

1993

## **An Examination of the Role of Collateral in the Loan Contracting Process.**

Gregory Kenneth Faulk  
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AN EXAMINATION OF THE ROLE OF COLLATERAL  
IN THE LOAN CONTRACTING PROCESS

A Dissertation

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy

in

The Interdepartmental Program in  
Business Administration

by

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## Table of Contents

Acknowledgements . . . . .	ii
List of Tables . . . . .	iv
Abstract . . . . .	vii
Chapter	
1 Introduction . . . . .	1
2 Literature Review . . . . .	8
3 The Significance of a Collateral Provision in a Bank Loan . . . . .	38
4 Sample Selection, Data, and Methods of Analysis . . . . .	58
5 Descriptive Statistics and Event Studies . . . . .	77
6 Multivariate and Logit Regressions . . . . .	118
7 Financial Distress and Security. . . . .	140
References . . . . .	199
Appendix A: Summary of Existing Theory and Evidence of the Role of Collateral in a Loan Contract . . . . .	203
Appendix B: Hypotheses Separating the Various Roles for Collateral. . . . .	206
Appendix C: Variables Employed. . . . .	208
Vita . . . . .	211

## List of Tables

5-1	<i>Wall Street Journal</i> loan announcements by reason for contamination. . . . .	78
5-2	Average two day prediction error of all observations grouped by contamination and security provision. . . . .	81
5-3	Uncontaminated loan announcements by year. . . . .	85
5-4	Descriptive statistics of clean announcements. . . . .	86
5-5	Distribution of the sample by firm size, exchange and security information in announcement. . . . .	92
5-6	COMPUSTAT listing disaggregated by exchange and security information in announcement. . . . .	94
5-7	Investment grade rated outstanding public bonds disaggregated by security information in announcement. . . . .	95
5-8	Average two day prediction error of all clean observations grouped by loan characteristics. . . . .	97
5-9	Average two day prediction error of all clean observations grouped by significant (10 percent, one tailed) pre announcement information from days -30 to -11. . . . .	106
5-10	Average two day prediction error of all clean observations grouped by monitoring variables and security provision. . . . .	108
5-11	Average two day prediction error of all clean observations grouped by security provision within monitoring variables. . . . .	111
6-1	Pearson correlation coefficients for various loan characteristic, prior information and monitoring variables . . . . .	122
6-2	Weighted ordinary least squares regression of cumulative prediction errors of market model regression against various loan characteristic, prior information and monitoring variables. . . . .	126
6-3	Weighted ordinary least squares regression of cumulative prediction errors of market model regression against various loan characteristic, prior information and monitoring variables separated by exchange listing and firm size. . . . .	134

# List of Tables cont'd.

7-1	Unordered Multinomial Logit regression of information on a security provision in a loan announcement against variables indicative of loan announcement information, pre-announcement information and various forms of external monitoring for 452 clean observations. . . . .	144
7-2	Binomial logit regression of secured versus unsecured loan announcements against variables indicative of loan announcement information, pre-announcement information and various forms of external monitoring for 119 clean observations. . . . .	146
7-3	Average two day prediction error of all clean observations for firms with information on COMPUSTAT separated by size and exchange and grouped by security provision. . . . .	150
7-4	Average two day prediction error of all clean observations for firms without information on COMPUSTAT separated by size and exchange and grouped by security provision. . . . .	152
7-5	Weighted ordinary least squares regression of cumulative prediction errors of market model regression against various loan characteristic, pre-announcement information and monitoring variables for firms with and without COMPUSTAT information. .	154
7-6	Weighted ordinary least squares regression of cumulative prediction errors of market model regression against various loan characteristic, pre-announcement information and monitoring variables for firms with COMPUSTAT information. . . . .	158
7-7	Weighted ordinary least squares regression of cumulative prediction errors of market model regression against various loan characteristic, pre-announcement information and monitoring variables for firms without COMPUSTAT information. . . . .	163
7-8	Quadratic discriminant analysis of information announced information on security for 238 loan announcements of COMPUSTAT firms. . . . .	167
7-9	Quadratic discriminant analysis of information announced information on security for 51 secured and unsecured loan announcements of COMPUSTAT firms.	169

# List of Tables cont'd.

7-10	Unordered Multinomial Logit regression of information on a security provision in a loan announcement against Altman's financial distress variables for 238 clean observations. . . . .	170
7-11	Binomial Logit regression of information on a security provision in a loan announcement against Altman's financial distress variables for 51 secured and unsecured observations. . . . .	171
7-12	Unordered Multinomial Logit regression of information on a security provision in a loan announcement against financial distress variables for 238 clean observations. . . . .	174
7-13	Binomial Logit regression of information on a security provision in a loan announcement against financial distress variables for 51 secured and unsecured observations. . . . .	175
7-14	Pearson correlation coefficients for various financial distress, monitoring and security information variables for 238 COMPUSTAT observations. . . . .	180
7-15	Ordinary least squares regression of cumulative prediction errors of market model regression against various financial distress ratios for firms with COMPUSTAT information. . . . .	183
7-16	Ordinary least squares regression of cumulative prediction errors of market model regression against various financial distress ratios, information on a security provision, exchange listing and the logarithm of firm size for firms with COMPUSTAT information. . . . .	184

## Abstract

This study examines the competing roles advocated for collateral in a loan contract: solving problems of adverse selection, underinvestment, incentive contracting, bankruptcy and dilution of the monitoring services provided by banks. These theories cannot be separated based upon the effect of collateral on the borrowing firm's share price. Market based evaluations for security produce: 1) a positive response for small firms in an event study, but not confirmed with multiple regression; 2) a negative association for NASDAQ listed firms with regression, but not with event study methods; and 3) no response for NYSE/Amex firms with either method although they comprise the large majority of secured loans in the study. However, these findings are consistent with an increased default risk explanation for secured debt. Logit regression indicates that secured loans can be distinguished from unsecured on the basis of financial distress. Firms with deteriorating asset values, decreasing liquidity, reduced earnings, high ratios of book-to-market value of equity and high interest expense as a percentage of cash flows receive secured loans. These results are consistent with Smith and Warner's (1979), Stulz and Johnson's (1985) and Barro's (1976) view that collateral is an effective monitoring device when firms pursue risky projects. They are also consistent with the findings of



Franks and Torous (1989), Weiss (1990) and Slovin, Sushka and Waller (1992) that collateral provides the lender adequate protection under bankruptcy.

This study supports the view of Slovin, Johnson and Glascock (1992) that the information provided to the market as a result of bank monitoring is limited to firms that are not highly monitored by other external agents (small firms, NASDAQ traded firms and firms that do not have investment grade bonds). The lack of a market reaction to secured loans for NYSE/Amex firms in this study provides evidence that the presence of other external monitors reduces the informational content of a security provision in a loan announcement. The employment of COMPUSTAT data to determine that financial distress is a characteristic of firms that obtain secured loans indicates that in general bankers use publicly available information to decide when a security provision should be attached to a loan contract.

## Chapter 1: Introduction

The objective of this thesis is to determine the role of collateral in the loan contracting process. Several competing explanations for the purpose of collateral have been offered. These explanations are separable by their effect on the borrowing firm's share price and the level of default risk of the firm associated with collateralized loans. Not all of these competing explanations have been empirically evaluated in the same study. Nor has a study been performed on the empirical implications of the competing theories for share price response and firm riskiness. Studies have found higher riskiness for secured loans, but have not provided conclusive evidence of the associated riskiness of the firm receiving a secured loan. These studies also do not provide evidence on the effect of collateral on the share price of the firm. Other studies have found that the existence of collateral in a loan contract does not significantly affect the share price of the borrowing firm. However, these studies do not combine an analysis of share price effects of secured loan announcements based upon bank monitoring theories with those based on the competing theories of collateral. The contributions of this study are 1) its focus on separating the various competing theories on the role of collateral within the framework of theories on the effect of external monitoring agents on share

price and 2) empirical analysis of both share price reaction to secured loan announcements and the difference in riskiness of firms that receive secured and unsecured loans.

To separate the competing theories of collateral this study differs from previous empirical studies in two aspects. First, this study incorporates the effects on share price predicted by the various theories of collateral within those effects associated with theories of bank monitoring. Several competing explanations for the effect of collateral on the share price of the borrower have been developed. However, collateral is not the only element of a bank loan to affect share price. Previous empirical studies have documented various loan characteristics, pre-announcement information and levels of external monitoring as important factors in the market response to bank loan announcements. No previous empirical study considers the combined effects of these factors when evaluating the influence of a collateral provision on the market's response to bank loan announcements. This thesis derives hypotheses to resolve the competing explanations for the effect of collateral on the firm's share price in the presence of other factors that affect market response to the information present at a bank loan announcement.

Second, this study employs financial ratios to measure the default risk of the firm. Previous empirical studies have found a higher risk premium for secured loans. One of

these studies concludes that riskier firms receive secured loans based on the finding that banks that have higher proportions of secured loans have higher proportions of non-performing loans. One shortcoming of this approach is that the number of secured loans made by a bank may not be proportionate to its number of delinquent loans. A direct measurement of the financial ratios indicative of distress for the firm overcomes this deficiency. The finding of a significant relation between default risk and security would provide evidence that borrower characteristics are as important as loan characteristics in determining when a security provision is to be included in a loan contract.

This study analyzes five different explanations for the use of security in a loan: 1) to signal firms with high quality projects, as proposed by Chan and Kanatas (1985) and Igawa and Kanatas (1990); 2) to reduce the underinvestment problem, as proposed by Stulz and Johnson (1985); 3) to resolve incentive contracting problems, as proposed by Barro (1976), Smith and Warner (1979), Stiglitz and Weiss (1981), Stiglitz (1985) and Stulz and Johnson (1985); 4) to preserve repayment priority in bankruptcy, as proposed by Franks and Torous (1989), Weiss (1990), and Slovin, Sushka, and Waller (1992); 5) to reduce the level of monitoring that lenders perform for the benefit of the borrowing firm's shareholders, as proposed within Diamond's (1984) model.

These five theories can be separated by their assumptions concerning market reaction to bank loan announcements and the difference in default risk between secured and unsecured loans. For the first two explanations, secured debt has less risk to the lender than does unsecured debt. These theories predict a positive market response for secured loans. For incentive contracting explanations where collateral is employed to resolve moral hazard problems for lenders, collateral indicates more default risk for secured debt than for unsecured debt. A positive as well as a negative share price effect is possible depending on who bears the costs or retains the benefits of collateral. Bankruptcy based explanations of collateral also imply that the firm has increased default risk. Three different market reactions are possible depending on the market's prior assessment of the probability of bankruptcy for the firm. Sitglitz' corporate control explanation of bank lending is based on the assumption that bank loans have reduced risk relative to other forms of financing, but no default risk differences exist between secured and unsecured bank loans. Share price may remain constant or be reduced depending on the efforts of the firm's managers. A negative or neutral effect on shareholder wealth for secured loans is also consistent with the bank monitoring model of Diamond (1984), depending on the effect of collateral on the monitoring efforts of lenders.

A confounding effect on using share price effects to separate these roles for collateral is Slovin, Johnson and Glascock's (1992) finding that share price effects may not be significant for some firms that receive secured loans because the market is already aware of the information contained in bank loan announcements for these firms. They find bank monitoring an important source of information for market participants for small firms. Since the market is cognizant of the financial status of large firms, the granting of collateral for loans to them has been anticipated by the market and thus no share price effects are generated.

Although Slovin, Johnson and Glascock find shareholders of small firms to be the primary beneficiaries of bank monitoring, the empirical results of Reinganum (1990), and Fama, French, Booth and Siquefield (1993) suggest that the monitoring associated with the exchange on which a firm is listed on is likely an important determinant of market reaction to secured debt. These studies further strengthen the argument that interpretation of market reaction to secured debt announcements is likely to be relevant only for firms that do not receive other forms of market monitoring.

The major finding of this study is that the various theories of the function of collateral cannot be separated solely based upon their effect on the borrowing firm's share price. Secured debt is a significant component of share price response to loan announcements only for groups of

lightly monitored firms. However, no consistent relation between market response and collateral is found. There is a positive market response for small firms in an event study, but no confirmation in a multiple regression of market returns against loan characteristics, pre-announcement information and various forms of monitoring. Multiple regression indicates a negative relation between security and market response for NASDAQ listed firms, a result not produced with event study methods. No market response for NYSE/Amex firms is observed although they comprise the majority of secured loans in the study.

The common element in the market response based explanations for secured debt of this study is that they support an increased default risk explanation for secured debt, a result consistent with Berger and Udell (1986) and Booth's (1992) finding of increased risk premiums for secured loans. In order to provide further empirical support for the increased default risk explanation of secured debt, firms that receive secured loans are analyzed for distress. Logit regression indicates that secured loans can be distinguished from unsecured on the basis of financial distress. Firms with deteriorating asset values, decreasing liquidity, reduced earnings, high ratios of the book to market value of equity and high interest expense as a percentage of cash flow receive secured loans. These results support increased default risk based explanations of secured debt. The

financial distress found for the firms that receive secured loans extends prior research that finds that riskier loans are collateralized.

In summary, the results of this thesis supports Smith and Warner, Stulz and Johnson and Barro's view that collateral is used to solve moral hazard problems. They also support the findings of Franks and Torous, Weiss, Slovin, Sushka and Waller, that collateral gives the lender adequate protection under bankruptcy. The use of collateral to solve moral hazard and bankruptcy problems can be considered parts of a single dilemma. Lenders require collateral as an aid in monitoring firms with risky projects (moral hazard). Since these firms have higher probabilities of bankruptcy, collateral also gives the lender adequate protection should the firm declare bankruptcy.



## Chapter 2: Literature Review

The appropriate literature involves the importance of collateral in a loan, and the monitoring services provided to the borrower's shareholders by the lender. The first branch mostly addresses problems associated with asymmetric information: namely adverse selection and moral hazard for the lender, and underinvestment for the borrower. Also included under the first branch is the resolution of bankruptcy claims for the lender. The second branch of the literature is concerned with direct monitoring by the lender and effects on the lender's monitoring by that of other external agents of the borrower, such as investment bankers and bond rating agencies.

These two branches of the literature are connected in that collateral is generally considered to lower the lender's costs of monitoring the borrower. Depending on the information presumed to underlie the lender's (borrower's) decision to require (offer) collateral, a security provision is likely to increase, decrease or have no effect on shareholders' wealth for the borrower.

A question that arises is whether collateral dilutes the monitoring services of the lender by focusing attention on an asset rather than on the activities of the borrower. The monitoring of an asset is passive in nature and suggests a reduced level of surveillance by the lender. The monitoring

of a firm by a lender implies that the lender has to be as astute as the borrower in assessing the future prospects of the firm.

The remainder of this chapter is organized as follows. Section 2.1 reviews the various theories for the use of collateral. Section 2.2 reviews securities issuance from the perspective of the the monitoring services provided by external agents. Section 2.3 summarizes the literature review. A summary of the various theories relating to secured debt and monitoring is contained in Appendix A.

### 2.1. Collateral

The literature suggests that the importance of a security provision in a loan contract lies in four areas. First, the offering of collateral by a borrower solves an adverse selection problem for lenders. Second, secured loans enable a firm's managers to resolve underinvestment problems. Third, lenders require secured debt to resolve moral hazard problems inherent in financial contracting (incentive contracting). Fourth, collateral confers super-priority status to the lender in bankruptcy proceedings.

#### 2.1.1. Adverse selection

Chan and Kanatas (1985) justify the use of collateral in the private negotiations between a lender and borrower in the absence of moral hazard. They note that collateral can be used as an observable variable on which participants can agree and base a loan contract when the lender and firm have

the same information but different beliefs about payoffs on the firm's projects. When the lender has a lower valuation of the firm's projects than the borrower, collateral is a signal of the high quality of the borrower's project. The borrower offers collateral and gets a lower rate because the borrower forecasts little risk of default and the subsequent loss of the collateral. Borrowers with low quality projects cannot mimic this behavior because of their higher probability of default and subsequent loss of collateral.

In Chan and Kanatas' model, secured loans receive a default risk discount. The offering of collateral should affect the borrowing firm's share price positively due to the signal that it sends to the market that the firm is undertaking a high quality project that will increase shareholder wealth. Unsecured loans do not affect share price since the market assumes that the firm has average quality projects. Empirical evidence does not support the view that secured loans increase shareholder wealth for the borrowing firm. Lummer and McConnell (1989) and Slovin, Johnson and Glascock (1992) find no evidence that the existence of collateral in a loan announcement increases shareholder wealth. In cross-sectional studies, Berger and Udell (1986) and Booth (1992) find a positive relationship between interest rates and the existence of a security provision in a loan, indicating a risk premium for secured loans. This evidence is not supportive of the view that

secured loans have a reduced risk premium as a general class. Berger and Udell also find that banks with higher proportions of secured loans have higher proportions of charged off, past due, non-accrual and renegotiated loans, and conclude that riskier firms receive secured loans. This finding suggests that firms that receive secured loans are riskier than firms that do not receive secured loans. However, Berger and Udell's finding is based on the assumption that the percentage of non-performing loans in a bank's portfolio is proportional to its percentage of secured loans.

