from the introduction of bank loan ratings, *Working Paper*, University of Chicago

Thistlewaite, Donald and Donald Campbell, 1960, Regression-discontinuity analysis: An alternative to the ex post facto experiment, *Journal of Educational Psychology* 51: 309-317

Titman, Sheridan, 2001, The Modigliani and Miller theorem and market efficiency, *NBER Working Paper* 8641

White, Lawrence J., 1991, *The S&L Debacle: Public Policy Lessons for Bank and Thrift Regulation*, New York: Oxford University Press.

Wojnilower, A., 1980, The central role of credit crunches in recent financial history, *Brookings Papers on Economic Activity* 95: 1196-1216

Wruck, Karen H., 1990, Financial distress, reorganization, and organizational efficiency, *Journal of Financial Economics* 27: 419-444

Zarutskie, Rebecca, 2006, Evidence on the effects of bank competition on firm borrowing and investment, forthcoming *Journal of Financial Economics*

Appendix A: Variable Definitions

All numbers in parentheses refer to the annual Compustat item number.

Credit Rating = senior long-term debt rating (280).

Net Investment = capital expenditures (128) + acquisitions (129) – sale PPE (107) + increase in investments (219) – sale of investments (109) all divided by start of period assets (6).

Net LT Debt Issues = Long **t**erm debt issues (111) – Long term debt reduction (114) divided by start of period assets.

Net ST Debt Issues = Change in current debt (301) divided by start of period assets.

Net Equity Issues = Sale of common and preferred stock (108) – Purchase of common and preferred stock (115) divided by start of period assets.

Net Issues of Secured Debt and Mortgages = Change in secured debt and mortgages (241) divided by start of period assets.

Change in Trade Credit = Change in accounts payable (304) + Change in accounts receivable (302) divided by start of period assets.

Change in Cash = Change in cash equivalents (274) divided by start of period assets.

Total Debt = Long term debt (9) + Short term debt (34).

Book Leverage = Total debt / book assets (6).

Market Value of Assets = Stock Price (199) * Shares Outstanding (25) + Short term debt + long term debt + preferred stock liquidation value (10) – Deferred Taxes and Investment Tax Credits (35).

Market Leverage = Total debt / Market Value of Assets.

Firm Size = Log(Sales), where Sales (12) are deflated by the GDP-deflator.

Market-to-Book = (market equity + total debt + preferred stock liquidating value – deferred taxes and investment tax credits) / book assets.

Z-Score = 3.3 * Pre-Tax Income (170) + Sales (12) + 1.4 * Retained Earnings (36) + 1.2 * (Current Assets (4) – Current Liabilities (5)) / book assets.

Cash Flow = income before extraordinary items (123) / lagged book assets.

Net Equity Issues (Alternative) = The split adjusted change in shares outstanding ($data25_t$ – $data25_{t-1}$ * ($data27_{t-1}$ / $data27_t$) times the split adjusted average stock price ($data199_t$ + $data199_{t-1}$ * ($data27_t$ / $data27_{t-1}$) dividend by the end of year *t-1* total assets.

Financially Distressed = indicator variable equal to one if either (1) the firm's earnings before interest, taxes, depreciation, and amortization (EBITDA) is less than its reported interest expense for the previous two years or, (2) EBITDA is less than 80% of its interest expense in the previous year.

Term Spread = the yield spread between the one and ten year treasury bonds.

Credit Spread = the yield spread between BB- and BBB-rated corporate bonds.

Equity Market Return = CRSP annual value weighted return.

S&P 500 = indicator equal to one if the firm is in the S&P 500 index.

NYSE = indicator equal to one if the firm is listed on the NYSE.

Firm Age = the age of the firm computed as the number of years in which the firm has been listed on Compustat and has a nonmissing value for total assets.

Operating Income = operating income (data13) before depreciation / total assets.

Asset Turnover = total sales (data12) / total assets.

Return on Equity = operating income before depreciation / book equity (data60).

Appendix B: Propensity Score Matching Analysis

Our matching procedure relies on a matching of propensity scores, originally developed by Rosenbaum and Rubin (1983) and later extended by Heckman, Ichimura, and Todd (1998). The matching procedure begins by defining the treatment and control groups, which correspond to below-investment-grade and unrated firms. Because we are employing a differences-in-differences estimator, we also require that each firm contain at least one observation in the pre-1990 and post-1989 eras, similar to the requirement imposed on the Local and Geography samples discussed above.

The next step is to estimate a probit regression of the binary variable indicating whether an observation corresponds to a below-investment-grade rated firm or an unrated firm after 1989. Our specification includes all of the firm characteristics examined in Table 2, plus year fixed effects and industry fixed effects, where industry is defined using Fama and French's 38-industry classification.[18] We also incorporate a measure of financial distress motivated by Asquith, Gertner, and Scharfstein (1994), which we denote *I(Distress)*. This variable, and the variables from Table 2, are averages over the 1986 to 1989 period. To capture the growth of leverage that occurred during this period (Bernanke, Campbell, and Whited (1990)), as well as any differences in financing and investment behavior before the shock, we include the average annual growth of leverage, net investment, and net security issuances during the 1986 to 1989 period. These variables help in ensuring that the parallel trends assumption underlying the difference in difference framework is satisfied.

The first three columns in Panel A of Table B1, denoted "Pre-Match," present a pair wise comparison of each covariate used in the matching process (except for the year industry fixed effects). Immediately apparent are the economically and statistically large differences between the two groups of firms. The first column in Panel B of Table B1 shows that many of these differences persist in a multivariate comparison by presenting the results from the probit estimation (standard errors are in parentheses). Specifically, we see large differences in the likelihood of having a below-investment-grade credit rating based on: whether or not a firm is listed on the *NYSE*, *Log(Sales)*, *Altman's Z-*

[18] We thank Ken French for the use of his industry classification data and note that alternative industry classifications (e.g., Fama and French 48, 2-digit SIC) lead to similar findings.

Score, and *Market Leverage*. We also find a number of the year and industry fixed effects to be statistically significant, though these are not reported to ease the presentation. Finally, we note that the pseudo R^2 is 38%, suggesting that our specification captures a significant fraction the variation across the two groups.

As a brief aside, one concern with the matching analysis is the self-selection by firms that obtain a credit rating. To address this concern, we follow Faulkender and Petersen (2006) by incorporating into our specification three instruments that they use to identify the decision to obtain a credit rating. As such, we only briefly mention the construction and motivation of these variables, referring the reader to the Faulkender and Petersen (2006) article for further details.

The first two variables are binary indicators of whether or not a firm is in the S&P 500 index or listed on the New York Stock Exchange (NYSE), respectively. These measures are intended to capture the visibility of the firm, a feature that underwriters suggest is particularly important for introducing new issues to the market. In a similar spirit, we also include the age of the firm, assuming longer-lived firms are more visible to market participants. As the results in Table B1 suggest, all of these instruments are, individually, statistically significant in the Pre-Match pairwise comparisons. In the probit estimation, only the NYSE indicator variable is statistically significant, though at the less than 1% level. Additionally, an unreported F-test confirms that the three instruments are jointly statistically significant at less than the 1% level, as well.

Returning to the matching procedure, we use the predicted probabilities (i.e., propensity scores) to match each firm from the treatment group with a firm from the control group based on the smallest absolute difference between the estimated propensity scores. In the matching process, we restrict attention to firm-year observations that fall in the overlap between the domains of propensity scores for the treatment and control groups. Additionally, we match with replacement to ensure the best possible match, albeit while sacrificing statistical power in our tests.

Our matching procedure produces 107 unique unrated firms that are matched to our sample of 159 below-investment-grade firms. (We note that all standard errors in our analysis are robust to the multiplicity of firm observations.) The last three columns of Panel A reveal that there are no pair wise statistically significant differences across the

two samples. Panel B reveals a similar finding: no statistically significant coefficients in the Post-Match probit regression, including the year and industry fixed effects (not reported). Importantly, the reduction in statistical significance is not simply an artifact of a decline in the degrees of freedom, as evidenced by a decline in magnitude of many coefficients. We also see that the pseudo R^2 has fallen from 38% to 6%. Thus, the matching procedure has resulted in treatment (below-investment-grade) and control (unrated) groups that are statistically homogenous across observable characteristics.

Figure 1
Below-Investment-Grade Issuance Volume

The figure presents the rate of below-investment-grade bond issuances as a percent of total stock market capitalization from 1977 to 1999. The data is kindly provided by Bengt Holmstrom and Steven Kaplan who present a similar figure in Holmstrom and Kaplan (2001), Figure 5.

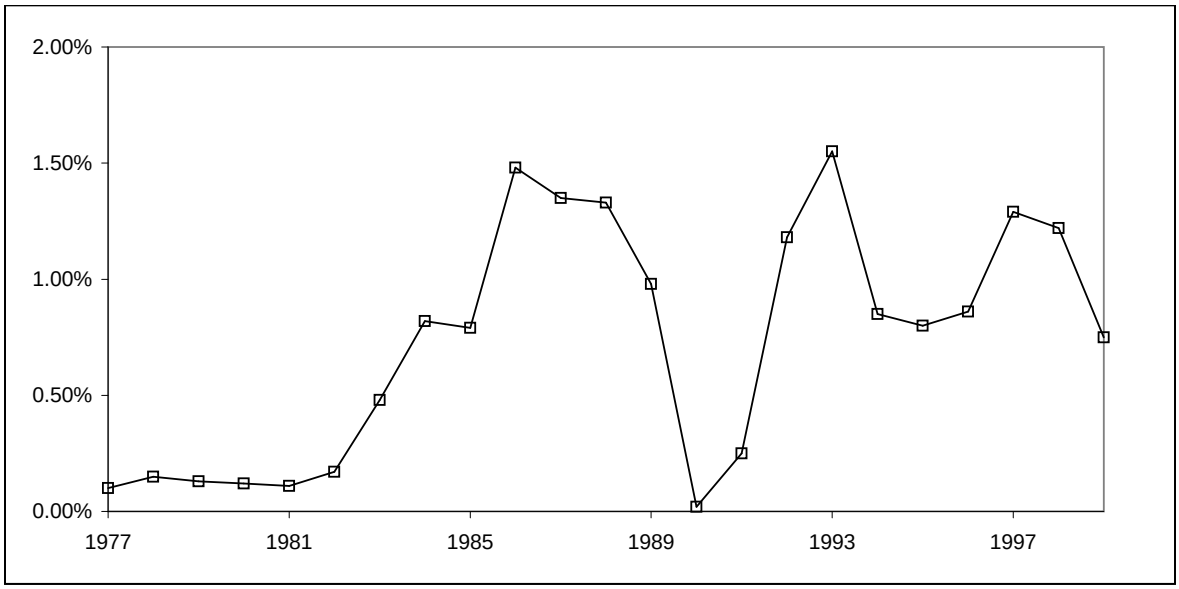

Figure 2
Monthly Junk Bond Credit Spreads

The figure presents the yield spread between the Merrill Lynch junk bond index and seven-year constant maturity Treasuries. The data are taken from Figure 1 in Kwan (2001).

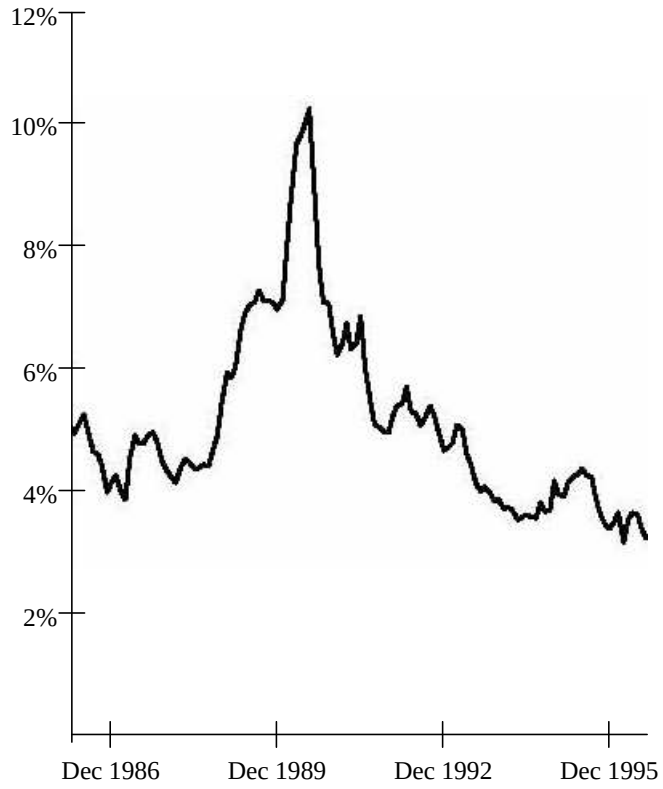

Table 1

Thrift and Insurance Below-Investment-Grade Debt Participation

The data in Panel A are based on the Quarterly Reports of Condition filed with the Office of Thrift Supervision and are obtained from Brewer and Mondeschean (1994) and from SDC. The panel presents the total holdings of junk bonds by Savings and Loans and the total principal amount of new issuances in millions of dollars from 1985 to 1989. All values are deflated by the GDP-deflator to year-end 1989 dollars. The data in Panel B are from the American Council of Life Insurance and are obtained from Carey et al. (1993).