Stiglitz and Weiss (1981) note collateral can have both beneficial incentive effects and countervailing adverse selection effects depending on the wealth of the borrower and the amount of collateral required by the bank. Collateral is used as a screening mechanism by bankers when they cannot observe the wealth of the borrower or the project undertaken. Under the assumption that wealthier entrepreneurs undertake riskier projects, the use of collateral as a screening device by banks to solve adverse selection problems results in low wealth, low risk entrepreneurs receiving loans with low levels of collateral requirements. However increasing collateral requirements to some higher critical level results in riskier average and marginal borrowers. The model of Stiglitz and Weiss categorizes the level of collateral required for a loan as a screening device of the banker, but implications for the impact of collateral on shareholder

wealth are conditional on the level of collateral required by the lender. At low collateral levels a secured loan is a positive signal to the market of the high quality of the borrower. At high collateral levels a secured loan is a negative signal of the low quality of the borrower.

### 2.1.2 Underinvestment problem

Stulz and Johnson (1985) note that secured debt can be used by the firm's managers to increase the value of the firm in two ways. First, secured debt can reduce the firm's monitoring and contracting costs. This explanation is based on incentive contracting and will be deferred until section 2.1.3. Second, the reduced monitoring costs of secured debt allows it to be used to solve Myers' (1977) underinvestment problem.

Myers notes that the value of the firm is dependent on its option to pursue new growth opportunities. Since in some states of nature the value of the project will be less than the required investment, the firm cannot issue riskless debt to finance new projects. If the state of nature is known to the firm and it issues (risky) unsecured debt that matures after the investment option expires, the firm will forego positive net present value projects in those states of nature where project returns are insufficient to return their investment and repay debt. In these states debtors would be repaid in full but investors would receive only partial repayment. Since this entails a decline in the equity of

shareholders, managers do not pursue the project even though it has a positive net present value.

Stulz and Johnson note that issuing secured debt allows the firm to resolve this underinvestment problem. When the firm has an asset in place and can acquire another asset to pursue a project, it is advantageous for the firm to pledge the new asset as collateral. The security provision diverts from the unsecured lenders some payoffs of the new asset that would otherwise accrue to them. Since monitoring and contracting costs are lower for secured debt than unsecured debt, funds are provided at a lower interest rate. The riskless nature of secured debt allows any gains in the new project to accrue entirely to shareholders, increasing the incentive of shareholders to undertake the new project and increase the value of the firm. Unsecured loans do not affect shareholder wealth since they do not have a reduced interest rate or allow the firm to undertake otherwise unfeasible projects. The lack of significance for collateral found by Lummer and McConnell and Slovin, Johnson and Glascock does not support the prediction of the model of Stulz and Johnson that secured loans increase shareholder wealth. The higher interest rates for secured loans found by Berger and Udell do not support Stulz and Johnson's view that secured loans have lower interest rates.

### 2.1.3 Incentive contracting

Barro (1976) suggests two functions for collateral. First, collateral can be used to solve moral hazard problems for a lender since it will be forfeited in the event of default. Forfeiture is undesirable and would presumably deter the borrower from undertaking projects with more risk than desired by the lender at the contracted interest rate. Second, in the event of default the lender acquires the collateral. If the lender has a lower valuation of collateral than the borrower, then deadweight losses will be incurred by the lender in the event of default. The lender will require an interest rate premium for secured loans based on deadweight costs and the probability of default for the borrower. The increased costs incurred by shareholders reduce equity value. Unsecured loans do not increase interest costs and thus have no effect on equity value.

Smith and Warner (1979) suggest that collateral is a lender requirement used for two purposes. First, secured debt solves wealth expropriation problems for lenders through the prohibition of asset substitution. Secured debt prevents shareholders from substituting riskier negative net present value projects that increase shareholder wealth but reduce lender wealth and the total value of the firm. The value of equity increases through the reduction of wealth expropriation costs. Second, secured debt is a cost effective device used by lenders to protect themselves in the

event of bankruptcy and liquidation by the borrower. If the borrower has high default risk, secured debt is the most cost effective monitoring device that can be employed. The interest rate may increase due to increased default risk by the firm, but it would be even higher with other forms of financial contracting. The value of equity increases due to the cheaper monitoring costs of secured debt. Unsecured debt does not increase shareholder wealth since there is no reduction in monitoring costs. In Smith and Warner's view small firms have high default risk and are the most likely candidates for secured debt.

Stulz and Johnson (1985) note the secured debt reduces moral hazard problems and decreases the lenders monitoring costs for three reasons. First, the firm cannot sell collateral and pay a dividend. Second, collateral cannot be swapped for a riskier asset. Third, secured creditors are less likely to restrict the activities of the firm. Secured debt has a lower interest rate than unsecured debt because it lowers the monitoring and contracting costs imposed on the borrower. Stulz and Johnson suggest that the gains from reduced monitoring costs (lower interest rates) for secured loans increase shareholder wealth.

The use of secured debt to solve moral hazard problems in the models of Barro, Smith and Warner, and Stulz and Johnson assumes that the firm's managers act in the shareholders' interests. Stiglitz (1985) develops a model of



corporate control in which the interests of the firm's managers are not necessarily aligned with those of shareholders. He suggests that to protect their interests, lenders desire that the firm's managers undertake investment projects with minimal risk. Projects funded by bank loans have less risk and return than projects funded by other sources. Collateral, along with the interest rate, terms of the loan contract and conditions under which loans are renewed are devices used by lenders to ensure that firms undertake low risk projects<sup>1</sup>. Collateral reduces the risk borne by the lender as well as the control exerted by the lender over the activities of the firm's managers. Two views of the effect of collateral on shareholder wealth can be derived from Stiglitz' model. First, projects financed by bank loans (with or without collateral) have reduced risk and return relative to projects financed by other sources and entail a decrease in shareholder wealth. Second, the interests of bankers are not aligned with those of shareholders. Consequently the granting of a loan does not have an impact on shareholder wealth.

The arguments put forth for the use of secured debt by Chan and Kanatas in section 2.1.1 assume that moral hazard does not exist between lenders and borrowers. Igawa and Kanatas (1990) note that in the presence of moral hazard,

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<sup>1</sup>Secured bank loans are not less risky than unsecured bank loans. Collateral is one of the mechanisms used by lenders as part of the terms and conditions of a loan.

secured debt is an incentive compatible device that reduces monitoring and contracting costs. They note that collateral can be used to solve moral hazard problems where moral hazard is defined as lack of due care by the firm for the asset being collateralized. In the private negotiations between lender and borrower, firms with high quality projects offer collateral in order to avoid being pooled with low project quality firms and paying higher interest rates. Collateralized loans have reduced risk. The use of collateral by a firm in this model is a signal that the firm is pursuing high quality projects that increase shareholders wealth. Unsecured loans do not affect shareholder wealth since they denote the firm as average.

Secured debt decreases the loan rate and increases the value of equity according to the views of Smith and Warner, Stulz and Johnson and Igawa and Kanatas. The risk premium for secured loans found by Berger and Udell and Booth does not support the contention that secured loans have reduced interest rates. The lack of a significant relationship between market returns and security found by Lummer and McConnell and Slovin, Johnson and Glascock does not support the view that secured debt increases shareholder equity. The findings of Berger and Udell and Booth support Barro's view that secured debt increases loan rates. The findings of Lummer and McConnell and Slovin, Johnson and Glascock support

the insignificant relationship of market returns and secured debt implication of Stiglitz' model.

Smith and Warner suggest that size is a firm characteristic indicative of distress and the attendant need for collateral. Recent empirical evidence by Chan and Chen (1991) and Fama, French, Booth and Siquefield (1993) suggests that the exchange that a firm is listed on is also indicative of potential financial distress.

Chan and Chen contend that abnormal returns for small firms are risk premiums for distress. They note that 32 percent of firms in the smallest quintile on NYSE are formerly larger firms that have suffered recent (within 2 years) reversals of fortunes. Only 3 percent of the firms in this quintile are newly listed firms. Chan and Chen create portfolios of distressed NYSE listed firms that have dividend reductions and high leverage (measured by the total assets less common equity to the market value of equity), and compare the returns of these portfolios to a control portfolio of small firms without these characteristics. They find that the distressed portfolios exhibit the abnormal returns and January effect associated with the well known small firm effect, but the control portfolio of small firms do not. They note that while the majority of distressed firms are small firms, distress is not limited to small firms.

Fama, French, Booth and Siquefield find that NYSE listed firms have higher returns than similar sized NASDAQ firms. They find that NYSE firms in the second, third and fifth size-sorted quintiles have higher returns and higher book-to-market equity ratios than similar sized NASDAQ firms. After controlling for size and book-to-market, the difference in market adjusted returns vanishes. Consistent with the findings of Chan and Chen, they attribute these higher returns to higher risks associated with distress for NYSE listed firms.

The above evidence suggests that NYSE exchange listed firms should be the primary recipients of secured loans since they have higher levels of financial distress (and higher probabilities of bankruptcy) than similar sized NASDAQ firms.

#### 2.1.4. Bankruptcy

A security provision in a loan contract gives the holder the highest creditor repayment priority in the event that the borrower files for bankruptcy under the United States Bankruptcy Reform Act of 1978<sup>2</sup>. One objective of the Act is to preserve the firm as an operating concern while financial claims are restructured. Under Chapter 5 of the Act absolute priority rules for financial claimants exist. The first priority is secured creditors, second the transactions costs

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<sup>2</sup>A more correct phrasing would recognize that secured debt is entitled to "adequate protection." All priority for other debt comes after this.

of bankruptcy, third wages, taxes and rent, fourth unsecured creditors and last equity. In the event of liquidation, secured creditors are entitled to reclaim assets before any other creditors are paid. If the priority of secured loans is upheld by the courts, then a secured loan is desirable if the lender anticipates a high probability of bankruptcy for the borrower. Empirical results support the absolute priority status of secured loans.

Franks and Torous (1989), Weiss (1990) and Slovin, Sushka and Waller (1992) all find pervasive violations of absolute priority in bankruptcy proceedings for unsecured creditors. However, in these studies secured creditors' contracts are upheld. Slovin, Sushka and Waller further disaggregate firms by whether they reorganize or liquidate pursuant to filing for Chapter 11 and find that in either outcome the priority of secured claims is upheld.

The retention of absolute priority status of secured loans under bankruptcy suggests that lenders may require security if they anticipate greater probability of bankruptcy for the borrower. Under asymmetric information, a secured loan would signal to the market that the firm is a bankruptcy candidate. Empirical evidence supports the view that the market is aware of the deteriorating status of firms that become bankrupt.

Aharony, Jones and Swary (1980) create a portfolio of firms that filed for bankruptcy and a matching portfolio of

firms that did not over the period 1970-1978. They find that the difference in weekly returns between the portfolios becomes significantly negative approximately four years before the filing. They interpret this result as indicative that the market anticipates bankruptcy filings. However, the largest negative differentials between the portfolios occur in the weeks immediately preceeding the announcement. Therefore the actual filing is not totally anticipated by the market.

Recent research also supports the contention that bankruptcy announcements are largely unanticipated by the market. Lang and Stulz (1992) and Slovin, Sushka and Waller (1992) find share price losses ranging from 21 percent to 56 percent upon the announcement of bankruptcy filings by firms. These findings coupled with the lack of significance of a security provision, as found by Lummer and McConnell and Slovin, Johnson and Glascock, provide evidence that a security provision is not a signal of imminent bankruptcy for the firm.

The asset substitution and bankruptcy arguments for the use of collateral can be considered parts of a single phenomenon. As the projects of the firm deteriorate (probability of bankruptcy increases) the value of the firm decreases. The firm may desire to pursue risky projects in order to increase its value. The requirement of collateral

by the lender would simultaneously solve asset substitution and bankruptcy priority problems.

#### 2.1.5 Summary - collateral

Managers of a firm may increase shareholder wealth by employing secured debt to resolve adverse selection and underinvestment problems. Under these views, secured debt has less risk than unsecured debt. In the process of monitoring borrowers, lenders may require collateral to solve incentive contracting and bankruptcy related problems. Shareholder wealth may increase, decrease or remain unchanged when collateral is imposed by the lender. When used to solve incentive contracting and bankruptcy related problems, secured debt may have either less or more risk than unsecured debt.

One of the implications for the use of secured debt to solve incentive contracting and bankruptcy problems is that the firm is financially distressed. Small firms have been identified as the most likely users of secured debt. Recent empirical evidence suggests that the exchange that a firm is listed on may also delineate firms that require secured debt.

#### 2.2 External monitors

The empirical evidence against the use of collateral to solve adverse selection and underinvestment problems suggests that the main function of collateral in a loan contract is to solve moral hazard and increased default risk (probability of bankruptcy) problems between the firm and its lenders. The

certification/monitoring by external agents such as investment and commercial banks also resolves moral hazard problems. An analysis of the importance of a security provision to firm share price increases associated with loan announcements must incorporate the already established certifying/monitoring roles that lenders (primarily banks) and other external agents have as a consequence of analyzing inside information held by the firm.

#### 2.2.1 Commercial banks

Leland and Pyle (1977) note that because inside information is held by a firm's owners, outsiders have difficulty valuing share price. Inside shareholders can obtain financing by one of two methods. First, they can signal firm quality by the proportion of shares that they retain, inducing investment by outsiders. Second, the firm may sell securities to financial intermediaries. The use of financial intermediaries is feasible for two reasons. First, intermediaries enjoy an informational gathering cost savings compared to individual investors. Second, although the intermediary faces the same moral hazard problem as the firm, the signalling cost of the intermediary is lower than that of the firm due to risk diversification.

Myers (1984) and Myers and Majluf (1984) note that firms have a preferred hierarchy of issuing securities (a "pecking order"). The managers of the firm possess information not held by market participants and act in behalf of passive



existing shareholders. These shareholders benefit when overvalued equity securities are issued to other investors. Market participants are cognizant of this and devalue the price of the firm's stock if there is a security offering by the firm. This devaluation is monotonically increasing in the riskiness of the security being offered. Managers develop a priority structure for funding projects in which internal funding is preferred to debt issuance, which is preferred to stock issuance.

When the firm's managers have a profitable net present value project they will refrain from undertaking the project if the decrease in stock price associated with the public financing announcement is more than the net present value of the project. Bank financing serves as a form of internal financing since it avoids the informational asymmetries associated with public security offerings. The announcement of a bank loan agreement should induce a non-negative market response.

Diamond (1984) develops a rationale for the existence of commercial banks based upon their function as delegated monitors between lenders and firms in a private information environment. Lenders have a moral hazard problem because only entrepreneurs know the outcome of the firm's projects and they may not sufficiently compensate lenders for the riskiness of the project undertaken. Lenders resolve this problem through monitoring. By delegating monitoring

activities to a representative group (banks), duplication of information gathering and free rider (no lender monitors because his share of the benefit is small) problems of lenders are eliminated. Shareholders benefit since the monitoring activities of lenders induce the firm's managers to maximize firm value.

One implication of Diamond's model is that secured loans should not affect shareholder wealth. In Diamond's model lenders monitor the activities of the firm's managers to insure that adequate compensation is received for the amount of risk involved in a project. In this model, lenders impose non-pecuniary penalties on borrowers in the event of default. Thus a collateral requirement by a lender as protection against bankruptcy does not affect firm value. Furthermore, a collateral requirement in a loan is not indicative of any change in the default risk of the firm. If a lender has collateral as a source of repayment, the lender is less concerned with evaluating the projects of the firm (monitoring). The firm's shareholders lose the benefit of the monitoring efforts of the lender.

Diamond (1991) suggests that the monitoring by banks assists the firm in establishing a reputation in the market. Once the firm's reputation is well established it is able to receive public financing (and monitoring). This implies that bank monitoring is not a significant source of information

for firms that are monitored by other sources such as investment banks and bond rating agencies.

Ramakrishnan and Thakor (1984) develop a model of financial intermediation similar to Diamond's (1984) model. Banks are formed because of informational asymmetries in the lending process and attendant moral hazard problems. Lenders (information processors) form coalitions in order to reduce the expected cost of screening borrowers. The screening process forces managers to maximize firm value.

Fama (1985) notes that bank loans avoid duplication of information costs. Bank loans are last in priority among fixed payment contracts. The short term nature of bank debt requires banks to frequently reevaluate the borrower's ability to repay bank loans. Positive renewals of bank loans reduces or eliminates monitoring by other agents with higher priority fixed payoff claims. The knowledge of their customers gained by banks over time gives banks a comparative advantage over other suppliers of funds when a loan is renewed. The renewal of a bank loan sends a positive signal to the market.

Empirical evidence is mixed but generally is supportive of the positive market reaction to the monitoring services provided by banks. Mikkelsen and Partch (1986) find a significant positive response to credit agreement announcements for NYSE/AMEX firms for the period 1972-1982, but normal returns (no significant response) for funded bank

loans (funds advanced at inception of contract). These results suggest that bank monitoring is beneficial for credit agreements. Mikkelsen and Partch interpret the positive results for credit announcements as not supportive Myers and Majluf's "pecking order" theory. The positive response for credit announcements is supportive of Diamond's (1984) monitoring services view of bank lending, however, a positive response should also exist for term loans since bank monitoring also occurs for them.

In a longitudinal study of 300 NYSE/AMEX firms covering the period 1974-1983, James (1987) finds significant positive responses for bank loan agreement announcements when funds are advanced and a marginally significant positive response when funds aren't advanced. Furthermore, negative share price responses occur for private placement financing and bond financing used to repay bank debt. James interprets these results as not fully consistent with the "pecking order" explanation for bank debt.

James examines market response as a function of loan maturity, the riskiness of the firm's debt and firm size. The rationale for studying maturity is based on Flannery's (1986) argument that a firm's choice of maturity signals management's assessment of earnings prospects. Managers who believe their firm is undervalued select short term debt in order to reveal the firm's true value at maturity. When the firm's prospects are revealed, investors are willing to

refund debt with a lower default risk premium. Overvalued firms issue long term debt since they do not want their prospects revealed to investors. The use of short term debt by overvalued firms would result in higher default risk premiums. James also includes the presence or absence of publicly rated debt in the firm's capital structure as an indicator of the default risk of the borrower. Firm size is included based on the observation that small firms are primarily funded by banks whereas large firms are able to place public debt. James uses the ratio of loan amount to the market value of equity as an indicator of the relative importance of the loan to the firm. He finds that market response to bank loan announcements cannot be differentiated by the characteristics of maturity, rated debt, firm size or relative importance of the loan (loan/market value of equity).

Flannery's analysis of the interrelation of loan rate and maturity indicates that information on both variables is important for market participants to determine whether a firm is undervalued or overvalued. Although the presence of rated debt also may proxy for default risk, as noted by James, many small firms do not have rated bonds.

Lummer and McConnell (1989) also find a significant positive response for *Wall Street Journal* announcements of loans for NYSE/Amex firms for the years 1976-1986. They find this response is concentrated in loans that are favorably

revised in at least one aspect (maturity, rate, dollar amount or protective covenants). Unfavorably revised loans have a significant negative response. Normal returns are found for loan initiations. They find no differential in the excess returns of new and favorably revised loans based on the characteristics of relative size, maturity, security provision and structure (revolving or term loan). Lummer and McConnell interpret their results as consistent with Fama's view that bank monitoring is effective predominantly for the continuation as opposed to initiation of a relationship between a borrower and lender.

Although Lummer and McConnell find the information provided to market participants by lenders beneficial for firms that have ongoing banking relationships, their results indicate that the knowledge that a loan is secured does not convey new information to market participants. They find insignificant excess returns for favorably renewed secured loans, but positive and significant excess returns for favorably renewed loans that are unsecured and those where the security status is unknown.

Slovin, Johnson and Glascock (1992) question the inconsistency of Lummer and McConnell's findings with Diamond's (1984) model. They note that Diamond's model predicts that bank monitoring announcement effects should be positive for both new and renewed bank financing. They also suggest that smaller firms should be the primary

beneficiaries of share price increases associated with lending announcements since banks are their primary external monitors. In order to have a more representative sample of small firms, Slovin, Johnson and Glascock include both NYSE/Amex and NASDAQ firms. They find significant positive responses for both new and favorably renewed loan announcements, supporting the prediction of Diamond's model. They also find positive market responses concentrated in loan announcements for small firms as well as firms with significant negative information disseminated to the market in the month beginning six weeks and ending two weeks prior to the loan announcement. No effects on market response are found for information on maturity, type of loan, relative loan size or collateral.

Slovin, Johnson and Glascock's finding of no effect of collateral on the excess returns found for bank loan announcements for small firms is consistent with the results of Lummer and McConnell. Both findings suggest that the market is aware of the conditions that require a collateralized loan for firms that benefit from bank monitoring. Slovin, Johnson and Glascock's result is not consistent with Smith and Warner's prediction that the cheaper monitoring costs of secured debt should positively affect the share price of small firms.

Slovin, Johnson and Glascock's finding that information on a security provision is not a significant component of the

excess returns for small firms is not consistent with the implication of Diamond's (1984) model that secured debt reduces the monitoring effectiveness of lenders. The model implies that an insignificant relation exists between secured loans and excess returns, but a positive relation exists between unsecured loans and excess returns.

Reinganum (1990) presages the importance of bank monitoring for small firms found by Slovin, Johnson and Glascock. He finds that small NYSE listed stocks have higher returns than similar size NASDAQ listed stocks. He attributes this difference to the liquidity of the NASDAQ market. Due to high transactions costs for small NYSE listed firms, small firms trading on NASDAQ are more liquid than similar sized NYSE listed firms. The higher returns for NYSE listed small firms are compensation for the higher trading costs<sup>3</sup>.

One possible implication of Reinganum's findings is that bank monitoring is important for NASDAQ firms. Since these firms are small, the flotation costs of public debt financing denies access to public debt markets for these firms. The monitoring provided by banks is likely to be a major source of investor information.

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<sup>3</sup>The higher returns for NYSE firms found by Reinganum are also found by Chan and Chen, and Fama, French, Booth and Siquefield, who attribute them to greater firm distress on NYSE rather than to transactions costs (liquidity). These results are not inconsistent if transactions costs include a premium for distress.



Central to the studies of Lummer and McConnell and Slovin, Johnson and Glascock is the measurement of share price response to loan announcements for firms that are publicly traded. The insignificant response to a security provision found in their studies can be attributed to the fact that the market is already cognizant of the circumstances that caused collateral to be included in the firm's loan. This information may not be available to investors for firms that are privately held or for firms that are publicly traded but lightly monitored. Thus, in addition to bank monitoring, the monitoring roles of other external agents may have a significant role in determining the impact upon share price of information contained in loan announcements.

#### 2.2.2 Non-bank monitors and cross-monitoring

Titman and Trueman (1986) suggest that entrepreneurs with favorable private information about firm value will select higher quality external accounting auditors and other external agents such as investment and commercial bankers to certify this information to market participants. Theoretical studies and empirical evidence support this hypothesis.

Booth and Smith (1986) demonstrate that firms lease the reputation of underwriters when offering public securities in order to certify that the issue price is consistent with inside information. Beatty and Ritter (1986) find that investment bankers will not indiscriminately underprice

initial public offerings because they have non-salvagable reputational capital at stake. Carter and Manaster (1990) demonstrate that initial public offering underwriters with high reputations select firms with low risk. Whited (1992) finds that the scrutiny of firms by investment bankers reduces information asymmetry and increases their accessibility to the capital markets. Hansen and Torregrosa (1992) find evidence that in addition to certification services, investment banks also monitor client firms, discipline managers and improve firm performance (and share price).

Booth's (1992) cross-monitoring hypothesis suggests that bank monitoring should be analyzed jointly with the certification/monitoring associated with publicly traded securities. He notes that public equity monitoring through security analysts, audits, and SEC filings lowers the monitoring costs of banks, as does public debt monitoring (Moody's and Standard and Poor's). Using data provided by the Loan Pricing Corporation for the years 1987-1989, he finds a positive and significant relationship between bank loan rates and the fact that a firm is privately held. This result supports the view that monitoring by investment banks for publicly traded firms reduces the costs of bank monitoring. Booth finds an inverse and significant relationship between bank loan rates and the presence of outstanding rated publicly traded debt by the firm. This

result supports the view that monitoring by bond rating agencies reduces bank monitoring costs. Booth also finds a significant positive relation between loan spreads and the existence of a security provision in a loan contract. This supports the view that bank monitoring costs are higher for secured loans. Approximately half of the 642 loans in his sample are secured, but only 6 have a security provision and outstanding public debt, providing evidence that secured lending is confined to firms are predominantly monitored by banks.

#### 2.2.3 Summary - external monitoring

The external monitoring of the firm provided by banks increases the wealth of the firm's shareholders. No conclusive view exists of the types of loans or firms that benefit most from bank monitoring. Small firms as well as firms that receive credit lines, funded loans and credit lines, and favorably renewed loans have all been variously espoused as major beneficiaries of bank monitoring. Empirical evidence indicates that attaching a security provision to a loan contract does not benefit shareholders of firms that have been shown to be the primary beneficiaries of bank monitoring (firms that receive favorably renewed loans and small firms). Empirical evidence also indicates that the exchange that a firm is listed on is an important indicator of the amount of monitoring received by the firm as well as its level of financial distress, and should be included in

tests of the importance of a security provision to share price returns.

In addition to commercial banks, empirical evidence supports the view that investment banks and bond rating agencies also function as external monitors and provide valuable information certification services to investors. Empirical evidence indicates that the monitoring services of investment banks and bond rating agencies reduces bank monitoring costs. Empirical evidence also supports a view that a security provision in a loan contract increases bank monitoring costs. No empirical tests have been specifically designed to determine if the borrower's shareholders benefit from the increased monitoring cost of collateral or the reduction in bank monitoring costs provided by other agents.

### 2.3 Summary

Various explanations have been advanced for the existence of a security provision in a loan contract. The adverse selection and underinvestment explanations for collateral predict that firm share price is increased through the use of collateral. The incentive contracting and bankruptcy explanations for collateral variously predict a positive, negative or neutral share price effect caused by collateral. Collateral is potentially a mechanism that reduces the monitoring effectiveness of lenders. The assessment of the impact of a security provision on firm share price must address the confounding effects on share

price caused by the monitoring services of commercial banks, investment banks and bond rating agencies.

The external monitoring by commercial banks increases shareholder wealth. The studies of Berger and Udell and Booth indicate that a security provision is a significant component bank monitoring costs. However the results of Lummer and McConnell and Slovin, Johnson and Glascock indicate that shareholders of firms that benefit most from bank monitoring do not gain from the inclusion of a security provision in a loan contract. Shareholders pay the extra costs of collateral, but do not benefit from its presence. These results provide evidence against the adverse selection and underinvestment problem explanations for secured debt. However, these studies do not address the effect on share price of the monitoring by agents other than commercial banks.

Booth provides evidence that the external monitoring by investment bankers and bond rating agencies reduces bank monitoring effectiveness. Slovin, Johnson and Glascock provide evidence that secured debt reduces the effectiveness of bank monitoring for shareholders of small firms, however their study does include the combined effects on share price of non-bank monitors and security. The small firms that are the major beneficiaries of bank monitoring in the view of Slovin, Johnson and Glascock are targeted by Smith and Warner as the primary candidates for secured debt. Recent empirical

evidence by Reinganum and Fama, French, Booth and Siquefield suggests that financially distressed firms can also be categorized exchange listing . These results imply that the importance of bank monitoring for a firm is related to the exchange that it belongs to in addition to size. The firm characteristics of size and exchange listing are indicative of those firms most likely to benefit from the monitoring services of commercial banks as well as a security provision.

### Chapter 3: The Significance of a Collateral Provision in a Bank Loan

The previous chapter outlined the literature on bank loan announcements, both with and without consideration of the role of collateral. The positive stock price reaction to a bank loan announcement in general is usually attributed to the monitoring capabilities of the lender. Loan characteristics, borrower characteristics, pre-announcement information, and the presence of non-bank monitoring are all found to be relevant in describing the market's response, and thus in determining the extent to which borrowers benefit from the monitoring services of lenders. Secured loans are a subset of bank loans. Prior studies, however, fail to consider the combined effects of all of these factors in evaluating the effects of a collateral provision on the market's response. Consequently, several conflicting explanations for the presence of a collateral provision have been offered. This chapter derives hypotheses to resolve these conflicts and isolate the effects of a collateral provision in a bank loan.

In section 3.1, hypotheses regarding the market's reaction to a collateral provision in bank loans are set forth. The possible relations between collateral and default risk are considered. In section 3.2, hypotheses are developed concerning the relation between the market's

reaction and measures of loan characteristics, pre-announcement information, and the presence of non-bank monitoring. In section 3.3, hypotheses are derived involving the relation between collateral and the variables. The relevant variables are described in the appropriate sections, but detailed definitions are deferred to Chapter 4. Appendix B summarizes the competing hypotheses on secured debt.

### 3.1 Market reaction and collateral

From the literature, five different explanations for the use of security in a loan can be identified: 1) to signal firms with high quality projects, as proposed by Chan and Kanatas (1985) and Igawa and Kanatas (1990); 2) to reduce the underinvestment problem, as proposed by Stulz and Johnson (1985); 3) to resolve incentive contracting problems, as proposed by Barro (1976), Smith and Warner (1979), Stiglitz and Weiss (1981), Stiglitz (1985) and Stulz and Johnson (1985); 4) to preserve repayment priority in bankruptcy, as proposed by Franks and Torous (1989), Weiss (1990), and Slovin, Sushka, and Waller (1992); 5) secured debt is advocated as a device within Diamond's (1984) model that reduces the level of monitoring that lenders perform for the benefit of the borrowing firm's shareholders. These five theories can be separated by their predictions concerning market reaction to bank loan announcements and the difference in default risk between secured and unsecured loans.



For the first two explanations, secured debt has less default risk than does unsecured debt. These theories predict a positive market response for secured loans and a neutral market response to unsecured loans. Secured debt indicates that the firm is high quality (Chan and Kanatas, Igawa and Kanatas) or that it is pursuing a positive net present value project unfeasible with unsecured debt (Stulz and Johnson).

For incentive contracting explanations where collateral is employed to resolve moral hazard problems for lenders, collateral indicates more default risk than for unsecured debt. Two different market reactions are possible depending on the effect on monitoring costs of collateral. First, if collateral is a cost effective monitoring mechanism and borrowers retain the cost savings, shareholders benefit through the reduced rate (Smith and Warner, Stulz and Johnson). Second, the firm bears the increased deadweight costs associated with collateral, and the borrower's share price is reduced (Barro). In either case, shareholders do not benefit from unsecured loans.

Bankruptcy based explanations of collateral also imply that the firm has increased default risk. Three different market reactions are possible. First, if the use of collateral reveals a larger than expected probability of bankruptcy, then a negative response is expected. Second, for a firm in distress, the granting of the loan itself can

produce a positive market response if the announcement indicates that the lender's assessment of the probability of the borrower defaulting is less than had been the market's assessment. Third, the news of bankruptcy offsets the granting of credit with no resulting change in market value. For all of these explanations, unsecured loans should have a normal market reaction except for the case when the market anticipated that the firm is to receive a secured loan due to impending bankruptcy. The granting of an unsecured loan under these circumstances would be positively received since the lender has indicated that the firm's prospects of bankruptcy are greatly diminished.

Sitglitz' corporate control explanation of bank lending is based on the assumption that bank loans have reduced risk relative to other forms of financing, but no default risk differences exist between secured and unsecured bank loans. Collateral is a device that lenders use to decrease their risk and monitoring efforts. Two market reactions are possible. First, share price is unchanged since lenders are concerned with repayment, not increasing shareholder wealth of the borrowing firm. Second, share price is reduced for both secured and unsecured bank loans since lenders require the firm's managers to undertake low payoff (low default risk) projects.

A negative or neutral effect on shareholder wealth for secured loans is also consistent with the the bank monitoring

model of Diamond (1984). Lenders observe the actions of borrowers to insure that they are adequately compensated for the riskiness of the project. Shareholders benefit from the monitoring efforts of lenders. However, when a lender takes collateral, the benefits derived by shareholders are diminished. The lender now monitors an asset instead of the actions of the firm's managers. Share price is unaffected or negatively impacted by the announcement of a secured loan since less lender monitoring is performed. A security provision in a loan contract is not indicative of default risk changes for the firm.

The empirical tests of Diamond's (1984) bank monitoring model by Slovin, Johnson and Glascock (1992) suggest that the measurement of market reaction to secured debt is applicable primarily for small firms. Secured debt is one of the devices used in the monitoring activities of banks. Bank monitoring is an important source of information for market participants for small firms. The market is cognizant of the financial status of large firms, the granting of collateral for loans to them has been anticipated by the market.

Although Slovin, Johnson and Glascock find shareholders of small firms to be the primary beneficiaries of bank monitoring, the empirical results of Rienganum (1990), and Fama, French, Booth and Siquefield (1993) suggest that the monitoring associated with the exchange that a firm is listed on is likely to be an important determinant of market

reaction to secured debt. Booth's (1992) results indicate that bank monitoring is important for firms not monitored by bond rating agencies. These studies further strengthen the argument that interpretation of market reaction to secured debt announcements is relevant only for firms that do not receive other forms of market monitoring.

Three hypotheses separating the various explanations for secured debt are derived based on two criteria: 1) market reactions to secured debt announcements and 2) the difference in default risk between secured and unsecured loans. Since a security provision in a loan is a component of bank monitoring, these hypotheses are subject to the caveat that market reaction is likely to be insignificant for a firm that has other sources of monitoring, and not because of the existence of a security provision.

$H_1$ : Collateralized loans have a *positive market response*.

$H_{1a}$ : The positive reaction to collateralized loans is a result of *decreased default risk*. The presence of collateral indicates reduced default risk of the borrower when solving adverse selection, (Chan and Kanatas, 1985), or moral hazard (Igawa and Kanatas, 1990) problems. Riskless collateralized loans solve the underinvestment problem (Stulz and Johnson, 1985). A positive market reaction for secured loans is expected due to high borrower

quality (Chan and Kanatas, Igawa and Kanatas) or project feasibility (Stulz and Johnson). No change in share price is expected for unsecured loans since the firms are average or do not have reduced interest rates.

H<sub>1b</sub>: Collateralized loans have a positive market reaction through *increased default risk* indicative of moral hazard problems within the firm or increased bankruptcy probability. Collateral decreases the monitoring costs of resolving moral hazard problems for lenders, the borrower's shareholder value increases due to decreased monitoring costs (Smith and Warner, 1979, Stulz and Johnson, 1985). Shareholder wealth is unaffected by unsecured loans since monitoring costs are not decreased. Collateral is used to give adequate protection to the lender when the borrower declares bankruptcy (Franks and Torous, 1989, Weiss, 1990, Slovin, Sushka and Waller, 1992). The share price of the firm increases because the receiving or renewal of credit (which the market did not wholly anticipate) gives the firm an option to continue operating and increase shareholder wealth. Unsecured loans receive either neutral or positive market reactions

depending on the market's assessment of the probability of bankruptcy for the firm.