Panel A: Thrift Junk Bond Holdings and Total New Issuances
(Brewer and Mondeschean (1994))

Year	Total Holdings ($Mil)	Total Principal Amount ($Mil)
1985	6,356	17,843
1986	8,394	36,881
1987	12,853	32,891
1988	15,164	32,215
1989	10,457	28,753

Panel B: Life Insurance Company Below-Investment-Grade Commitments
(Carey et al. (1993))

Year	Fraction of Total Commitments to Purchase Below-Investment-Grade Private Placements
1990 (1st half)	15.0%
1990 (2nd half)	6.0%
1991 (1st half)	5.5%
1991 (2nd half)	2.5%
1992 (1st half)	3.0%
1992 (2nd half)	2.0%

Table 2
Summary Statistics

The table presents variable averages for five different subsamples of the merged annual CRSP/Compustat database during the period 1986-1993. The samples are defined as follows: *Investment Grade* consists of all investment grade rated firm-year observations (i.e., BBB- and above), *Junk* consists of all below investment grade rated firm-year observations (i.e., BB+ and below). *Unrated* consists of all firm-year observations without a credit rating, The last two columns condition on firms maintaining either investment-grade or below-investment-grade status between 1986 and 1993 and firms having at least one observation in both the pre- and post-1989 era. *BBB* consists of all firm-year observations with a BBB rating, and *BB* consists of all firm-year observations with a BB rating. All variables are defined in Appendix A.

	Sample				
Variable	Investment Grade	Junk	Unrated	BBB	BB
Sources of Funds					
Net LT Debt Issuances	0.02	0.04	0.01	0.02	0.04
Net Equity Issuances	0.00	0.03	0.14	0.00	0.01
Cash Flow	0.12	0.08	0.04	0.10	0.10
Uses of Funds					
Net Investment	0.11	0.13	0.14	0.11	0.11
Capital Expenditures	0.08	0.08	0.08	0.08	0.08
Acquisitions	0.01	0.03	0.02	0.01	0.03
Sale PPE	0.00	0.01	0.01	0.00	0.00
Change in Inventory	-0.00	-0.01	-0.01	-0.00	-0.01
Dividends	0.03	0.00	0.01	0.02	0.01
Firm Characteristics					
Market Leverage	0.34	0.51	0.25	0.43	0.45
Log(Sales)	7.55	6.17	3.53	7.35	6.54
Market-to-Book	1.10	1.07	1.70	0.92	1.05
Profitability	0.14	0.11	0.03	0.13	0.12
Tangibility	0.56	0.37	0.32	0.58	0.35
Altman's Z-Score	1.55	1.24	0.59	1.40	1.80
Firms	1,053	1,056	8,933	165	119

Table 3

Financial and Investment Policy (Matched Sample)

The sample is a propensity score matched sample of below-investment-grade (BB+ or lower) and unrated firms in the merged CRSP/Compustat database (excluding financial firms) during the period 1986-1993 and satisfying three additional criteria: (1) unrated firms are always unrated throughout the entire 1986 to 1993 period, (2) below-investment-grade firms do not change status to or from investment-grade during the period, and (3) each firm contains at least one observation both before and after 1989. (See Tables B1 and B2 for propensity score matching results.) The table presents the following summary statistics for the two sets of matched firms. *Avg* is the average difference between the post-1989 era and the pre-1990 era for all below-investment-grade firms. *SE* is the standard error of the average. *Dif-in-Dif* is the difference between the average differences (Avg) for the two groups of firms. *T-stat* is the ratio of Dif-in-Dif to the standard error of the difference between the two averages. Panels A and B present results where the within firm (i.e., Junk or Unrated) time-series difference is computed as the average during 1993 and 1990 less the average from 1986 to 1989.

Panel A: Financial Policy

Variable	Net Debt & Equity Issues	Net LT Debt Issues	Net ST Debt Issues	Net Equity Issues	Change in Trade Credit	Change in Cash	Market Leverage	Book Leverage
Avg: Junk Difference	-0.12	-0.12	0.00	-0.00	0.00	-0.01	0.04	-0.01
SE: Junk Difference	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Avg: Unrated Difference	-0.05	-0.05	0.00	-0.00	-0.00	-0.00	0.03	-0.01
SE: Unrated Difference	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.02)	(0.01)
Dif-in-Dif	-0.08	-0.07	-0.00	0.00	0.01	-0.01	0.01	0.01
T-Stat: Dif-in-Dif	-3.55	-3.74	-0.09	0.16	1.32	-0.93	0.45	0.46

Panel B: Investment Policy

Variable	Net Investment	Capital Expenditures	Acqui-sitions	Sale PPE	Change in Inventory
Avg: Junk Difference	-0.12	-0.03	-0.05	-0.00	0.01
SE: Junk Difference	(0.02)	(0.01)	(0.01)	(0.00)	(0.00)
Avg: Unrated Difference	-0.06	-0.02	-0.02	-0.00	0.01
SE: Unrated Difference	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)
Dif-in-Dif	-0.06	-0.01	-0.03	0.00	-0.00
T-Stat: Dif-in-Dif	-2.66	-1.07	-2.03	0.64	-0.26

Table 4

Financial and Investment Policy (Local Sample)

The sample consists of all firms in the merged CRSP/Compustat database (excluding financial firms) with a debt rating of BBB or BB during the period 1986-1993 and satisfying two additional criteria: (1) each firm does not change status from investment-grade to below-investment-grade (or vice versa) during the period, and (2) each firm contains at least one observation both before and after 1989. The table presents coefficient estimates from regressions of financing (Panels A and B) and investment (Panel C) variables on a number of covariates. Two specifications are presented for each dependent variable: a baseline specification consisting solely of the difference-in-differences indicator variables and an expanded specification incorporating additional firm-specific and macroeconomic determinants. All left hand side variables are normalized by the start of period asset value of the firm except the leverage measures, which are normalized by the contemporaneous end-of-period assets. All variable definitions appear in Appendix A. All t-statistics are computed with standard errors that are robust to both heteroscedasticity and within firm correlation.