H<sub>2</sub>: Collateralized loans have a *negative market response*.

H<sub>2a</sub>: The negative market reaction of collateralized loans is a result of *increased default risk*. The increased monitoring cost of collateral to resolve moral hazard problems are borne by the borrower, whose share price decreases (Barro, 1976). Unsecured loans do not affect share price since monitoring costs are unaffected. Collateral is used to give adequate protection to the lender when the borrower declares bankruptcy (Franks and Torous, 1989, Weiss, 1990, Slovin, Sushka and Waller, 1992). The share price of the firm decreases because the high probability of bankruptcy restricts credit availability (and the ability to pursue positive net present value growth opportunities) for the firm. Unsecured loans receive either neutral or positive market reactions depending on the market's assessment of the probability of bankruptcy for the firm.

H<sub>2b</sub>: Although a negative market reaction exists for collateralized loans *no default risk differential* exists for them. Share price for both secured and unsecured loans is negative since lenders provide

loans for projects with low risk and low return (Stiglitz, 1985). The borrower's share price is reduced for collateralized loans since lenders monitor an asset (collateral) instead of the activities of firm's managers (interpretation of Diamond, 1984). Unsecured loan announcement effects should be positive since shareholders receive the benefit of bank monitoring.

$H_3$ : Collateralized loans have a *neutral market response* and no default risk differential exists between secured and unsecured loans. Share price for both secured and unsecured loans is unaffected since lenders interests are not aligned with shareholders (Stiglitz, 1985). The borrower's share price is unaffected for collateralized loans since lenders monitor an asset (collateral) instead of the activities of firm's managers (interpretation of Diamond, 1984). Unsecured loan announcement should be positive since shareholders receive the benefit of bank monitoring. Shareholder wealth may not be affected for either secured or unsecured loan announcements if the firm receives monitoring from other agents that reduces the importance of bank monitoring (Booth, 1992).

The first testable hypothesis then, is simply the direction of the market's reaction to the presence of a collateral provision. Since increased default risk is a possible explanation for both positive and negative market reaction to secured loan announcements, further tests using financial ratios indicative of financial distress are necessary to separate the competing hypotheses. Further separation of the data by monitoring sources may also be required to validate any initial interpretation of market reaction to secured debt announcements.

### 3.2 Market reaction, default risk, and monitoring

The hypotheses separating various explanations for secured debt outlined in section 3.1 are based on market reaction to secured loan announcements. However, previous empirical studies show that the importance of bank loan announcements to market participants is a function of several variables. The contribution of a security provision to market reaction surrounding a bank loan announcement must be jointly analyzed with other explanatory factors. The only two empirical studies of the market reaction to loan announcements that explicitly consider the collateral provision are Lummer and McConnell (1989) and Slovin, Johnson, and Glascock (1992). The lack of significance in both studies for the security provision is inconclusive because neither of these empirical studies consider the connection between collateral and the full range of factors



identified in the literature. Furthermore, both studies exclude unfavorably revised loans although increased default risk explanations for collateral suggest that secured bank loans may be unfavorably revised.

Variables that have been identified as indicative of firms that benefit from secured debt and the asset monitoring services of lenders can be classified into three categories: levels of non-bank monitoring, information prior to announcement and loan characteristics. Relevant variables for each of these categories together with their expected relation to the market's response are discussed below.

### 3.2.1 Non-bank monitoring

The results of Slovin, Johnson and Glascock indicate that small firms are the primary beneficiaries of the monitoring associated with bank loans. These firms receive little or no monitoring from other sources. Firm size is expected to be significant and inversely related to the market's response.

Reinganum (1990) notes that small firms are predominantly found on NASDAQ. He finds that small NASDAQ firms have more liquidity than small NYSE firms. This indicates that small NASDAQ firms have significant investor interest and suggests a positive market response for NASDAQ firms.

Chan and Chen (1991) find that small NYSE listed firms are marginal firms with high default risk. Fama, French,

Booth and Siquefield likewise find that NYSE firms have more default risk than similar size NASDAQ listed firms. Smith and Warner indicate firms with higher default risks should be the primary users of secured debt. These suggest that if a security provision is significant it should be so for a subset of firms listed on NYSE. A security provision should also be significant for Amex firms since they have the same market structure as NYSE firms and equity and net income characteristics that are more restrictive than NASDAQ firms<sup>4</sup>.

The studies of Chan and Chen and Fama, French, Booth and Siquefield use information from COMPUSTAT to measure financial distress. The COMPUSTAT survival bias is well known and presents another selection bias. Firms found on COMPUSTAT presumably have more investor interest and thus more non-bank monitoring than firms not on COMPUSTAT. Therefore a negative relationship is expected between the availability of COMPUSTAT data for a firm and the market's response to the loan announcement.

Booth's cross-monitoring hypothesis suggests that the monitoring by bond rating agencies reduces the importance of bank monitoring. The presence of outstanding investment grade bonds should be inversely related to market response.

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<sup>4</sup>NYSE and Amex have a monopolist specialist market structure, NASDAQ has a competitive bid market structure. As of January 1986, listing requirements include a size provision of \$16,000,000 in market value of equity for NYSE, and \$1,000,000 for NASDAQ.

### 3.2.2 Pre-announcement information available to the market

Because the issue of asymmetric information is critical to the role of both collateral and bank monitoring, it is important to know the nature of information available for use in pricing the borrower's stock prior to the loan announcement. Market participants are continually processing whatever information is available. Information available to the market significant enough to influence the borrower's stock price would presumably also be known to the lender.

Slovin, Johnson and Glascock find market response positively related to a significant negative runup for the month ending two weeks before the announcement date. They interpret their result as indicative of prior information that the firm is in distress (the negative runup) being offset by the announcement's implication that the lender's assessment of the probability of the borrower defaulting is not as great as expected. A similar result would be expected here.

The information available before the announcement can be favorable as well. This pre-announcement information could include specifics about the loan leaked to the market. In that case, however, assuming reasonably efficient markets, there would be no market reaction on the announcement date. The finding of announcement effects by prior studies implies either markets are not "reasonably efficient" or such leakage is not usual. Another possibility is that the firm has

favorable pre-announcement news not related to bank lending. In this case a positive market response to a loan announcement is expected.

### 3.2.3 Loan characteristics

#### A. Security

As discussed in section 3.1, a positive and significant relation between the inclusion of a security provision in a loan contract and market returns supports both the *positive market response, increased default risk* and *positive market response, decreased default risk* hypotheses. An inverse and significant relation supports both the *negative market response, increased default risk* and *negative market response, no differential default risk* hypotheses. Further tests using financial ratios indicative of distress (increased default risk) are necessary to separate these competing explanations and are discussed in section 3.3.2. The finding of no significant relation between information on a security provision and price changes supports the *neutral market response and no default risk differential* hypothesis and indicates that a collateral provision in a loan contract does not benefit shareholders of the borrowing firm.

Only the *positive market response, reduced default risk* explanation for secured debt unambiguously predicts a neutral market reaction for unsecured loan announcements. The finding of positive or neutral market reactions for unsecured debt is consistent with the remaining hypotheses. Unsecured

loans may have positive announcement effects according to bankruptcy and reduced monitoring explanations for secured debt. Should a positive market reaction be found for unsecured debt announcements, the financial ratio tests indicative of distress to be discussed in section 3.3.2. will be helpful in separating the market effects of unsecured loan announcements implied by bankruptcy (increased default risk) and bank monitoring (no change in default risk) explanations for secured debt.

#### B. Loan type

Mikkelson and Partch find a positive relationship between market response and lines of credit, but no significant relationship for term loans. James finds a significant positive relationship for term loans. Neither Lummer and McConnell nor Slovin, Johnson and Glascock find a significant relationship between market response to loan announcements and type of loan. The results of this study are expected to confirm the latter findings.

#### C. Loan status (new, renewal, transfer)

The major difference between the studies of Lummer and McConnell and Slovin, Johnson and Glascock is that the former study finds a positive and significant market response to renewed loans indicating that the continuation of a banking relationship signals information to the market whereas the latter study found neither new nor renewed loans to be significant, indicating that the monitoring associated with

the formation of a banking relationship is as important as the monitoring associated with the continuation of a relationship. Two major differences exist between their studies. First, Slovin, Johnson and Glascock include NASDAQ firms in their study whereas Lummer and McConnell do not. Second, Lummer and McConnell treat loans transferred from one bank to another as renewals whereas Slovin, Johnson and Glascock categorize them as new loans. However, loans that are transferred from one bank to another are neither new nor renewed. The transfer of a loan may indicate a change in the default risk of the firm and/or amount of credit it requires. A positive market response for loan transfers indicates an decrease in default risk. It may indicate an increase in default risk with the effect of credit granting by a new lender overriding the increase in default risk. It may also indicate that the firm has been denied credit by its current lender but has found another source of funding. Finally, a positive reaction can indicate that the funding requirements of the firm have changed and the firm needs another bank to handle its larger credit requirements. A negative relationship indicates an increase in the default risk of the firm.

#### D. Maturity and rate

Flannery suggests that undervalued firms issue short term debt to decrease the default risk premium whereas overvalued firms prefer longer term loans in order to avoid

this disclosure and attendant interest rate increases. This suggests overvalued firms would avoid disclosure of maturity and interest rate information. A positive market response for the disclosure of maturity information as well as rate information would be supportive of the view that undervalued firms choose to disclose this information.

#### E. Loan/Equity ratio

Arguments for borrower share price increases associated with bank loan announcements are based on the monitoring abilities of lenders. Another possible reason for a positive share price reaction is that the initiation or renewal of a credit request by a lender gives the firm the ability to pursue a positive net present value project. Under this view larger loan amounts as a percentage of the firm's equity induce larger positive market responses due to increased leverage effects. James, Lummer and McConnell, and Slovin, Johnson and Glascock do not find this variable significant.

### 3.3 Collateral and the variables

#### 3.3.1 Collateral and loan and market characteristics

Regardless of whether a security provision is significant in explaining market reaction to loan announcements, the sheer number of secured loans found by Berger and Udell and Booth indicate that lenders and borrowers have some purpose for employing collateral. Firm characteristics or market information may induce bankers to include a security provision in a loan. A security provision

can be included in a loan in tandem with other loan characteristics (e.g. found predominantly in conjunction with renewed loans). An unordered multinomial logit regression with the variables mentioned in section 3.2 will be used to determine if the profile of an announced secured loan is significantly different from an announced unsecured loan and loans where information on collateral is not disclosed. Even if the logit regression is significant, the identification of specific variables is difficult due to multinomial logit model limitations for multiple choice dependent variables (discussed further in Chapter 4).

### 3.3.2 Collateral and borrower characteristics

To understand the role of security in a loan, it is also necessary to relate the presence of a collateral provision to various characteristics of the borrower. If the lender uses readily available information about the borrower to determine whether to require collateral, then the market should be able to predict that requirement. If the collateral provision is not a function of known borrower characteristics, then the collateral provision is potentially a conduit to the market of hidden information about the borrower.

Incentive contracting and bankruptcy based explanations for the use of secured debt are based on the assumption that the firm has increased its default risk. The findings of Chan and Chen and Fama, French, Booth and Siquefield indicate that financial distress is not necessarily limited



to small firms. An examination of cash flow, leverage, liquidity and profitability ratios for firms with sufficient data availability on COMPUSTAT may provide evidence of firm financial characteristics associated with secured loans.

Discriminant analysis using variables indicated by Altman (1968) as predictors of bankruptcy may indicate whether a high probability of bankruptcy by the borrowing firm induces a lender to include a security provision in the loan. Five variables have been suggested by Altman as predictive of bankruptcy. Working capital to total assets measures net liquid assets of the firm relative to total capitalization. This ratio should be smaller for firms experiencing reduced operating earnings. Retained earnings to total assets discloses the earned surplus of the firm over time. This ratio should be smaller for small firms as well as firms with deteriorating earnings. Earnings before interest and taxes to total assets indicates the productivity of the firm's assets. This ratio should be low for firms with relatively unproductive assets. The market value of equity to book value of total liabilities measures how much the firm's assets can decline in value before the firm becomes insolvent, and should be low for firms with a high probability of default. Sales to total assets indicates management's capacity to deal with competitive conditions. Although this ratio varies by industry, it is related to the

other variables in the model and contributes to the overall discriminating ability of the model.

A logit regression based upon more general conditions of financial distress explanations for secured debt is also employed. Chan and Chen (1991) find high leverage to be indicative of financial distress. Whited (1991) finds that high interest coverage ratios (interest expense as a percentage of cash flows) are associated with poorly performing firms. Fama, French, Booth and Siquefield find that firms with poor earnings have high book to market equity ratios. Altman notes that the firm's liquidity (working capital to total assets) should be smaller for firms experiencing poorer earnings.

## Chapter 4: Sample Selection, Data, and Methods of Analysis

This chapter describes the data and the empirical procedures employed to test the hypotheses established in the previous chapter. The sample selection process is described in section 4.1. In section 4.2, the relevant variables are defined, with their respective sources. The methods of analysis to test the various hypotheses are discussed in section 4.3. A list of the variables employed in this thesis is contained in Appendix C.

### 4.1 Sample selection

The primary sample consists of bank loan announcements that appear in the *Wall Street Journal* (hereafter, simply the *Journal*) during the period 1980-1991. These dates are chosen due to data availability and changes in the legislative environment.

The risk of default (i.e., bankruptcy) has been identified as a reason for collateral to be offered or required on a loan. Over time, however, there have been changes in the laws governing bankruptcy. A major change, the Bankruptcy Reform Act of 1978, became effective in October 1979, making 1980 the first full calendar year under that legislation. To avoid any possibility that the change in legislation could affect the results of this study, no announcements prior to 1980 are included in the sample. The

sample ends in 1991 simply because that was the most recent available year of accounting and market data at the time of the analysis.

To be included in the sample, a report of a bank loan could not include any other corporate news such as dividends, earnings, management changes, operational changes, other financing, acquisitions, divestitures, or litigation. These other events have the potential to affect stock prices and thus are a confounding factor. In addition, loan announcements are excluded from the sample if any other news concerning the borrower appears in the *Journal* the day preceeding, the day of or the day following the loan announcement. A final selection criterion is that stock market returns are available for at least half of the estimation period of the market model regression (discussed more fully in section 4.3). The final uncontaminated sample consists of 452 loan announcements.

For the period from January 1, 1980 through September 30, 1987, bank loan announcements appear in the *Financing Business* column(s) of the *Journal*. Financing activity reported in other parts of the *Journal* is found to be of a secondary nature and frequently is combined with other announcements. The sample includes 410 loan announcements from this period.

On October 1, 1987, the *Journal* changed its format to the present three sections. From that date to December 31,

1991 (the terminus of the sample) bank loan announcements appear in the *Money and Investing* section. As with the earlier announcements, financing activity reported elsewhere in the *Journal* almost always includes other corporate events. The sample includes 42 loan announcements from this period.

#### 4.2 Variables of interest

This study examines the market's reaction to the announcement of a bank loan agreement as a key to understanding the role of collateral in such loans. As described in the previous chapter, this examination requires data covering market returns, the nature of the information flowing to the market about the borrower prior to the loan announcement, the characteristics of the loan, the presence of alternative (i.e., non-bank) monitors of the borrower, and various characteristics of the borrower. Multivariate regressions (described in section 4.3) are used to measure the joint effects of these variables on the market's reaction. Discriminant analysis and logit regressions (described in section 4.3) are used to analyze the role of financial distress for firms with secured loans. Each of the variables of interest are defined in the following paragraphs.

##### 4.2.1 Market returns

The market's reaction to a bank loan announcement is defined as the average daily risk-adjusted stock return for a borrower on the day before and the day of the announcement.

(The single-index market model procedure for calculating this measure is described in section 4.4.) Data for deriving share price changes are obtained from the University of Chicago Center for Research in Securities Prices (CRSP) data files. This database contains daily share price information for firms listed on the New York (NYSE) and American (Amex) stock exchanges and for firms traded on the National Association of Securities Dealers Automated Quotation (NASDAQ) system. Firms not included in these files and those with insufficient information to estimate parameters for the market model are discarded.

#### 4.2.2 Prior information

To determine whether the information available for use in pricing the borrower's stock prior to the loan announcement is generally positive or negative, for each borrower, the cumulative average daily risk-adjusted stock returns for the 20 trading days from 30 days before through 11 days before the announcement are calculated (see section 4.3). A standardized residual z-statistic (see section 4.3, equation 1) is calculated for each observation. If the returns are negative and significant at the 10 percent level (one-tailed test), the binary variable NEGRUN is coded with a value of 1; otherwise the variable is coded with a value of 0. If the returns are positive and significant at the 10 percent level, the binary variable POSRUN is coded with a value of 1; otherwise the variable has a value of 0. Any

announcement that does not have significant negative (positive) pre-announcement rundown (runup) is coded with a value of 0 for both NEGRUN and POSRUN.

#### 4.2.3 Characteristics of the loan

##### A. Security information

In order to determine if share price is affected by the existence of a security provision in a loan contract, loan announcements are separated by secured, unsecured and unknown security status. The binary variable SECURE is coded with a 1 for loans identified as such in the article or the collateral provided for the loan is described in the article. Otherwise the binary variable SECURE is coded with a 0. The binary variable UNSECURE is used in the same fashion as SECURE for loans denoted as unsecured in the announcement. Any announcement that does not indicate information on the security status of the loan contract contains a value of 0 for SECURE and UNSECURE.

##### B. Status (new, renewal or transfer)

In order to determine the importance to share price of new, existing and changed banking relationships, loan announcements are categorized as new, renewals and transfers. The binary variable NEW is coded as 1 if loans are identified as new in the article and it is apparent from the article that the loan is not a renewal of an existing loan. Any loan not classified as new contains a 0 for NEW. The binary variable RENEW is coded with a 1 for loans that are noted as

such in the article. Also identified as renewals are loans that are classified as new but are obviously renewals. Any loan not classified as a renewal contains a 0 for RENEW. The binary variable TRANSFER is coded with a 1 for loans that are transferred from one bank or group of banks to another. In those circumstances where some members of a lending group change but others do not, the loan is denoted as a transfer if the lead lender changes, otherwise it is classified as a renewal. Any loan not classified as a transfer receives a 0 for TRANSFER. Any loan for which the article does not contain information necessary for the above classifications contains a 0 for all three classification codes.

D. Type (line of credit, term loan, revolving credit)

The granting of credit that can be drawn upon at a later date and the advancing of the agreed upon contract amount at loan closing are different methods of bank loan contracting that could have different levels of bank monitoring and different share price reaction. Loans are coded with 1 for the binary variable LINE if the loan is identified as a line of credit or revolving line of credit in the article. All other loans contain a value of 0 for LINE. The binary variable TERM contains 1 if the loan is identified as a term loan or combination of a revolving line and a term loan. All other loans contain the value of 0 for TERM. (Any loan types that are not identified and contain a value of 0 for both TERM and LINE.)



#### E. Maturity and rate

Information on the maturity and rate of a financial contract can indicate whether the firm is over-valued or under-valued and affect share price. The binary variable `MATURE` is coded as 1 if the term of the loan or the maturity date is found in the article. If this information is not given, `MATURE` contains a value of 0. The binary variable `RATE` is coded as 1 if information on the interest rate is provided in the article; otherwise `RATE` contains a value of 0.

#### F. Loan amount/market value of equity

Information on the amount of credit being granted is present on virtually all loan announcements. This information is retained since the importance of the loan to the firm (loan amount/market value of equity) has been suggested as a component of announcement effects. The variable `LOANMKT` contains the ratio of the amount of the loan to the market value of the firm one week before the announcement.

### 4.2.4 Alternative monitors of the borrower

#### A. Firm size

Slovin, Johnson and Glascock find the monitoring services of banks to affect share price of small firms but not large firms. Firm size is calculated for each firm as the share price one week before the event date multiplied by the number of outstanding ordinary common shares at that

time. The continuous variable LOGSIZE is the natural logarithm of firm size. These data are from CRSP. Firms are categorized as small if the market value of equity is below the CRSP NYSE/Amex median year-end market value during the sample period; otherwise they are categorized as large.

#### B. Bond rating agencies

In order to determine the importance of bond rating agencies as assessors of default risk (James, 1986) and external monitors (Booth, 1992), bond ratings from *Moody's Bond Record* and *Standard and Poor's Bond Guide* in the month preceeding the announcement are collected for the firms in the sample. The public debt of a firm is classified as investment grade and the binary variable INVGRAD is coded as 1 if the lowest Moody rating of its bonds is Baa. Similarly the firm's public debt is classified investment grade if its lowest Standard and Poor bond rating is BBB. In those cases where both agencies have a bond rating, both of the above criteria must be satisfied for the public debt of the firm to receive an investment grade rating. Firms are classified as non-investment grade (INVGRAD coded as 0) if they have rated bonds outstanding that do not meet this criteria or if they have no public rated bonds outstanding.

#### C. Exchange listing

Bankruptcy explanations of the *default risk increase* hypothesis are based on the premise that secured debt is employed because the firm is engaged in risky projects with

a high probability of default (financial distress). Fama, French, Booth and Siquefield (1993) suggest that on average NYSE firms are more distressed than similar sized NASDAQ firms. Therefore, the market's reaction to secured loan announcements should be significant for NYSE firms. The similarity of market structure for NYSE and Amex firms suggests that firms listed on either exchange would have similar share price responses to loan announcements<sup>5</sup>.

Reinganum suggests that significant investor interest exists for NASDAQ firms. Since these firms are smaller than NYSE firms, bank monitoring for these firms should be an important source of investor information. Loan announcements should be positive for NASDAQ firms. In order to determine the importance of exchange listing for share price response, the binary variable EXCHANGE is coded as 1 for NASDAQ firms and 0 for NYSE/Amex firms.

#### D. COMPUSTAT bias

A firm with accounting information on COMPUSTAT has significant investor interest in the opinion of Standard and Poor's<sup>6</sup>. The inclusion of a firm on COMPUSTAT is a form of non-bank monitoring similar to the bond rating services performed by Standard and Poor's. This suggests that firms

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<sup>5</sup>Separate analyses separating the data by NYSE and Amex listed firms did not alter the final results of this study.

<sup>6</sup>The COMPUSTAT limited coverage file contains NYSE and Amex listed firms as well as some NASDAQ firms that have the largest market following in the opinion of Standard and Poor's.

that are not listed on COMPUSTAT should be the primary beneficiaries of bank monitoring. The binary variable COMPUSTAT is coded as 1 if a firm is listed on COMPUSTAT, otherwise it is coded as 0.

#### 4.2.5 Financial distress

Several of the explanations of the market's response to secured debt announcements are based on the supposition that a security provision is present due to increased financial distress for the firm. To determine if financial distress is a condition for providing collateral, discriminant analysis and logit regressions (described in section 4.4) are conducted. Accounting financial ratios indicative of financial distress are calculated from Standard and Poor's COMPUSTAT database. Variables indicative of financial distress are described below.

##### A. Altman's bankruptcy ratios

Altman (1968) provides a predictive model of bankruptcy using discriminant analysis. Since a security provision has been suggested as beneficial for the lender in the event of the firm's bankruptcy, a modification of Altman's model to predict the use of security provision may provide evidence for the role of security for financially distressed firms that are bankruptcy candidates. This model contains a dependent variable with three possible values: 1) secured loans, 2) unsecured loans and 3) loans where information on security is not announced. The independent variables have

been suggested by Altman as indicative of increased bankruptcy potential. The working capital to total assets ratio (WCTA) measures net liquid assets of the firm relative to total capitalization and should be smaller for firms experiencing reduced operating earnings. The retained earnings to total assets ratio (RETA) discloses the earned surplus of the firm over time and should be smaller for small firms as well as firms with deteriorating earnings. The earnings before interest and taxes to total assets ratio (EBITTA) indicates the productivity of the firm's assets and should be low for firms with relatively unproductive assets. The market value of equity to book value of total liabilities ratio (MVEBTL) measures how much the firm's assets can decline in value before the firm becomes insolvent and should be low for firms with a high probability of default. The sales to total assets ratio (SLSTA) indicates management's capacity to deal with competitive conditions. Although this ratio varies by industry, it is related to the other variables in the model and contributes to the overall discriminating ability of the model.

In addition to discriminant analysis, which maximizes the squared distance between the populations of secured, unsecured and unknown security status loans based upon linear combinations of Altman's financial ratios, logit regressions using these same variables is performed. Logit regression assesses the probability that a loan is secured, unsecured or

unknown with respect to security status based upon the the independent variables. Since the dependent variables in this analysis are discrete, logit regression has three advantages over discriminant analysis: 1) logit regression adjusts for non-normal error terms, 2) logit regression adjusts for non-constant error variance and 3) logit regression constrains the response function to have a probability between 0 and 1 (see Neter, Wasserman and Kunter, *Applied Linear Regression Models*, 1989, pp. 580-581).

#### B. Other ratios indicative of financial distress

Logit procedures using alternative financial ratios may also be used to confirm financial distress explanations for secured debt. Consistent with the work of Altman, the working capital to total assets ratio (WCTA) measures the liquidity of the firm and should be smaller for firms with secured loans. The results of Chan and Chen (1991), indicate that the debt to market value of equity ratio (LEVERAGE) should be higher for firms with secured loans. Whited's (1990) finding that distressed firms have high interest expense to cash flow ratios (INTCOVER) should also be applicable for firms with secured loans. Fama, French, Booth and Siquefield's (1993) finding of high book to market equity ratios (BKEQMKEQ) for poor performing firms should also be applicable to the distressed firms that use secured debt.

### 4.3 Method of Analysis

#### 4.3.1 Event study

The event study method is appropriate for this study since the competing hypotheses described in section 3.1 predict changes in the market value of the firm at the announcement of a secured loan. The most commonly used event study procedure is the standardized residual test method of Patell (1976) and Brown and Warner (1985). This procedure is well specified if there is no change in the variance of a security's return during the event period. However, Brown and Warner (1985) point out that if changes in a security's variance accompany an event, "using a time series of non-event period data to estimate the variance of the mean excess return will result in too many rejections of the null hypothesis that the mean excess return is equal to zero." (p. 23) Empirical evidence indicates that event induced variance is present and significant for various financial activities. Event induced variance is found for earnings announcements (Beaver, 1968), common stock repurchases (Dann, 1981), convertible security calls (Mikkelsen, 1981), earnings forecasts (Penman, 1982) and directorship announcements (Rosenstein and Wyatt, 1990). Boehmer, Musumeci and Poulsen (1991) propose a modification of the Brown and Warner test statistic that allows for cross-sectional event period variances. Using simulation they demonstrate that in the presence of event induced variance their standardized cross

sectional test is much more powerful than the standardized residual method in detecting no abnormal returns when in fact no abnormal returns are present. If loan announcements are not accompanied by changes in cross-sectional variation, both tests produce identical results.

The simulations of Boehmer, Musumeci and Poulsen demonstrate that the standardized cross-sectional test loses its advantage over the standardized residual test when event induced changes in variance exists and abnormal returns are 1 to 2 percent. Previous loan announcement studies have found some sets of loan announcements that fit this category. Thus neither event study test has a clear advantage over the other. The results of both tests are provided in this study. The final results of this study are independent of the method chosen since the standardized cumulative prediction errors of the market model estimation period (used in the multiple regression models discussed in section 4.3.3) are the same for both methods.

The ordinary least squares market model is employed for a 120 day estimation period beginning 240 days prior to the announcement. This period is chosen to avoid contamination caused by information leakage in loan recontracting<sup>7</sup>. The

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<sup>7</sup>The vast majority of those instances where the lender(s) is (are) identified indicate that loans are provided by a syndicate of lenders. Since loan recontracting involves the transfer of information between lenders prior to the maturity of the existing loan, a 120 day interval between the end of the estimation period and the event day avoids any information leakage affecting the predicted returns.



equally weighted index provided by CRSP is used as a measure of market returns<sup>8</sup>. Cumulative prediction errors are measured for the day preceeding the announcement and the day of the announcement.

Under the null hypothesis that the event window cumulative prediction errors are not significantly different from zero, the standardized residual test statistic is derived as follows:

$$\sum_{i=1}^N SR_{iE} / (\sum_{i=1}^N (T_i - 2) / (T_i - 4))^{1/2} \quad (1)$$

where:

$$SR_{iE} = A_{iE} / S_i \sqrt{1 + \frac{1}{T_i} + \frac{(R_{mE} - \bar{R}_m)^2}{\sum_{t=1}^{T_i} (R_{mT} - \bar{R}_m)^2}} \quad (2)$$

where:

$N$  = number of firms in sample.

$A_{iE}$  = security i's abnormal return on the event day.

$A_{it}$  = security i's abnormal return on day t.

$T_i$  = number of days in security i's estimation period.

$R_{mt}$  = market return on day t.

$\bar{R}_m$  = average market return during estimation period.

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<sup>8</sup>The equally weighted index is used in the event study simulation models of Brown and Warner and Boehmer, Musumeci and Poulsen as well as the research of Mikkelsen and Partch, James and Lummer and McConnell.

$s_i$  = security  $i$ 's estimated standard deviation of abnormal returns during the estimation period.

$SR_{iE}$  = security  $i$ 's standardized residual on the event day.

The purpose of standardizing residuals before forming portfolios is to adjust for heteroskedastic event day residuals and prevent securities with large variances from dominating the test.

The Boehmer, Musumeci and Poulsen test statistic is a simple cross-sectional t-statistic of the aggregation of the individual test statistics of equation 1 and is given by:

$$\frac{1}{N} \sum_{i=1}^N SR_{iE} / \sqrt{\frac{1}{N(N-1)} \sum_{i=1}^N (SR_{iE} - \sum_{i=1}^N \frac{SR_{iE}}{N})^2} \quad (3)$$

#### 4.3.2. Analysis of variance and test of difference in means

Event study methodology is performed on the data sample partitioned by variables of interest in order to determine if sub-categorizations of loan announcements are the prime beneficiaries of secured debt. To augment this procedure, an analysis of variance is performed to determine if significant difference of means exists between the partitioned data sets. Since some of the data categorizations include more than two partitions, pairwise least squares differences of means tests are performed.

#### 4.3.3 Multivariate regression

As discussed in chapter 3, variables representative of loan characteristics, pre-announcement information and various levels of non-bank monitoring have the potential to affect the market value of a firm at a loan announcement. A regression on cumulative market model prediction errors can indicate the significance of a security provision in the presence of these test and control variables. In order to adjust for heteroskedasticity in stock returns, all variables are weighted by the inverse of the standard deviation of the prediction error derived from the market model estimation. The general form of this model is described by equation 4.

$$CPE_i/s_i = B_0/s_i + \sum_i B_i x_i/s_i + u_i/s_i \quad (4)$$

where:

$CPE_i$  = cumulative event window prediction error.

$x_i$  = variable of interest (described in section 4.2).

$u_i$  = mean zero white noise.

$s_i$  = standard deviation of the prediction error derived from market model estimation.

#### 4.3.4 Altman's discriminant analysis

The findings of positive, negative or insignificant coefficients for a security provision in equation 4 are all consistent with a distressed firm explanation for secured debt. In order to establish the plausibility of this

explanation, Altman's (1968) discriminant analysis procedure for predicting bankruptcy is used for those observations for which sufficient accounting data is available. Instead of predicting bankruptcy, Altman's model is modified to predict the existence of a security provision in a loan. This model is described in equation 5.

$$sec = B_1 wc/ta + B_2 re/ta + B_3 ebit/ta + B_4 mve/btl + B_5 sls/ta + u \quad (5)$$

where:

*sec* = variable indicating whether the announcement indicated that the loan is secured, unsecured or not disclosed.

*wc* = working capital.

*ta* = total assets.

*re* = retained earnings.

*ebit* = earnings before interest and taxes.

*mve* = market value of equity.

*btl* = book value of liabilities.

*sls* = sales.

*u* = mean zero white noise.

#### 4.2.5 Logit regression

The binary and unordered multinomial logit models based on the logistic probability distribution are used to determine circumstances under which secured debt is chosen based on whether or not the announcement contains information that the loan is secured. The binary model is employed to determine the probabilities of choosing secured versus

unsecured debt and the multinomial model is employed when not disclosing the security status of a loan is also an alternative choice. Equation 6 describes the general form of the estimation of the parameters of model employed.

$$sec_i = B_0 + \sum_i B_i x_i + u_i \quad (6)$$

where:

$sec_i$  = variable indicating whether the announcement indicated that the loan is secured, unsecured or not disclosed.

$x_i$  = variable of interest.

$u_i$  = mean zero white noise.

Equation 7 describes the probability of a particular choice.

$$Prob(Y=j) = e^{B_j x_i} / (1 + \sum_{k=1}^J e^{B_k x_i}) \quad (7)$$

for  $j = 1, 2, \dots, J$ . The model is normalized by setting the parameters of one of the choices to 0 (Greene, *Econometric Analysis*, 1990, pp. 695-706).

## Chapter 5: Descriptive Statistics and Event Studies

### 5.1 Full data sample

The full data sample of *Wall Street Journal* loan announcements for the period 1980-1991 with sufficient data on CRSP contains 739 observations. Of this total, 120 announcements (16.2 percent) specifically identify a security provision in the loan agreement (Table 5-1). Forty-nine of the secured loan announcements (41 percent) contain other pertinent information or have concurrent announcements. The predominant reasons for contamination of secured loan announcements roughly parallel those for the full data set: earnings announcements, other forms of financing and announcements within the event window. The majority of the contaminated secured loan announcements indicate that the firm is under financial distress and support the *increased default risk* hypotheses. With the exception of the purchase of airplanes by People Express, secured loan announcements contaminated by earnings statements indicate that expected or actual earnings are either negative or below prior expectations. Announcements contaminated by other forms of financing indicate that the firm is in violation of loan covenants, agrees to more restrictive loan covenants, has received loans from major shareholders, or is considering bankruptcy. Four hundred and fifty two of the announcements are uncontaminated.

Table 5-1

*Wall Street Journal* loan announcements by reason for contamination. Percentage of total observations in parentheses.