Panel A: Financial Policy

Variable	Net Debt & Equity Issues		Net LT Debt Issues		Net ST Debt Issues		Net Equity Issues		Change in Trade Credit		Change in Cash	
Intercept	0.02	0.05	0.03	0.03	-0.00	0.01	0.00	0.00	-0.00	-0.03	0.01	0.00
	(4.08)	(0.86)	(4.36)	(0.58)	(-0.82)	(1.52)	(0.36)	(0.29)	(-1.77)	(-1.90)	(3.27)	(0.10)
$I(Year > 1989)$	-0.02	-0.02	-0.02	-0.02	-0.00	0.00	0.00	-0.01	0.00	-0.00	-0.01	-0.01
	(-2.49)	(-1.93)	(-2.71)	(-1.58)	(-1.03)	(0.23)	(0.88)	(-1.58)	(0.97)	(-0.24)	(-2.01)	(-2.12)
$I(BBRated)$	0.07	0.06	0.06	0.05	-0.00	-0.00	0.01	0.01	-0.00	-0.00	0.01	0.01
	(4.18)	(3.89)	(3.85)	(3.75)	(-0.64)	(-0.84)	(2.01)	(1.52)	(-0.59)	(-0.79)	(1.69)	(1.43)
$I(Year > 1989) \times I(BBRated)$	-0.05	-0.05	-0.06	-0.07	0.01	0.01	0.01	0.01	0.00	0.01	-0.01	-0.01
	(-2.69)	(-2.85)	(-3.51)	(-3.82)	(2.44)	(2.50)	(1.01)	(1.06)	(0.88)	(1.44)	(-0.63)	(-0.99)
Cash Flow	.	0.05	.	0.12	.	0.03	.	-0.10	.	-0.04	.	0.00
	(.)	(0.33)	(.)	(0.89)	(.)	(1.34)	(.)	(-1.90)	(.)	(-1.17)	(.)	(0.05)
Market-to-Book	.	0.02	.	0.02	.	-0.00	.	0.01	.	0.00	.	0.01
	(.)	(1.30)	(.)	(1.18)	(.)	(-1.71)	(.)	(1.27)	(.)	(0.21)	(.)	(1.09)
Log(Sales)	.	-0.01	.	-0.01	.	-0.00	.	-0.00	.	0.00	.	-0.00
	(.)	(-2.18)	(.)	(-2.37)	(.)	(-0.49)	(.)	(-0.14)	(.)	(1.97)	(.)	(-2.02)
Altman's Z-Score	.	0.01	.	0.01	.	0.00	.	-0.00	.	0.00	.	0.00
	(.)	(1.90)	(.)	(2.62)	(.)	(0.95)	(.)	(-1.85)	(.)	(1.47)	(.)	(1.87)
$I(Distress)$	.	-0.06	.	-0.05	.	0.00	.	-0.01	.	-0.00	.	-0.02
	(.)	(-2.67)	(.)	(-2.34)	(.)	(0.16)	(.)	(-1.19)	(.)	(-0.16)	(.)	(-1.33)
Term Spread	.	0.54	.	0.34	.	-0.25	.	0.44	.	0.07	.	0.55
	(.)	(1.04)	(.)	(0.68)	(.)	(-2.08)	(.)	(2.88)	(.)	(0.35)	(.)	(2.29)
Credit Spread	.	0.06	.	0.98	.	-0.54	.	-0.38	.	0.17	.	0.65
	(.)	(0.03)	(.)	(0.53)	(.)	(-1.16)	(.)	(-0.47)	(.)	(0.26)	(.)	(0.70)
Equity Market Return	.	0.06	.	0.05	.	-0.02	.	0.03	.	0.00	.	0.03
	(.)	(1.57)	(.)	(1.54)	(.)	(-2.94)	(.)	(2.51)	(.)	(0.06)	(.)	(1.45)
R^2	0.06	0.11	0.07	0.13	0.01	0.03	0.02	0.06	0.01	0.03	0.01	0.05
Model P-Value	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.17	0.08	0.01	0.00
Firm-Year Obs	852	787	852	787	852	787	852	787	683	632	838	774

Panel B: Financial Policy (Continued)

Variable	Book Leverage		Market Leverage	
Intercept	0.30	0.13	0.34	0.16
	(22.47)	(1.56)	(19.60)	(1.67)
$I(Year > 1989)$	0.01	-0.01	0.02	0.01
	(0.84)	(-0.91)	(1.29)	(1.01)
$I(BBRated)$	0.10	0.10	0.10	0.15
	(4.81)	(4.64)	(3.91)	(5.71)
$I(Year > 1989) \times I(BBRated)$	0.01	0.01	-0.02	-0.02
	(0.42)	(0.68)	(-0.61)	(-0.84)
Cash Flow	.	-0.34	.	-0.21
	(.)	(-1.12)	(.)	(-0.62)
Market-to-Book	.	0.11	.	-0.11
	(.)	(4.84)	(.)	(-5.92)
Log(Sales)	.	0.02	.	0.04
	(.)	(2.70)	(.)	(4.05)
Altman's Z-Score	.	-0.05	.	-0.04
	(.)	(-5.36)	(.)	(-4.17)
$I(Distress)$	.	-0.05	.	-0.03
	(.)	(-1.20)	(.)	(-0.51)
Term Spread	.	0.18	.	-0.22
	(.)	(0.35)	(.)	(-0.38)
Credit Spread	.	0.59	.	10.48
	(.)	(0.27)	(.)	(3.94)
Equity Market Return	.	0.06	.	-0.07
	(.)	(2.24)	(.)	(-2.22)
R^2	0.12	0.30	0.07	0.32
Model P-Value	0.00	0.00	0.00	0.00
Firm-Year Obs	847	782	850	786

Panel C: Investment Policy

Variable	Net Investment		Capital Expenditures		Acquisitions		Sale PPE		Change in Inventory	
Intercept	0.12	0.13	0.09	0.11	0.03	0.05	0.00	0.00	-0.01	-0.03
	(14.97)	(2.62)	(14.22)	(2.81)	(6.33)	(1.50)	(6.53)	(0.65)	(-5.92)	(-2.37)
$I(Year > 1989)$	-0.03	-0.04	-0.01	-0.01	-0.01	-0.00	-0.00	-0.00	0.01	0.01
	(-3.70)	(-3.27)	(-1.60)	(-0.78)	(-1.64)	(-0.04)	(-0.58)	(-0.18)	(3.92)	(2.80)
$I(BBRated)$	0.03	0.02	-0.01	-0.02	0.02	0.02	0.00	0.00	-0.02	-0.01
	(2.02)	(1.31)	(-1.06)	(-1.48)	(1.83)	(1.65)	(0.33)	(0.61)	(-2.93)	(-2.61)
$I(Year > 1989) \times I(BBRated)$	-0.03	-0.03	-0.00	-0.00	-0.02	-0.02	-0.00	-0.00	0.01	0.01
	(-2.12)	(-1.97)	(-0.42)	(-0.31)	(-1.74)	(-1.92)	(-0.21)	(-0.48)	(1.86)	(1.17)
Cash Flow	.	0.30	.	0.12	.	0.04	.	-0.01	.	0.00
	(.)	(2.26)	(.)	(1.43)	(.)	(0.45)	(.)	(-1.06)	(.)	(0.12)
Market-to-Book	.	0.04	.	0.03	.	0.01	.	-0.00	.	0.00
	(.)	(3.64)	(.)	(3.42)	(.)	(0.83)	(.)	(-1.08)	(.)	(0.82)
Log(Sales)	.	-0.01	.	-0.00	.	-0.00	.	0.00	.	0.00
	(.)	(-2.59)	(.)	(-0.99)	(.)	(-1.72)	(.)	(0.06)	(.)	(2.02)
Altman's Z-Score	.	-0.01	.	-0.00	.	-0.00	.	0.00	.	-0.00
	(.)	(-1.71)	(.)	(-1.02)	(.)	(-0.73)	(.)	(0.20)	(.)	(-3.70)
$I(Distress)$	.	-0.08	.	-0.03	.	-0.03	.	-0.00	.	0.01
	(.)	(-4.51)	(.)	(-3.62)	(.)	(-3.17)	(.)	(-2.11)	(.)	(1.46)
Term Spread	.	0.87	.	-0.31	.	-0.29	.	-0.00	.	-0.12
	(.)	(1.72)	(.)	(-1.36)	(.)	(-0.88)	(.)	(-0.06)	(.)	(-0.79)
Credit Spread	.	2.96	.	-0.60	.	1.08	.	0.13	.	0.70
	(.)	(1.55)	(.)	(-0.63)	(.)	(0.81)	(.)	(0.66)	(.)	(1.20)
Equity Market Return	.	0.01	.	0.00	.	0.00	.	0.00	.	0.02
	(.)	(0.18)	(.)	(0.23)	(.)	(0.23)	(.)	(0.57)	(.)	(2.51)
R^2	0.05	0.17	0.02	0.12	0.02	0.04	0.00	0.01	0.08	0.09
Model P-Value	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.85	0.00	0.00
Firm-Year Obs	852	787	852	787	852	787	852	787	684	631