Reason for Contamination	Secured	Unsecured	Unknown	Total
Uncontaminated	71 (9.61)	48 (6.50)	333 (45.06)	452 (61.16)
Acquisition	0 (0.00)	0 (0.00)	3 (0.41)	3 (0.41)
Divestiture	0 (0.00)	0 (0.00)	5 (0.68)	5 (0.68)
Earnings	11 (1.49)	0 (0.00)	24 (3.25)	35 (4.74)
Other Financing	14 (1.89)	1 (0.14)	70 (9.47)	85 (11.50)
Litigation	1 (0.14)	0 (0.00)	1 (0.14)	2 (0.27)
Operational Changes	6 (0.81)	2 (0.27)	31 (4.19)	39 (5.28)
Event window announcement	15 (2.03)	4 (0.54)	74 (10.01)	93 (12.58)
Event window +1 announcement	2 (0.27)	3 (0.41)	20 (2.71)	25 (3.38)
Total	120 (16.24)	58 (7.85)	561 (75.91)	739 (100.00)

The standardized residual event study methodology of Patell (1976) and Brown and Warner (1985) as well as the standardized cross-sectional event study methodology of Boehmer, Musumeci and Poulsen (1991) are employed in this study. The function of the latter methodology is to adjust the z-statistic for event induced variance. Event induced variance is present in the data in Table 5-2 but does not change any levels of significance. For the contaminated events all standardized cross-sectional z-statistics are larger in absolute value than the counterpart standardized residual z-statistics (Table 5-2 Panel C). For the full data sample as well as the uncontaminated subset (Table 5-2 Panels A and B) event induced variance increases the overall variance and reduces the z-statistic. Since both methodologies indicate the presence of significant APEs, the standardized residual z-statistic is referenced throughout this study. The simulations of Boehmer, Musmuci and Poulsen indicate that this statistic is more reliable than the standardized cross-sectional z-statistic in the presence of abnormal returns. Both statistics are reported, however.

The average prediction error (APE) during the event window  $(-1,0)$  for the full data sample is positive (0.95) and significant at the 1 percent level (4.80 z-statistic) (Table 5-2, Panel A). This result stems primarily from the clean



data sample (0.96 APE, 3.84 z-statistic) (Table 5-2, Panel B)<sup>9</sup>. The contaminated announcements have an APE (0.93) that is not statistically significant (0.49 z-statistic). The significant positive APE found for the full data sample as well as the insignificance of the APE for the contaminated data sample is consistent with the findings Slovin, Johnson and Glascock (1992) and demonstrate that contaminating events do not affect the outcome of this study<sup>10</sup>.

Although the clean announcements have overall positive and significant returns, APEs are insignificant for those announcements that contain information on a security provision. Secured loan announcements are numerically positive (1.27 APE), however statistically insignificant (1.29 z-statistic) (Table 5-2, Panel B). Unsecured loan announcements are also positive (0.38 APE) and insignificant (0.66 z-statistic). Loan announcements where information on collateral is not disclosed are positive (0.98 APE) and significant (3.63 z-statistic). There is no difference in the means of the APEs of the three groups. The insignificance of both secured and unsecured loan

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<sup>9</sup>An observation for Omnidentrix, a dental HMO, is omitted from the clean data sample although this announcement fulfilled the filter criteria described in chapter 4. This firm has a 44% APE and a studentized residual larger than 6 for the subsequent multiple regressions, imparting a significant bias to results for negative runup. The observation with the largest studentized residual for the remaining clean observations is lower than 5 and does not significantly affect the final results.

<sup>10</sup>The research of Mikkelsen and Partch, James and Lummer and McConnell did not report share price announcement effects for contaminated events. Neither did these studies include NASDAQ firms.

Table 5-2

Average two day prediction error of all observations grouped by contamination and security provision.

Group	pct. APE	Standardized cross- residual sectional z-stat. z-stat.		N	pct. pos.
Panel A: Full sample.					
All observations	0.95***	4.80	2.95	739	53.3
Secured	0.83	0.52	0.34	120	56.7
Unsecured	0.36	0.87	0.75	58	48.3
Unknown	1.04***	4.98	2.95	561	53.1
Panel B: Clean Observations					
All observations	0.96***	3.84	3.04	452	52.2
Secured	1.27	1.29	0.99	71	56.3
Unsecured	0.38	0.66	0.55	48	47.9
Unknown	0.98***	3.63	2.85	333	52.0
Panel C: Contaminated Observations					
All observations	0.93	0.49	1.38	287	55.1
Secured	0.19	-0.38	-0.41	49	57.1
Unsecured	0.29	0.54	0.66	10	50.0
Unknown	1.11	0.57	1.58	228	54.8

\*\*\* significant at 1 percent.

announcements supports the *neutral market response*, no *default risk differential* hypothesis and supports the view that secured debt reduces the monitoring efforts of lenders. As noted in section 3.1, bank loan announcements is likely to be significant for subsets of firms. Small firms, firms listed on NYSE/Amex, and firms that do not have investment grade bonds are identified as primary candidates for secured debt. Disaggregation by these criteria may provide evidence supportive of the *positive market response* or *negative market response* hypotheses and is deferred until section 5.3.4.

The lack of a significant, positive APE for loans identified as unsecured for the full sample is not consistent with the view that borrower's share price should benefit from the monitoring services of banks. Disaggregation of the data by the sources of monitoring available for a firm may be necessary to determine the significance of unsecured loan announcements and is deferred until section 5.3.4. An insignificant APE is expected for unsecured loan announcements of firms that are monitored by non-bank sources, but not for firms for whom bank monitoring is the primary source of market information.

## 5.2 Descriptive statistics for clean announcements

### 5.2.1 Clean data sample disaggregated by status of security provision in loan announcements

Over half (51.5 percent) of the clean announcements occur in the first three years of the sample (Table 5-3). By contrast less than 5 percent of the clean announcements occur

in the last three years of the sample. At least two explanations for the skewness of the observations are possible. First, the early part of the decade coincides with the increasing popularity of leverage buyouts and attendant financing requirements. This trend diminished in popularity in the second half of the decade. Second, for unknown reasons (perhaps the change of format of the *Wall Street Journal* in October of 1987 coupled with increased coverage of international firms) less column space became available for financing announcements in the latter part of the decade. Interpretation of the final results is subject to the caveat that a large proportion of events occur at the beginning of the 1980's.

Secured loans are made to firms that are smaller than firms receiving unsecured loans as well as firms who receive loans where the security status is not disclosed. The median market value of firms receiving secured loans (\$37.3mm, Table 5-4, Panel B) is approximately one third that of firms who receive unsecured loans (\$139.3mm, Table 5-4, Panel C) as well as firms with undisclosed security status in the loan announcement (\$111.9mm, Table 5-4, Panel D). An analysis of variance indicates a difference in means of the value of equity of secured, unsecured and undisclosed security status loan announcements at the 5 percent level. Least squared differences of means tests indicate that the value of equity of unsecured loans differs from both secured loans and loans

with undisclosed security status at the 1 percent level. The difference in the mean value of equity for firms that receive secured loans and those that receive unsecured loans suggests that the small firms that have been identified by Slovin, Johnson and Glascock as the primary beneficiaries of bank monitoring are also the primary recipients of secured loans. The data also supports the contention of Smith and Warner (1979) that small firms are the most frequent users of secured debt.

Although firms that receive secured loans are approximately one third the size of other firms, the median value of secured loans (\$33mm) is approximately two thirds the size of unsecured loans (\$50mm) and unknown security status loans (\$54.3mm). The resultant median loan to market value of equity ratio for secured loans (1.02) is approximately double that of unsecured loans (0.44) and unknown security status loans (0.49). Even though secured loans are made to small firms, the relative importance of the amount financed is significantly higher than for other firms. Secured bank lending is a significant source of financing for small firms.

For loans for which maturity information is available, secured loans have shorter median maturities (3.5 years) than do unsecured loans (5 years) or loans whose security status is unknown (7 years). According to Flannery's maturity hypothesis this suggests that firms that receive secured

Table 5-3

Uncontaminated loan announcements by year. Percentage of total observations in parentheses.

Event year	Secured	Unsecured	Unknown	Total
80	10 (2.21)	6 (1.33)	68 (15.04)	84 (18.58)
81	5 (1.11)	13 (2.88)	66 (14.60)	84 (18.58)
82	12 (2.65)	2 (0.44)	51 (11.28)	65 (14.38)
83	10 (2.21)	3 (0.66)	36 (7.96)	49 (10.84)
84	11 (2.43)	10 (2.21)	36 (7.96)	57 (12.61)
85	5 (1.11)	6 (1.33)	25 (5.53)	36 (7.96)
86	8 (1.77)	0 (0.00)	16 (3.54)	24 (5.31)
87	4 (0.88)	2 (0.44)	9 (1.99)	15 (3.32)
88	0 (0.00)	3 (0.66)	13 (2.88)	16 (3.54)
89	2 (0.44)	2 (0.44)	4 (0.88)	8 (1.77)
90	2 (0.44)	1 (0.22)	5 (1.11)	8 (1.77)
91	2 (0.44)	0 (0.00)	4 (0.88)	6 (1.33)
Total	71 (15.71)	48 (10.62)	333 (73.67)	452 (100.00)

Table 5-4

Descriptive statistics of clean announcements.

Variable	N	Mean	Median	Minimum	Maximum
Panel A: All observations					
Loan amount <sup>a</sup>	452	141.94	50.00	1.40	2500.00
Equity value <sup>b</sup>	452	351.65	101.00	2.06	7218.13
Loan/Equity	452	0.99	0.53	0.02	38.70
Loan term <sup>c</sup>	261	5.89	6.21	0.16	31.00
Listing term <sup>d</sup>	452	11.85	11.42	0.75	29.25
NASDAQ pct. <sup>e</sup>	452	25.00	-	-	-
Panel B: Secured loans					
Loan amount	71	132.54	33.00	1.40	2000.00
Equity value <sup>f</sup>	71	182.06	37.29	2.06	2813.85
Loan/Equity	71	2.03	1.02	0.02	38.70
Loan term	34	4.19	3.50	0.16	10.00
Listing term	71	11.59	11.08	0.75	29.25
NASDAQ pct.	71	31.00	-	-	-
Panel C: Unsecured loans					
Loan amount	48	94.16	50.00	5.00	700.00
Equity value <sup>f,g</sup>	48	246.36	139.28	10.74	1403.70
Loan/Equity	48	0.53	0.44	0.02	2.51
Loan term	29	4.97	5.00	1.83	8.58
Listing Term	48	10.74	8.92	0.75	25.25
NASDAQ pct.	48	27.00	-	-	-

Table 5-4 cont'd.

Variable	N	Mean	Median	Minimum	Maximum
Panel D: Unknown security status					
Loan amount	333	150.83	54.30	3.00	2500.00
Equity value <sup>b</sup>	333	402.99	111.92	2.77	7218.13
Loan/Equity	333	0.83	0.49	0.02	7.45
Loan term	198	6.32	7.00	0.50	31.00
Listing term	333	12.06	11.83	0.75	27.91
NASDAQ pct.	333	23.00	-	-	-

<sup>a</sup> Amount of loan disclosed in announcement in millions.

<sup>b</sup> Common equity multiplied by share price one week before announcement in millions.

<sup>c</sup> Loan term disclosed in announcement in years.

<sup>d</sup> Period between initial listing on exchange and event date in years.

<sup>e</sup> Percentage of firms listed on NASDAQ.

<sup>f,g</sup> Difference in means significant at 1 percent.



loans are undervalued. However, maturity information must be jointly interpreted with interest rate information.

Firms that receive secured loans are not newcomers to public stock exchanges. The median exchange listing time for firms that receive secured loans (11.1 years) is approximately the same as for firms that have not disclosed security status (11.8 years) and slightly longer than for firms with unsecured loans (8.9 years).

#### 5.2.2 Announcement bias

Loans that are disclosed as secured comprise 15.7 percent of the announcements (Table 5-3). Disclosure that a loan is unsecured occurs in 10.6 percent of the loan announcements. For a large majority (73.7 percent) of the loan announcements information is not disclosed on security status. The large percentage of firms that do not indicate whether a loan is secured or unsecured has two implications. First, some firms or lenders prefer not to disclose that a loan is secured or unsecured, either because the information is immaterial or because it will be negatively received by the market. Second, the contracting parties view a security provision as material information that should be disclosed, however the loan is unsecured and no disclosure on security status is made. The proportion of disclosed secured loans in the sample is far less than the 57.5 percent of secured loans in the samples of Berger and Udell (1990) and the 51 percent of Booth (1992). However, Berger and Udell derive their data

from the Federal Reserve's *Survey of Terms of Bank Lending* which includes loans to firms that are not listed on any exchange. Booth's sample is provided by the Loan Pricing Corporation for firms with publicly traded equity and privately held firms. The discrepancy between the proportion of announced secured loans in this study and the percentage of secured loans obtained by public corporations in Booth's study indicates that either some firms receive secured loans but do not disclose this information in the announcement or that a reporting bias exists in the *Wall Street Journal* against firms that receive secured debt.

One possible reason for reporting bias may be that information is reported in the *Wall Street Journal* predominantly for large firms or firms that are listed on NYSE/Amex. Scott (1986) suggests that large firms customarily receive unsecured loans. He cites Federal Reserve data in which 18 percent of the loans made to firms with assets of \$100,000,000 are secured and 78 percent of loans to firms with assets of less than \$250,000 are secured. The listed firms noted by Booth that receive secured debt may be predominantly small firms.

The data does not support an announcement bias in the sample based on firm size or exchange listing. Over 44 percent of the reported loans are to firms that are above the NYSE/Amex median firm size for the sample period. One quarter of the sample consists of NASDAQ listed firms. The

percentage of reported secured loan announcements in this data sample is less than what is expected based on Booth's study. This suggests that some secured loans are not announced as such. Information on the inclusion of a security provision in the announcement of the terms and conditions surrounding private contracting between lender and borrower is an item that is voluntarily disclosed and may be interpreted as a deliberate decision by the lender and/or borrower to convey (or not to convey) information to market participants.

#### 5.2.3 Security provision information and external monitors

The hypotheses for which secured debt is an indication of increased default risk for the firm (section 3.1) suggest that the level of external monitoring received by a firm is indicative of the propensity of a firm to obtain secured debt. Smith and Warner suggest that small firms are the primary candidates for secured debt. Chan and Chen (1991) and Fama, French, Booth and Siquefield (1993) suggest that NYSE firms are more distressed than similar sized NASDAQ firms. Given the adequate protection afforded by security in bankruptcy, NYSE and Amex firms should be the predominant users of secured debt. The studies of Chan and Chen and Fama, French, Booth and Siquefield are limited to NYSE listed firms that are also on COMPUSTAT. Their studies have a COMPUSTAT selection bias and may not have contained a representative sample of firms that receive secured loans.

A partitioning of announcements by the availability of COMPUSTAT information will indicate the extent of this bias. Booth finds evidence that monitoring by bond rating agencies decreases the need for secured debt by a firm. This section disaggregates the inclusion of a security provision in a loan by the type of external monitoring that the firm receives.

When separated by size, secured loans represent 20.5 percent of all loan announcements of small firms (Table 5-5, Panel A) and 9.6 percent of all announced loans of large firms (Table 5-5, Panel B). A Chi-square test based on a 2 by 2 contingency table rejects at at least the 0.005 percent level the hypothesis security and firm size are independent (9.91 Chi-square with 1 degree of freedom). Similarly, the hypothesis that the proportion of secured loans in small firms (52/254) is equal to the proportion among large firms (19/198) is rejected (3.317 z-statistic). These results further support Smith and Warner's contention that small firms are the primary candidates for secured loans.

Only 2 Amex and 3 NASDAQ large firms have secured loan announcements. However secured loan announcements for NYSE firms are equally divided (14) between large and small firms (Table 5-5, Panel's A & B). This supports Chan and Chen and Fama, French, Booth and Siquefield's contention that NYSE firms are distressed. Some of these firms face higher probabilities of bankruptcy and are candidates for secured debt.

Table 5-5

Distribution of the sample by firm size, exchange and security information in announcement. Small firms have equity value below NYSE/Amex median value for years 1980 1991; large firms are at or above median value (\$125,406,000). Percentage of total observations in parentheses.

Firm size	Secured	Unsecured	Unknown	Total
Panel A: Small firms by exchange				
NYSE	14 (5.51)	9 (3.54)	65 (25.59)	88 (34.65)
Amex	19 (7.48)	6 (2.36)	50 (19.69)	75 (29.53)
NASDAQ	19 (7.48)	7 (2.76)	65 (25.59)	91 (35.83)
Total	52 (20.47)	22 (8.66)	180 (70.87)	254 (100.00)
Panel B: Large firms by exchange				
NYSE	14 (7.07)	10 (5.05)	131 (66.16)	155 (78.28)
Amex	2 (1.01)	10 (5.05)	9 (4.55 )	21 (10.61)
NASDAQ	3 (1.52)	6 (3.03)	13 (6.57)	22 (11.11)
Total	19 (9.60)	26 (13.13)	153 (77.27)	198 (100.00)
Panel C: Total				
Total	71 (15.71)	48 (10.62)	333 (73.67)	452 (100.00)

Although observations on firms on COMPUSTAT with full balance sheet and income statement information comprise 52.6 percent of all observations, they contain only 29.6 percent of all secured loan observations (Table 5-6, Panels A and B). This indicates that over 70 percent of the firms that receive secured debt lack significant investor interest in the view of Standard and Poor's. Furthermore, only 18 percent (4/22) of secured loans to NASDAQ firms are in the COMPUSTAT sub sample. The disproportionate lack of COMPUSTAT coverage for firms that receive secured loans indicates that bank monitoring is a significant source of investor information for the majority of firms that receive secured loans. Approximately 10 percent of the observations in the sample are for firms that have outstanding investment grade bonds (Table 5-7). Only 4 (5.6 percent) of these firms have secured loan announcements. However, both unsecured and unknown security status loan announcements also contain low percentages of firms with outstanding investment grade bonds, suggesting that little information is to be derived when separating share price effects of loan announcements by this variable.

### 5.3 Event study results

The focus of this section is on disaggregating announcement effects by the various loan characteristic, pre announcement information and monitoring variables described in section 3.2. The purpose of this separation is twofold.

Table 5-6

COMPUSTAT listing disaggregated by exchange and security information in announcement. Percentage of total observations in parentheses.

Status	Secured	Unsecured	Unknown	Total
Panel A: Non-COMPUSTAT by exchange				
NYSE	16 (7.48)	8 (3.74)	68 (31.78)	92 (42.99)
Amex	16 (7.48)	3 (1.40)	21 (9.81)	40 (18.69)
NASDAQ	18 (8.41)	7 (3.27)	57 (26.64)	82 (38.32)
Total	50 (23.36)	18 (8.41)	146 (68.22)	214 (100.00)
Panel B: COMPUSTAT by exchange				
NYSE	12 (5.04)	11 (4.62)	128 (53.78)	151 (63.45)
Amex	5 (2.10)	13 (5.46)	38 (15.97)	56 (23.53)
NASDAQ	4 (1.68)	6 (2.52)	21 (8.82)	31 (13.03)
Total	21 (8.82)	30 (12.61)	187 (78.57)	238 (100.00)
Panel C: Total				
Total	71 (15.71)	48 (10.62)	333 (73.67)	452 (100.00)

Table 5-7

Investment grade rated outstanding public bonds disaggregated by security information in announcement. Firms with Baa or better Moody rating or BBB or better Standard and Poor rating are considered as having investment grade bonds. Percentage of total observations in parentheses.

Status	Secured	Unsecured	Unknown	Total
Investment Grade	4 (0.88)	1 (0.22)	43 (9.51)	48 (10.62)
Non-Investment Grade	67 (14.82)	47 (10.40)	290 (64.16)	404 (89.38)
Total	71 (15.71)	48 (10.62)	333 (73.67)	452 (100.00)



The first is to compare the results of this study with previous studies that have documented the subsets of firms that benefit most from the monitoring services of banks. The second is to isolate the effect of a security provision in a loan announcement from these previously identified firm characteristics as well as additional characteristics described in section 3.2 as potential indicators of the existence of collateral in a loan contract.

#### 5.3.1 Event study by loan characteristics

##### A. Security provision

The two day APE for the uncontaminated sample is 0.96 percent with a z-statistic of 3.84 which is statistically significant at the 1 percent level and consistent the view that the monitoring services provided by lenders is a valuable service for borrowers (Table 5-8, Panel A). Announcements which indicate that a security provision is present in the loan contract comprise 15.7 percent of the clean observations (Table 5-8, Panel A). For secured loan announcements the APE is positive (1.27) but not significant at traditional confidence levels (1.29 z-statistic). The APE for unsecured loan announcements is positive (0.38) and insignificant (0.66). Loans that have not disclosed information on a security provision have a positive (.98 percent) and significant (3.63 z-statistic) APE. An analysis of variance as well as least squared differences pairwise tests of means reveals no significant difference in means

Table 5-8

Average two day prediction error of all clean observations grouped by loan characteristics.

Group	Standardized			N	pct. pos.
	pct. APE	residual z-stat.	cross- sectional z-stat.		
Panel A: Security status.					
All observations	0.96***	3.84	3.04	452	52.2
Secured	1.27	1.29	0.99	71	56.3
Unsecured	0.38	0.66	0.55	48	47.9
Unknown	0.98***	3.63	2.85	333	52.0
Panel B: Loan purpose.					
Acquisition	0.74*	1.79	0.85	16	37.5
General corporate	0.05	0.03	0.03	85	43.5
Project	1.38***	2.61	1.99	65	56.9
Repay debt	2.12*	1.70	1.14	37	51.4
Working capital	1.10	1.50	1.27	74	54.1
Unknown	0.97**	2.26	1.80	175	55.4
Panel C: New, renewal, transfer status.					
New	-0.14	0.42	0.28	14	28.6
Renewal	1.94**	2.18	1.63	90	57.8
Transfer	2.53***	4.23	1.84	25	60.0
Unknown	0.62**	2.13	1.92	323	51.1

Table 5-8 cont'd.

Group	Standardized			N	pct. pos.
	pct. APE	residual z-stat.	cross- sectional z-stat.		
Panel D: Loan type.					
Credit line	1.32***	2.61	2.01	145	51.7
Term	0.80***	2.46	2.10	205	52.2
Unknown	0.79	1.49	1.05	102	52.9
Panel E: Maturity.					
Known	0.49 <sup>a</sup>	1.55	1.40	261	49.8
Unknown	1.60*** <sup>a</sup>	4.09	2.82	191	55.5
Panel F: Rate.					
Known	1.36***	4.41	3.43	142	60.6
Unknown	0.78	1.66	1.32	310	48.4

\*\*\* significant at 1 percent.

\*\* significant at 5 percent.

\* significant at 10 percent.

<sup>a</sup> difference in means significant at 5 percent.

between secured, unsecured and unknown security status loan announcements at the 10 percent level. As indicated in section 5.1, these results support the *neutral market response, no default risk differential* hypothesis for secured debt.

The lack of significant APEs for secured and unsecured loans can be interpreted in three different manners. First, a security provision in a loan is of no benefit to the borrower's shareholders. Second, firms for whom market participants rely on bank monitoring for significant information choose not to disclose the security status of the loan contract. Third, the information contained in bank loans is significant mainly for those firms that benefit from the monitoring services of banks. For these firms disclosure of the security status of a loan may reveal relevant information to the market. Further disaggregation of the data based on the forms of monitoring received by the firm is deferred until section 5.3.4.

#### B. Purpose

Information on the purpose of the loan is available on 61 percent of all loan announcements (Table 5-8, Panel B). APEs are positive and significant at the 10 percent level or greater for all categories except general corporate purposes and working capital. Consistent with the results of James (1987) and Slovin, Johnson and Glascock (1992), loans that are used to repay debt have a positive APE (2.12 percent)

that is significant (1.70 z-statistic) indicating that the positive share price effects of bank loans are not solely generated by leverage increasing effects. No significant differences in means across purposes are found.

C. Status (New, renewal, transfer)

Before addressing the controversy of the importance of bank monitoring for new versus renewed loans studied by Lummer and McConnell (1989) and Slovin, Johnson and Glascock, it must be noted that two classification differences exist between this study and theirs. Both of these classification differences arise because of the focus of this study on secured loans. First, a separate category is established for loans that are transferred from one group of banks to another. As noted in section 3.2.3, these loans may signify a change in the default risk of the borrower and as such indicate the need for a security provision in a loan contract. Second, loans are classified as new, renewals or transfers solely based on information contained in the loan announcement. The studies of Lummer and McConnell and Slovin, Johnson and Glascock use annual corporate reports for the years ending before and after the announcement to classify loan status when this information is not in the announcement. Evidence described in section 5-4 indicates that some loans in this study are secured but not announced as such. Classifying loan status by post event information would distort announcement effects and is not employed.

Only 29 percent of the loan announcements identify loans as new, renewed or transferred (Table 5-8, Panel C). Renewed loans have a positive (1.94) and significant (2.18 z-stat) APE, consistent with the event study findings of Lummer and McConnell (1989) and Slovin, Johnson and Glascock. New loans have a negative APE (-0.14) that is insignificant with a 0.42 z-statistic. This is consistent with the results of Lummer and McConnell, but not those of Slovin, Johnson and Glascock. However, transferred loans (which Slovin, Johnson and Glascock categorize as new and Lummer and McConnell categorize as renewals) have a positive (2.53 percent) and significant (4.23 z-statistic) APE. The results of this study are consistent with the studies of Lummer and McConnell and Slovin, Johnson and Glascock when the same categorizations of loan status are used. Furthermore, the results of this study suggest that their event study results would obtain even without using post event sources of categorization. Although transferred loans comprise only 5.5 percent of the sample, their large positive and significant APEs indicate that either the default risk of the borrower has decreased or that the firm's current lender has curtailed or denied credit and the firm has found a replacement lender.

D. Type (Line of credit, term loan)

One hundred and forty five announcements are categorized as lines of credit because the loan agreement is identified as a line of credit or credit line or revolving line of

credit (Table 5-8, Panel D). Two hundred five announcements are classified as term loans because loans are identified in the announcement as term loans or a combination revolving line/term loan. The remaining one hundred two announcements are classified as unknown. Different levels of monitoring may exist for lines of credit which are contingent promises by lenders to fund, and term loans which are funded loans. The major difference between lines of credit and term loans is that for lines of credit the lender has the option to deny funding if the borrower defaults on the covenants of the loan contract whereas for term loans the lender can demand repayment with borrower default, but the borrower may decline to do so. Lines of credit are typically used by firms for seasonal working capital needs or serve as a backstop source of funding. Term loans are typically used for project financing.

Shareholders benefit from the monitoring capabilities of banks for both lines of credit and term loans. Lines of credit announcements have a positive (1.32 percent) and significant (2.61 z-statistic) APE (Table 5-8, Panel D). Term loans also have a positive (0.80 percent) and significant (2.46 z-statistic) APE. The APE is positive (0.79 percent) but not significant (1.49 z-statistic) for loan announcements for which neither of the above categorizations is possible. No significant differences in means are found between the APEs.

#### E. Maturity

Flannery's maturity hypothesis implies that undervalued firms desire to disclose maturity information and interest rates, but overvalued firms do not. The results of this study are not supportive of the implications of Flannery's maturity hypothesis. Information on the maturity status of a loan is known for 57.7 percent of the sample (Table 5-8, Panel E). The APE for announcements where maturity information is known is positive (0.49 percent) but insignificant. When maturity information is not disclosed the APE is positive (1.60 percent) and significant with a 4.09 z-statistic. A significant difference in means exists for these groups at 5 percent. The lack of significance for maturity information is consistent with the findings of Lummer and McConnell and Slovin, Johnson and Glascock. These results do not support the view undervalued firms disclose maturity information.

#### F. Interest rate

Interest rate information is provided for 31.4 percent of the sample (Table 5-8, Panel F). Loans that contain this information have a positive (1.36) and significant APE (4.41 z-statistic). Loans that do not disclose interest rate information have a positive (0.78) but insignificant APE (1.66 z-statistic). No significant difference in the means of the APE's exists between loans whose interest rate is disclosed and those where the rate is not disclosed. The



positive market reaction to interest rate disclosure is consistent with Flannery's maturity hypothesis, but does not necessarily support it. The negative market reaction for loans with maturity information is inconsistent with Flannery's maturity hypothesis. Thus the overall results offer evidence against Flannery's maturity hypothesis.<sup>11</sup>

#### G. Summary

For four of the six categorizations of information provided in the loan announcement for the full sample, APEs for firms that chose not to disclose information are positive and significant (security, purpose, status and maturity). Furthermore, for the categorizations of purpose, status and type, multiple positive significant APEs exist. This suggests that further categorization by factors such as pre-announcement information and levels of external monitoring may be necessary in order to separate the effects of share price response to a security provision from those attributable to the monitoring associated with lending announcements.

#### 5.3.2 Event study results for pre-announcement information

One possible cause for positive share price reaction to loan announcements is significant negative information dissemination about a firm in the time period immediately

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<sup>11</sup>Ninety two loans disclosed both maturity and interest rates. The APE for these loans is 1.23 percent which is significant at the 1% level for the standardized residual (2.67 z-statistic) and standardized cross-sectional (2.32 z-statistic) event studies. This joint result is consistent with Flannery's maturity hypothesis.

preceeding an event. Market participants may learn that the firm is negotiating with creditors and infer that the firm is troubled. The granting of credit for a firm would be positively viewed. Another possibility is that market participants may have surmised that the firm and its creditor(s) have or will successfully negotiate a loan. The granting of credit for a firm under these circumstances is not particularly newsworthy.

In order to determine the importance of pre-announcement information to share price response, share price runup is measured for a period beginning 30 days before the event and ending 11 days before the event. This period is chosen because loan negotiations between a group of lenders and a firm typically span this period, increasing the possibility of information leakage.

A positive (0.66) but insignificant (1.35 z-statistic) APE is found for 19 firms that have significant negative share price runup (Table 5-9). A positive (2.17 pct.) and significant (3.40 z-statistic) APE is found for 32 firms that have significant positive share price runup. These results are the opposite of prior expectations. One possible explanation is that significant share price runup is caused by factors other than anticipated bank financing. The vast majority of observations (88.7) have no significant prior runup at the 10 percent level. These firms have a positive

Table 5-9

Average two day prediction error of all clean observations grouped by significant (10 percent, one tailed) pre announcement information from days -30 to -11.

Group	Standardized			N	pct. pos.
	pct. APE	residual z-stat.	cross- sectional z-stat.		
Negative	0.66	1.35	1.33	19	57.9
Positive	2.17***	3.40	2.44	32	62.5
Not significant	0.88***	2.82	2.24	401	51.1

\*\*\* significant at 1 percent.

(0.88) and significant (2.82 z-statistic) APE at the loan announcement.

### 5.3.3 Event studies categorized by external monitoring

#### A. Firm size

The results of this study support Slovin, Johnson and Glascock's finding that bank loan announcements constitute a primary information source for market participants for small firms. Small firms (categorized as such by being below the NYSE/Amex median firm size for the time horizon under study) constitute 56.2 percent (254/452) of the sample (Table 5-10, Panel A). They have a positive APE (1.89) that is significant (5.64 z-statistic) at the 1 percent level. Large firms have a negative (-0.23) and statistically insignificant (-0.59 z-statistic) APE. The means of the APEs are significantly different at the 1 percent level.

#### B. Exchange listing

NYSE/Amex firms have an APE of 0.65 which is significant at 10 percent (Table 5-10, Panel B). This is consistent with the fact that 64.2 percent of the small firms in the sample are listed on NYSE/Amex. NASDAQ firms have an APE of 1.90 which is significant at 1 percent (Table 5-10, Panel A). A significant difference in means of APEs exists at the 5 percent level and supports the view developed in section 3.2.1 that the structural differences between NYSE/Amex and NASDAQ are a prime source of variation in market reaction to

Table 5-10

Average two day prediction error of all clean observations grouped by monitoring variables and security provision.

Group	pct. APE	Standardized		N	pct. pos.
		residual z-stat.	cross- sectional z-stat.		
Panel A: Firm size.					
Large firms	-0.23 <sup>a</sup>	-0.59	-0.53	198	43.9
Small firms	1.89 <sup>***a</sup>	5.64	4.17	254	58.7
Panel B: Exchange.					
NYSE/Amex	0.65 <sup>*b</sup>	1.92	1.57	339	49.6
NASDAQ	1.90 <sup>***b</sup>	4.36	3.17	113	60.2
Panel C: Investment grade bonds.					
Investment grade	0.87	1.40	1.27	48	54.2
Below grade	0.97 <sup>***</sup>	3.58	2.78	404	52.0
Panel D: COMPUSTAT					
COMPUSTAT	0.91 <sup>***</sup>	2.81	2.13	238	48.3
Non-COMPUSTAT	1.02 <sup>***</sup>	2.62	2.17	214	56.5

\*\*\* significant at 1 pct..

\*\* significant at 5 percent.

\* significant at 10 percent.

<sup>a</sup> difference in means significant at 1 percent.

<sup>b</sup> difference in means significant at 5 percent.

information about a firm. These results also support the view that NYSE/Amex listed firms are more distressed than NASDAQ traded firms.

#### C. Investment grade bonds

The APE for firms that have investment grade bonds is positive (0.87) but insignificant (Table 5-10, Panel C). For firms with below investment grade bonds the APE is positive (0.97) and significant (3.58 z-statistic). These results support Booth's view that firms that receive monitoring provided by bond rating agencies have reduced need for the monitoring services of banks. However, no difference in means exists between investment grade and below investment grade bonds.

#### D. COMPUSTAT

APEs are positive and significant for firms listed on COMPUSTAT (0.91, 2.81 z-statistic) as well as firms that are not listed on COMPUSTAT (1.02, 2.62 z-stat). There is no difference in means for the APEs of the groups. The facilitation of monitoring with accounting information from COMPUSTAT does not diminish the effect of bank monitoring.

#### E. Summary

The difference in means of APEs for small and large firms as well as NYSE/Amex and NASDAQ firms indicates that exchange listing may be as significant as size in determining the importance to firms of the monitoring provided by lenders. This distinction is also important for determining the

significance of a security provision. Smith and Warner suggest that small firms are the major users of secured debt. The different levels of distress for NYSE and NASDAQ firms found by Fama, French, Booth and Siquefield imply that secured loans may primarily benefit NYSE/Amex firms. Section 5.3.4 investigates this hypothesis.

#### 5.3.4 Secured loans disaggregated by external monitor

In this section event study results are analyzed for secured loans disaggregated by the level of external monitoring received by the borrower. Due to the difference in means for APEs found in section 5.3.3 for firm size and exchange, analysis of the importance of information on a security provision in a loan announcement focuses on these subsets.