Table 5

Short- and Long-Run Effects on Financial and Investment Policy (Matched Sample)

The sample is a propensity score matched sample of below-investment-grade (BB+ or lower) and unrated firms in the merged CRSP/Compustat database (excluding financial firms) during the period 1986-1993 and satisfying three additional criteria: (1) unrated firms are always unrated throughout the entire 1986 to 1993 period, (2) below-investment-grade firms do not change status to or from investment-grade during the period, and (3) each firm contains at least one observation both before and after 1989. (See Tables B1 and B2 for propensity score matching results.) The table presents the following summary statistics for the two sets of matched firms. *Avg* is the average difference between the post-1989 era and the pre-1990 era for all below-investment-grade firms. *SE* is the standard error of the average. *Dif-in-Dif* is the difference between the average differences (Avg) for the two groups of firms. *T-stat* is the ratio of Dif-in-Dif to the standard error of the difference between the two averages. Panels A and B present results where the within firm (i.e., Junk or Unrated) time-series difference is computed as the average during 1990 and 1991 less the average from 1986 to 1989. Panels C and D present results where the within firm (i.e., Junk or Unrated) time-series difference is computed as the average during 1992 and 1993 less the average from 1986 to 1989.

Panel A: Financial Policy: Short-Run Effects

Variable	Net Debt & Equity Issues	Net LT Debt Issues	Net ST Debt Issues	Net Equity Issues	Change in Trade Credit	Change in Cash	Market Leverage	Book Leverage
Avg: Junk Difference	-0.13	-0.12	0.00	-0.01	0.01	-0.01	0.07	0.00
SE: Junk Difference	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Avg: Unrated Difference	-0.04	-0.04	0.00	-0.01	0.00	-0.00	0.05	0.00
SE: Unrated Difference	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.02)	(0.01)
Dif-in-Dif	-0.10	-0.08	0.00	0.00	0.01	-0.00	0.02	-0.00
T-Stat: Dif-in-Dif	-3.88	-3.96	0.63	0.42	1.08	-0.51	0.63	-0.06

Panel B: Investment Policy: Short-Run Effects

Variable	Net Investment	Capital Expenditures	Acqui-sitions	Sale PPE	Change in Inventory
Avg: Junk Difference	-0.12	-0.03	-0.05	-0.00	0.02
SE: Junk Difference	(0.02)	(0.01)	(0.01)	(0.00)	(0.00)
Avg: Unrated Difference	-0.06	-0.02	-0.02	-0.00	0.01
SE: Unrated Difference	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
Dif-in-Dif	-0.07	-0.01	-0.03	0.00	0.00
T-Stat: Dif-in-Dif	-2.97	-1.40	-2.27	0.83	0.99

Panel C: Financial Policy: Long-Run Effects

Variable	Net Debt & Equity Issues	Net LT Debt Issues	Net ST Debt Issues	Net Equity Issues	Change in Trade Credit	Change in Cash	Market Leverage	Book Leverage
Avg: Junk Difference	-0.14	-0.15	0.00	0.01	0.01	-0.02	0.00	-0.02
SE: Junk Difference	(0.02)	(0.02)	(0.00)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)
Avg: Unrated Difference	-0.06	-0.06	0.00	-0.01	-0.00	-0.00	0.00	-0.02
SE: Unrated Difference	(0.01)	(0.01)	(0.00)	(0.01)	(0.00)	(0.00)	(0.02)	(0.01)
Dif-in-Dif	-0.08	-0.09	-0.00	0.02	0.02	-0.01	0.00	0.01
T-Stat: Dif-in-Dif	-2.96	-3.73	-0.34	1.58	2.21	-1.53	0.10	0.41

Panel D: Investment Policy: Long-Run Effects

Variable	Net Investment	Capital Expenditures	Acqui-sitions	Sale PPE	Change in Inventory
Avg: Junk Difference	-0.13	-0.03	-0.06	-0.00	0.01
SE: Junk Difference	(0.02)	(0.01)	(0.01)	(0.00)	(0.00)
Avg: Unrated Difference	-0.08	-0.03	-0.02	-0.00	0.01
SE: Unrated Difference	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
Dif-in-Dif	-0.05	0.01	-0.03	-0.00	0.00
T-Stat: Dif-in-Dif	-2.17	0.69	-2.11	-0.27	0.13

Table 6

Short- and Long-Run Effects on Financial and Investment Policy (Local Sample)

The sample consists of all firms in the merged CRSP/Compustat database (excluding financial firms) with a debt rating of BBB or BB during the period 1986-1993 and satisfying two additional criteria: (1) each firm does not change status from investment-grade to below-investment-grade (or vice versa) during the period, and (2) each firm contains at least one observation both before and after 1989. The table presents coefficient estimates from regressions of financing (Panel A) and investment (Panel B) variables on a number of covariates. All left hand side variables are normalized by the start of period asset value of the firm except the leverage measures, which are normalized by the contemporaneous end-of-period assets. All variable definitions appear in Appendix A. All t-statistics are computed with standard errors that are robust to both heteroscedasticity and within firm correlation.

Panel A: Financial Policy

Variable	Net Debt & Equity Issues	Net LT Debt Issues	Net ST Debt Issues	Net Equity Issues	Change in Trade Credit	Change in Cash	Book Leverage	Market Leverage
Intercept	0.01	0.00	0.01	-0.00	-0.03	-0.00	0.12	0.17
	(0.23)	(0.05)	(1.23)	(-0.15)	(-1.94)	(-0.02)	(1.38)	(1.80)
$I(Year > 1989)$	-0.01	-0.01	0.00	-0.00	-0.00	-0.01	-0.00	0.01
	(-0.69)	(-0.53)	(0.48)	(-0.89)	(-0.16)	(-1.79)	(-0.23)	(0.72)
$I(BBRated)$	0.06	0.05	-0.00	0.01	-0.00	0.01	0.10	0.15
	(3.84)	(3.71)	(-0.85)	(1.49)	(-0.81)	(1.42)	(4.61)	(5.69)
$I(Year \in \{1990, 1991\}) \times I(BBRated)$	-0.08	-0.09	0.01	0.00	0.01	-0.01	-0.01	-0.01
	(-4.27)	(-4.69)	(1.88)	(0.01)	(1.07)	(-1.14)	(-0.42)	(-0.42)
$I(Year \in \{1992, 1993\}) \times I(BBRated)$	-0.02	-0.04	0.01	0.01	0.01	-0.01	0.03	-0.03
	(-0.97)	(-2.22)	(2.38)	(1.70)	(1.47)	(-0.69)	(1.28)	(-0.95)
Cash Flow	0.05	0.12	0.03	-0.10	-0.05	0.00	-0.33	-0.21
	(0.39)	(0.93)	(1.35)	(-1.91)	(-1.18)	(0.06)	(-1.08)	(-0.62)
Market-to-Book	0.02	0.02	-0.00	0.01	0.00	0.01	0.11	-0.11
	(1.18)	(1.08)	(-1.76)	(1.23)	(0.19)	(1.07)	(4.77)	(-5.84)
Log(Sales)	-0.01	-0.01	-0.00	-0.00	0.00	-0.00	0.02	0.04
	(-2.32)	(-2.49)	(-0.54)	(-0.22)	(1.96)	(-2.05)	(2.63)	(4.04)
Altman's Z-Score	0.01	0.01	0.00	-0.00	0.00	0.00	-0.05	-0.04
	(2.04)	(2.71)	(1.00)	(-1.78)	(1.49)	(1.91)	(-5.35)	(-4.21)
$I(Distress)$	-0.06	-0.05	0.00	-0.01	-0.00	-0.02	-0.05	-0.03
	(-2.43)	(-2.15)	(0.22)	(-1.08)	(-0.14)	(-1.29)	(-1.10)	(-0.53)
Term Spread	0.15	0.05	-0.27	0.37	0.06	0.52	-0.05	-0.11
	(0.30)	(0.10)	(-2.24)	(2.34)	(0.32)	(2.11)	(-0.10)	(-0.19)
Credit Spread	3.52	3.58	-0.37	0.31	0.37	0.94	2.47	9.48
	(1.67)	(1.87)	(-0.67)	(0.41)	(0.48)	(0.97)	(0.99)	(3.18)
Equity Market Return	0.09	0.07	-0.02	0.03	0.00	0.03	0.08	-0.08
	(2.27)	(2.13)	(-2.73)	(3.01)	(0.26)	(1.53)	(2.59)	(-2.36)
R^2	0.13	0.14	0.03	0.07	0.03	0.05	0.30	0.32
Model P-Value	0.00	0.00	0.01	0.00	0.11	0.00	0.00	0.00
Firm-Year Obs	785	785	785	785	630	772	780	785

Panel B: Investment Policy

Variable	Net Investment	Capital Expenditures	Acquisitions	Sale PPE	Change in Inventory
Intercept	0.10	0.11	0.03	0.00	-0.01
	(1.97)	(2.90)	(1.00)	(0.57)	(-1.36)
$I(Year > 1989)$	-0.02	-0.01	0.01	-0.00	0.01
	(-2.21)	(-1.03)	(0.74)	(-0.04)	(2.08)
$I(BBRated)$	0.02	-0.02	0.02	0.00	-0.01
	(1.27)	(-1.47)	(1.63)	(0.61)	(-2.55)
$I(Year \in \{1990, 1991\}) \times I(BBRated)$	-0.06	0.00	-0.03	-0.00	0.01
	(-3.50)	(0.22)	(-3.07)	(-0.69)	(2.38)
$I(Year \in \{1992, 1993\}) \times I(BBRated)$	-0.01	-0.01	-0.01	-0.00	-0.00
	(-0.34)	(-0.72)	(-0.63)	(-0.20)	(-0.36)
Cash Flow	0.31	0.12	0.05	-0.01	0.00
	(2.26)	(1.43)	(0.49)	(-1.05)	(0.18)
Market-to-Book	0.04	0.03	0.01	-0.00	0.00
	(3.52)	(3.49)	(0.75)	(-1.11)	(0.99)
Log(Sales)	-0.01	-0.00	-0.01	0.00	0.00
	(-2.73)	(-0.96)	(-1.85)	(0.04)	(2.14)
Altman's Z-Score	-0.01	-0.00	-0.00	0.00	-0.00
	(-1.56)	(-1.06)	(-0.63)	(0.22)	(-3.87)
$I(Distress)$	-0.07	-0.03	-0.03	-0.00	0.01
	(-4.10)	(-3.67)	(-2.87)	(-2.04)	(1.21)
Term Spread	0.55	-0.25	-0.45	-0.01	-0.07
	(1.11)	(-1.07)	(-1.36)	(-0.16)	(-0.47)
Credit Spread	5.86	-1.14	2.53	0.18	-0.41
	(2.84)	(-1.05)	(1.73)	(0.92)	(-0.70)
Equity Market Return	0.03	-0.00	0.02	0.00	0.01
	(0.97)	(-0.07)	(0.75)	(0.74)	(1.18)
R^2	0.18	0.12	0.05	0.01	0.11
Model P-Value	0.00	0.00	0.00	0.88	0.00
Firm-Year Obs	785	785	785	785	629

Table 7

Financial and Investment Policy (Geography Sample)

The sample consists of all firms in the merged CRSP/Compustat database (excluding financial firms) with a below-investment-grade debt rating (BB+ or lower) during the period 1986-1993 and satisfying two additional criteria: (1) the firm does not change status to or from investment-grade during the period, and (2) the firm contains at least one observation both before and after 1989. The table presents coefficient estimates from regressions of financing (Panel A) and investment (Panel B) variables on a number of covariates. All left hand side variables are normalized by the start of period asset value of the firm except the leverage measures, which are normalized by the contemporaneous end-of-period assets. $I(Northeast)$ is an indicator variable equal to one if the firm's headquarters are located in the Northeast region of the country, which includes Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania. All other variable definitions appear in Appendix A. All t-statistics are computed with standard errors that are robust to both heteroscedasticity and within firm correlation.

Panel A: Financial Policy

Variable	Net Debt & Equity Issues	Net LT Debt Issues	Net ST Debt Issues	Net Equity Issues	Change in Trade Credit	Change in Cash	Book Leverage	Market Leverage
Intercept	0.17	0.14	0.01	0.03	-0.03	-0.01	0.45	0.57
	(2.79)	(2.43)	(0.78)	(1.38)	(-1.92)	(-0.27)	(4.80)	(5.99)
$I(Year > 1989)$	-0.04	-0.04	0.00	-0.01	0.01	-0.01	0.01	0.02
	(-2.79)	(-3.09)	(1.45)	(-0.93)	(1.66)	(-0.76)	(0.73)	(0.99)
$I(Northeast)$	0.06	0.05	-0.00	0.01	-0.00	-0.01	0.05	0.03
	(1.42)	(1.47)	(-0.78)	(0.86)	(-0.07)	(-0.58)	(1.30)	(0.91)
$I(Year > 1989) \times I(Northeast)$	-0.08	-0.08	0.01	-0.01	-0.00	-0.00	-0.02	-0.00
	(-1.92)	(-1.99)	(0.99)	(-1.25)	(-0.09)	(-0.25)	(-0.73)	(-0.03)
Cash Flow	0.05	0.09	0.03	-0.06	-0.03	0.03	-0.20	-0.10
	(0.38)	(0.74)	(1.85)	(-1.30)	(-0.77)	(0.44)	(-1.04)	(-0.44)
Market-to-Book	0.03	0.02	-0.00	0.02	0.00	0.01	0.09	-0.14
	(1.64)	(1.15)	(-2.30)	(1.98)	(0.52)	(0.84)	(3.19)	(-6.43)
Log(Sales)	-0.03	-0.03	0.00	-0.00	0.00	-0.00	0.01	0.02
	(-4.46)	(-4.63)	(0.05)	(-0.78)	(2.18)	(-1.84)	(0.47)	(1.25)
Altman's Z-Score	0.04	0.04	0.00	-0.00	0.00	0.01	-0.04	-0.04
	(3.34)	(4.19)	(0.11)	(-1.45)	(2.19)	(2.56)	(-3.34)	(-2.77)
$I(Distress)$	-0.01	0.01	-0.00	-0.02	0.01	0.01	-0.01	0.01
	(-0.32)	(0.59)	(-0.84)	(-2.73)	(1.55)	(0.66)	(-0.40)	(0.22)
Term Spread	-0.04	-0.38	-0.11	0.46	-0.14	0.58	-1.61	-1.84
	(-0.05)	(-0.55)	(-0.96)	(1.90)	(-0.56)	(1.66)	(-2.25)	(-2.43)
Credit Spread	-1.30	0.46	-0.24	-1.52	-0.66	0.97	-3.77	5.88
	(-0.43)	(0.17)	(-0.43)	(-1.61)	(-0.73)	(0.83)	(-1.17)	(1.59)
Equity Market Return	0.10	0.10	-0.01	0.01	0.01	0.05	0.02	-0.10
	(2.14)	(2.31)	(-1.16)	(0.80)	(1.12)	(2.02)	(0.41)	(-2.19)
R^2	0.14	0.17	0.02	0.05	0.04	0.03	0.12	0.16
Model P-Value	0.00	0.00	0.12	0.00	0.02	0.03	0.00	0.00
Firm-Year Obs	745	745	745	745	595	737	730	726

Panel B: Investment Policy

Variable	Net Investment	Capital Expenditures	Acquisitions	Sale PPE	Change in Inventory
Intercept	0.14	0.06	0.10	0.01	-0.03
	(2.59)	(1.68)	(2.87)	(0.87)	(-1.97)
$I(Year > 1989)$	-0.04	0.00	-0.02	-0.00	0.01
	(-2.41)	(0.54)	(-2.40)	(-1.27)	(1.18)
$I(Northeast)$	0.06	-0.02	0.07	-0.01	-0.00
	(1.67)	(-2.00)	(1.95)	(-3.02)	(-0.21)
$I(Year > 1989) \times I(Northeast)$	-0.11	-0.02	-0.06	0.00	0.00
	(-2.57)	(-2.09)	(-1.82)	(0.88)	(0.55)
Cash Flow	0.25	-0.02	0.01	-0.03	-0.01
	(1.92)	(-0.31)	(0.19)	(-2.11)	(-0.28)
Market-to-Book	0.07	0.04	0.01	-0.00	-0.00
	(3.87)	(3.90)	(0.67)	(-0.76)	(-0.49)
Log(Sales)	-0.02	-0.01	-0.00	-0.00	0.00
	(-3.68)	(-2.69)	(-1.22)	(-0.91)	(2.18)
Altman's Z-Score	0.01	0.01	0.00	0.00	-0.01
	(1.64)	(1.76)	(0.51)	(1.04)	(-2.95)
$I(Distress)$	-0.02	-0.01	-0.02	-0.00	0.01
	(-0.94)	(-0.93)	(-3.15)	(-1.05)	(1.79)
Term Spread	0.77	-0.05	-0.87	-0.02	0.02
	(1.16)	(-0.17)	(-1.99)	(-0.26)	(0.13)
Credit Spread	0.54	2.28	-3.15	0.79	0.84
	(0.22)	(1.82)	(-1.83)	(1.95)	(1.11)
Equity Market Return	0.05	0.03	-0.01	0.00	-0.00
	(1.25)	(1.85)	(-0.39)	(0.17)	(-0.17)
R^2	0.18	0.15	0.08	0.04	0.06
Model P-Value	0.00	0.00	0.00	0.00	0.00
Firm-Year Obs	745	745	745	745	596

Table 8
Efficiency Measures (Matched and Local Samples)

In Panel A, the sample is a propensity score matched sample of below-investment-grade (BB+ or lower) and unrated firms in the merged CRSP/Compustat database (excluding financial firms) during the period 1986-1993 and satisfying three additional criteria: (1) unrated firms are always unrated throughout the entire 1986 to 1993 period, (2) below-investment-grade firms do not change status to or from investment-grade during the period, and (3) the firm contains at least one observation both before and after 1989. See Tables B1 and B2 for propensity score matching results. For the leverage comparisons, leverage is removed from the set of matching characteristics. The table presents the following summary statistics for two sets of firms: below-investment-grade (Junk) and unrated. *Avg* is the average difference between the post-1989 era and the pre-1990 era for the below-investment-grade firms (Junk) and matched Unrated firms. *SE* is the standard error for the average (Avg). *Dif-in-Dif* is the difference between the average differences for the two groups of firms. *T-stat* is the ratio of Dif-in-Dif to the standard error of the difference between the two averages (Avg). Panels A presents results where the within group (i.e., Junk or Unrated) time-series difference is computed as the average during 1993 and 1991 less the average from 1986 to 1989. In Panel B the sample consists of all firms in the merged CRSP/Compustat database (excluding financial firms) with a debt rating of BBB or BB during the period 1986-1993 and satisfying two additional criteria: (1) the firm does not change status from investment-grade to below-investment-grade (or vice versa) during the period, and (2) the firm contains at least one observation both before and after 1989. All variable definitions appear in Appendix A. All t-statistics are computed with standard errors that are robust to both heteroscedasticity and within firm correlation.

Panel A: Matched Sample

Variable	Return on Assets	Asset Turnover	Return on Equity
Avg: Junk Difference	-0.00	0.10	0.02
SE: Junk Difference	(0.00)	(0.02)	(0.03)
Avg: Unrated Difference	-0.02	0.04	-0.12
SE: Unrated Difference	(0.01)	(0.03)	(0.06)
Dif-in-Dif	0.02	0.06	0.14
T-Stat: Dif-in-Dif	2.40	1.41	1.99

Panel B: Local Sample

Variable	Return on Assets	Asset Turnover	Return on Equity
Intercept	0.14	-0.83	-0.26
	(5.09)	(-3.44)	(-0.91)
$I(Year > 1989)$	-0.00	0.06	0.05
	(-0.34)	(1.88)	(1.52)
$I(BBRated)$	-0.03	0.12	0.11
	(-3.97)	(2.43)	(2.29)
$I(Year > 1989) \times I(BBRated)$	0.02	0.13	0.04
	(2.13)	(2.31)	(0.73)
Cash Flow	0.32	-5.69	0.27
	(4.51)	(-10.64)	(0.61)
Market-to-Book	0.04	0.19	0.17
	(4.02)	(2.31)	(2.92)
Log(Sales)	-0.00	0.11	0.07
	(-0.71)	(5.07)	(2.69)
Altman's Z-Score	-0.00	0.71	-0.02
	(-0.97)	(26.86)	(-1.12)
$I(Distress)$	-0.03	-0.17	-0.15
	(-3.70)	(-2.57)	(-3.56)
Term Spread	-0.47	-3.43	-3.03
	(-2.45)	(-2.98)	(-2.23)
Credit Spread	-1.14	-14.65	-3.96
	(-1.52)	(-2.61)	(-0.57)
Equity Market Return	-0.02	-0.01	-0.06
	(-1.45)	(-0.11)	(-1.03)
R^2	0.26	0.78	0.08
Model P-Value	0.00	0.00	0.00
Firm-Year Obs	777	779	762

Table B1
Propensity Score Matching Diagnostics

The base sample consists of all below-investment-grade (BB+ or lower) and unrated firms in the merged CRSP/Compustat database (excluding financial firms) during the period 1986-1993 and satisfying two additional criteria: (1) the firm does not change status to or from investment-grade during the period, and (2) the firm contains at least one observation both before and after 1989. Panel A presents pairwise comparisons of different variables before (Pre-Match) and after (Post-Match) the matching procedure. All variables are time-series averages over the 1986 to 1989, inclusive, period except those denoted "Growth," which correspond to average annual growth rates during this period. Panel B presents the results from estimating a probit regression of an indicator variable that is equal to one if the firm observation corresponds to a below-investment-grade firm and zero if it corresponds to an unrated firm. All variable definitions appear in Appendix A. All standard errors and test-statistics are robust to both heteroscedasticity and within firm correlation.

Panel A: Pairwise Comparisons

	Pre-Match			Post-Match		
Variable	Control	Treatment	T-Diff	Control	Treatment	T-Diff
S&P 500	0.02	0.07	.	0.06	0.07	.
	(0.00)	(0.01)	4.23	(0.02)	(0.02)	0.23
NYSE	0.15	0.50	.	0.50	0.50	.
	(0.01)	(0.03)	11.64	(0.04)	(0.04)	0.00
Firm Age	12.82	18.24	.	16.26	18.24	.
	(0.19)	(0.68)	7.66	(0.84)	(0.84)	1.67
Cash Flow	-0.07	0.01	.	0.02	0.01	.
	(0.01)	(0.02)	4.11	(0.00)	(0.00)	-1.48
Market-to-Book	1.68	1.13	.	1.17	1.13	.
	(0.04)	(0.13)	-4.07	(0.06)	(0.06)	-0.43
Log(Sales)	3.37	5.93	.	5.97	5.93	.
	(0.04)	(0.16)	15.42	(0.11)	(0.11)	-0.29
Altman's Z-Score	0.96	1.66	.	1.85	1.66	.
	(0.07)	(0.25)	2.73	(0.09)	(0.09)	-1.49
Market Leverage	0.26	0.45	.	0.41	0.45	.
	(0.00)	(0.02)	10.87	(0.02)	(0.02)	1.73
$I(Distress)$	0.34	0.15	.	0.13	0.15	.
	(0.01)	(0.03)	-6.06	(0.02)	(0.02)	0.87
Market Leverage Growth	0.69	0.46	.	0.67	0.46	.
	(0.05)	(0.16)	-1.35	(0.16)	(0.16)	-0.93
Net Investment Growth	0.57	0.75	.	0.72	0.75	.
	(0.07)	(0.24)	0.74	(0.25)	(0.25)	0.08
Net Issuance Growth	0.83	1.02	.	1.27	1.02	.
	(0.21)	(0.76)	0.24	(0.63)	(0.63)	-0.27
Obs	2,021	159	.	159	159	.

Panel B: Probit Regression Results

Variable	Pre-Match	Post-Match
Intercept	-4.17	0.19
	(0.64)	(1.09)
S&P 500	0.08	0.24
	(0.26)	(0.33)
NYSE	0.51	0.00
	(0.12)	(0.17)
Firm Age	-0.01	0.01
	(0.01)	(0.01)
Cash Flow	2.81	-0.21
	(1.07)	(1.50)
Market-to-Book	0.01	0.07
	(0.08)	(0.13)
Log(Sales)	0.46	-0.05
	(0.04)	(0.07)
Altman's Z-Score	-0.16	-0.17
	(0.04)	(0.12)
Market Leverage	2.24	0.16
	(0.32)	(0.50)
$I(Distress)$	0.19	-0.17
	(0.24)	(0.39)
Market Leverage Growth	0.06	-0.03
	(0.03)	(0.04)
Net Investment Growth	0.03	0.00
	(0.02)	(0.03)
Net Issuance Growth	0.01	-0.01
	(0.01)	(0.01)
Industry Fixed Effects	Yes	Yes
Control	2,021	159
Treatment	159	159
Obs	2,180	318
Pseudo R^2	0.38	0.06