The only group for which secured loans have a negative APE (-0.08) is large firms (Table 5-11, Panel A), however it is insignificant (-0.55 z-statistic). Unsecured loan announcements and announcements for which security information is unknown are also insignificant for large firms. For small firms unsecured loan announcements are insignificant (0.93 z-statistic, Table 5-11, Panel B). The APE of secured loans is positive (2.04) and significant at the 10 percent level (1.83 z-stat) Loans with unknown security status have the same APE as secured loans at a higher significance level (2.04, 5.39 z-statistic). The positive and significant APE for secured loans for small

Table 5-11

Average two day prediction error of all clean observations grouped by security provision within monitoring variables.

Group	Standardized			N	pct. pos.
	pct. APE	residual z-stat.	cross- sectional z-stat.		
Panel A: Large firms.					
Secured	-0.08	-0.55	-0.52	19	47.4
Unsecured	0.39	0.04	0.03	26	50.0
Unknown	-0.25	-0.49	-0.45	153	42.5
Panel B: Small Firms					
Secured	2.04**	1.83	1.34	52	59.6
Unsecured	0.37	0.93	0.77	22	45.5
Unknown	2.04***	5.39	3.94	180	60.0
Panel C: NYSE/Amex					
Secured	1.23	1.54	1.15	49	55.1
Unsecured	0.24	-0.15	-0.14	35	51.4
Unknown	0.60	1.59	1.29	255	48.2
Panel D: NASDAQ					
Secured	1.36	0.02	0.01	22	59.1
Unsecured	0.76	1.52	0.90	13	38.5
Unknown	2.24***	4.62	3.39	78	64.1



Table 5-11 cont'd.

Group	Standardized			N	pct. pos.
	pct. APE	residual z-stat.	cross- sectional z-stat.		
Panel E: Investment grade					
Secured	7.06	0.55	0.48	4	50.0
Unsecured	0.46	-	-	1	100.0
Unknown	0.30	1.29	1.15	43	53.5
Panel F: Below investment grade					
Secured	0.93	1.19	0.91	67	56.7
Unsecured	0.38	0.65	0.53	47	46.8
Unknown	1.08***	3.39	2.62	290	51.7
Panel G: COMPUSTAT					
Secured	2.69	0.62	1.01	21	52.4
Unsecured	0.02	0.17	0.09	30	50.0
Unknown	0.85***	2.69	2.01	187	47.6
Panel H: Non-COMPUSTAT					
Secured	0.67	0.71	0.54	50	58.0
Unsecured	0.97	0.93	0.80	18	44.4
Unknown	1.15***	4.62	2.06	146	57.5

\*\*\* significant at 1 percent.  
 \*\* significant at 5 percent.  
 \* significant at 10 percent.

firms supports the *positive market response, decreased default risk* and the *positive market response, increased default risk* hypotheses for secured debt. The positive and significant market reaction for secured loan announcements for small firms contrasts with the finding of insignificant secured loan announcements for large firms as well as the full data sample discussed in section 5.3.

Although a security provision in a loan announcement is significant when firms are categorized by size, the event study results of this thesis as well as prior studies outlined in Chapter 3 indicate that other variables also impact market reaction to bank loan announcements. In order to confirm the positive market reaction to secured debt found for small firms in the presence of other variables that impact share price, the importance of a security provision for market reaction to bank loan announcements must be analyzed jointly with the loan characteristics, pre-announcement information disclosure and external monitoring factors surrounding a loan announcement. This analysis is performed using multivariate regressions in Chapter 6.

The positive market reaction results found for small firms supports Slovin, Johnson and Glascock's hypothesis that bank loan announcements contain significant information on firms that are not highly monitored by non-bank sources. The insignificance of a security provision in a loan announcement for large firms as well as the full data sample in this study

can be attributed to the higher level monitoring received by large firms, secured loan announcements do not convey information to the market for large firms (whose results are predominant for the full sample). Consequently, an analysis of financial ratios indicative of financial distress may indicate whether the positive market reaction found for small firms is supportive of the *increased default risk* or *decreased default risk* sub-hypotheses for positive market reaction. This study is deferred until Chapter 7.

Although NYSE/Amex firms have positive (0.65 APE) and significant (1.92 z-statistic) returns (Table 5.3.3, Panel B), secured, unsecured and unknown security status loan announcements all yield positive but insignificant returns (Table 5-11, Panel C). Loans made to NASDAQ firms where information on a security provision is not provided have a positive (2.24) and significant (4.62 z-statistic) APE (Table 5-11, Panel D). When information is provided on security status for these firms returns are positive but insignificant.

The insignificant response for secured loans for NASDAQ listed firms contrasts with the positive and significant reaction found for small firms. One possible reason is that the categorizations are not synonymous. Only 36 percent of the small firms in the data sample are listed on NASDAQ (Table 5-5, Panel A). Exchange listing may be as important as firm size in determining the effectiveness of bank

monitoring for a firm as well as determining the importance of a security provision in a loan contract. The interaction of firm size, exchange listing and security provision is further analyzed with multivariate regressions in Chapter 6.

APEs are insignificant for investment grade bonds regardless of security provision status (Table 5-11, Panel E). The APE is also insignificant for below investment grade bonds when security status is known (Table 5-11, Panel F). The APE is positive (1.38) and significant (3.39 z-statistic) when security status is unknown. This evidence also supports a view that a security provision does not benefit the shareholders of firms that do not have outstanding investment grade bonds.

APEs are positive (0.85) and significant (2.69 z-stat) for firms with COMPUSTAT information (Table 5-10, Panel B). APEs are also positive (1.15) and significant (4.62 z-stat) when COMPUSTAT information is not available for the firm. APEs are insignificant when information on the security status of a loan is provided for firms with COMPUSTAT data as well as firms without COMPUSTAT data (Table 5-11, Panels G and H). This evidence also supports a view that the inclusion of a security provision in a loan is of no benefit to the firm's shareholders.

#### 5.4 Summary

In summary the APE is insignificant when information on the existence (or lack thereof) of a security provision is

provided in a loan announcement for the full sample of 452 observations. In contrast, the APE is positive and significant when information is not provided on the existence of collateral. This suggests that the information disclosed on collateral (or lack of collateral) through the monitoring services of banks diminishes the importance of any other information that may have been contained in the loan announcement. Furthermore, firms monitored by non-bank sources benefit neither from bank monitoring nor from the disclosure of information on the inclusion of a security provision in loan contract. Large firms, NYSE/Amex listed firms, and firms with investment grade bonds do not have significant abnormal returns. The firms that benefit from the monitoring services of banks are sub-categories of firms that have limited or non-existent non-bank monitoring. When categorized by size, small firms are the primary beneficiaries of the monitoring services of banks. When classified by exchange listing, NASDAQ firms are the major beneficiaries. When categorized by outstanding rated bonds, firms with below investment grade outstanding bonds are the recipients. For all three categorizations, unsecured loans do not have significant APEs. Loan announcements where no information on security is provided have positive and significant APEs. Within these three different monitoring level classifications, secured loan announcements are positive and significant only for small firms. Thus weak

support is found for the *positive market response* hypotheses. However, as noted in section 3.1, the effect upon share price of a security provision must be jointly analyzed other loan characteristics, pre-announcement information available to the market and the effects of non-bank monitoring. These joint effects are analyzed in Chapter 6 using multivariate regression techniques. Furthermore, the non-response to secured loan announcements for large firms, firms listed on NYSE/Amex and firms with outstanding investment grade bonds may be due to the high level of non-bank monitoring received by these firms, and not because a loan is secured. In order to differentiate the *increased default risk* and *decreased default risk* explanations for the positive market response to secured debt found for small firms in this study, an analysis financial ratios indicative of financial distress (increased default risk) is performed in Chapter 7.

## Chapter 6: Multivariate and Logit Regressions

The event study results of Chapter 5 provide evidence that for the full data sample information on a security provision in a loan contract does not generate significant share price changes. The results indicate that shareholders of small firms benefit when the firm receives a secured loan. Small firms have also been identified by Slovin, Johnson and Glascock (1992) as the primary beneficiaries of bank monitoring since bank loan announcements are a source of information for the shareholders of these firms. Thus the event study results of Chapter 5 support the view that the information in bank loan announcements (which includes information about security) is important primarily for small firms. Positive share price effects are also found for firms that are listed on NASDAQ and firms that do not have investment grade bonds. (These categorizations are not mutually exclusive.) To determine the joint effects on share price of the various forms of non-bank monitoring and those of a security provision, multivariate regressions of market model cumulative event window prediction errors against a security provision and variables potentially related to the positive effects of bank monitoring are performed. Section 6.1 analyses the relation between prediction errors and secured loans in the presence of variables that describe loan characteristics, pre-announcement share price movement and

forms of non-bank monitoring. Section 6.2 contains multiple regressions based on the exchange that a firm is listed on and firm size. Section 6.3 summarizes the results of this chapter.

### 6.1 Multivariate regressions

Multivariate regressions are used to analyze the contribution of the inclusion of a security provision in a loan contract to the cumulative event window prediction errors associated with commercial bank monitoring. The dependent variable in each regression is the two day cumulative prediction error (CPE) of the market model regression of the sample of 452 loan announcements. To correct for cross-sectional heteroskedasticity among stock returns, dependent and independent variables are divided by the standard deviation of the prediction errors of the market model. The explanatory variables are qualitative and quantitative variables relating to the existence of a security provision as well as firm size, relative loan size, characteristics of the firm and loan and share price movement prior to the announcement. The following independent variables are used:

Announcement date information:

SECURE      Binary variable indicating whether the loan is disclosed in the announcement as secured (1) or not (0).



UNSECURE Binary variable indicating whether the loan is disclosed as unsecured (1) or not (0).

NEW Binary variable indicating whether the loan is disclosed as new (1) or not (0).

RENEW Binary variable indicating whether the loan is disclosed as renewed (1) or not (0).

TRANSFER Binary variable indicating whether the announcement denotes that the loan has been transferred from one bank or group of banks to another (1) or not (0).

LINE Binary variable indicating whether the loan is disclosed as a line of credit or revolving line (1) or not (0).

TERM Binary variable indicating whether the loan is disclosed as a term loan or revolving line and term loan (1) or not (0).

MATURE Binary variable indicating whether maturity information is disclosed (1), or not (0).

RATE Binary variable indicating whether rate information is disclosed (1) or not (0).

LOANMKT Loan value divided by the market value of equity of the firm one week prior to event.

Pre-announcement information variables:

NEGRUN Binary variable indicating negative-valued information prior to the announcement. It is coded as 1 if the firm has significant (10

percent, one-tailed test of significance) share price rundown starting 30 and ending 11 days before the event, 0 otherwise.

POSRUN Binary variable indicating positive-valued information prior to the announcement. It is coded as 1 if the firm has significant (10 percent, one-tailed test of significance) share price runup starting 30 and ending 11 days before the event, 0 otherwise.

Non-bank monitoring level:

LOGSIZE Natural logarithm of firm size measured as the market value of equity one week prior to event.

EXCHANGE Binary variable indicating the exchange that the firm is listed on (0 for NYSE/Amex, 1 for NASDAQ).

INVGRAD Binary variable indicating the existence of investment grade bonds (1, 0 otherwise).

COMPUSTAT Binary variable with a value of 1 if sufficient COMPUSTAT information is available on the firm to construct the balance sheet and income statement.

Several of the variables have a statistically significant correlation with information on security in a loan announcement. The largest correlations of SECURE include negative correlations with LOGSIZE (-0.23) and COMPUSTAT (-0.20) and positive correlations with RENEW (0.19) and LOANMKT (0.21) (Table 6-1). None of these correlations indicate that these variables are proxies for one another.

Table 6-1

Pearson correlation coefficients for various loan characteristic, prior information and monitoring variables for 452 clean observations. The probability of the correlation coefficient being significantly different from zero is listed below the associated correlation.

Variable	SECURE	UNSECURE	NEW	RENEW	TRANSFER	LINE
SECURE	1.000 0.0					
UNSECURE	-0.148 0.00	1.000 0.0				
NEW	-0.006 0.88	0.104 0.02	1.000 0.0			
RENEW	0.195 0.00	-0.028 0.55	-0.089 0.05	1.000 0.0		
TRANSFER	0.055 0.24	-0.020 0.66	-0.043 0.35	-0.120 0.01	1.000 0.0	
LINE	0.094 0.04	-0.006 0.89	0.041 0.38	-0.045 0.32	0.061 0.18	1.000 0.0
TERM	-0.051 0.27	-0.039 0.39	-0.008 0.84	0.024 0.60	-0.045 0.33	-0.626 0.00
MATURE	-0.073 0.11	0.018 0.69	-0.002 0.96	0.045 0.33	-0.047 0.31	-0.141 0.00
RATE	-0.017 0.71	0.045 0.33	0.071 0.12	0.032 0.49	0.065 0.16	-0.128 0.00
LOANMKT	0.211 0.00	-0.074 0.11	-0.043 0.36	0.111 0.01	-0.016 0.72	-0.045 0.33
NEGRUN	-0.090 0.05	-0.036 0.43	0.026 0.57	0.005 0.89	-0.002 0.95	-0.025 0.58
POSRUN	0.117 0.01	-0.011 0.81	-0.049 0.29	-0.008 0.86	0.121 0.00	0.069 0.14
LOGSIZE	-0.233 0.00	0.054 0.24	0.012 0.79	-0.158 0.00	-0.124 0.00	0.018 0.69
EXCHANGE	0.059 0.20	0.016 0.72	0.014 0.75	-0.006 0.89	0.061 0.19	-0.024 0.60
INVGRAD	-0.069 0.13	-0.095 0.04	0.021 0.65	-0.099 0.03	-0.083 0.07	0.040 0.39
COMPUSTAT	-0.199 0.00	0.067 0.14	0.041 0.37	-0.015 0.74	-0.003 0.94	-0.022 0.63

Table 6-1 cont'd.

Variable	TERM	MATURE	RATE	LOANMKT	NEGRUN	POSRUN
TERM	1.000 0.0					
MATURE	0.428 0.00	1.000 0.0				
RATE	0.149 0.00	0.096 0.04	1.000 0.0			
LOANMKT	-0.054 0.25	-0.082 0.08	-0.045 0.33	1.000 0.0		
NEGRUN	0.030 0.51	0.000 0.98	-0.046 0.32	0.005 0.90	1.000 0.0	
POSRUN	0.008 0.85	0.061 0.19	-0.019 0.67	0.029 0.53	-0.057 0.21	1.000 0.0
LOGSIZE	0.016 0.72	0.132 0.00	-0.046 0.32	-0.342 0.00	-0.020 0.66	-0.087 0.06
EXCHANGE	-0.033 0.47	-0.126 0.00	0.060 0.19	0.101 0.03	0.082 0.07	0.019 0.67
INVGRAD	-0.054 0.24	0.047 0.31	-0.094 0.04	0.026 0.57	-0.036 0.43	-0.011 0.81
COMPUSTAT	0.045 0.33	0.103 0.02	-0.016 0.72	-0.006 0.89	-0.022 0.63	-0.066 0.15

Variable	LOGSIZE	EXCHANGE	INVGRAD	COMPUSTAT
LOGSIZE	1.000 0.0			
EXCHANGE	-0.334 0.00	1.000 0.0		
INVGRAD	0.481 0.00	-0.132 0.00	1.000 0.0	
COMPUSTAT	0.201 0.00	-0.291 0.00	0.111 0.01	1.000 0.0

The correlations of the remaining independent variables with SECURE are below 0.15 in absolute value. All of the independent variables have a correlation coefficient smaller than 0.15 in absolute value with UNSECURE.

Although the independent variables are not highly correlated with either SECURE or UNSECURE, several significant correlations are found. Loan type is correlated with maturity: TERM has a negative (-0.63) correlation with LINE and a positive (0.43) correlation with MATURE. The correlation between TERM and MATURE, plus a lack of a large correlation between LINE and MATURE suggests that information on maturity is provided primarily for term loans. LOGSIZE has a positive correlation (0.48) with INVGRAD, a negative correlation (-0.34) with LOANMKT, and a negative correlation (-0.33) with EXCHANGE, indicating that small firms tend not to have investment grade bonds, have higher relative loan amounts and are listed on NASDAQ. COMPUSTAT has a negative (-0.29) correlation with EXCHANGE, indicating that COMPUSTAT firms are primarily listed on NYSE/Amex. All of the remaining correlations of the independent variables are below 0.15 in absolute value.

Four regressions are performed. The first (equation 1, Table 6-2) contains all announcement, prior information and monitoring variables. The second (equation 2) retains only LOGSIZE and EXCHANGE as monitoring variables. The results of

Table 6-2

Weighted ordinary least squares regression of cumulative prediction errors of market model regression against various loan characteristic, prior information and monitoring variables. All variables weighted by the inverse of the standard deviation of the prediction error of the market model regression. T-statistics are in parentheses below the parameter estimates. Chi-square test statistics are for White's (1980) general test for homoskedasticity.

Equation	(1)	(2)	(3)	(4)
Variable	All variables	Size and exchange	Size	Exchange
INTERCEPT	0.1916 (1.05)	0.1512 (0.87)	0.1910 (1.11)	0.0800 (0.49)
SECURE	-0.0032 (-0.47)	-0.0039 (-0.57)	-0.0037 (-0.55)	-0.0029 (-0.44)
UNSECURE	-0.0004 (-0.07)	-0.0016 (-0.26)	-0.0010 (-0.16)	-0.0016 (-0.26)
NEW	0.0018 (0.22)	0.0024 (0.29)	0.0028 (0.34)	0.0018 (0.22)
RENEW	-0.0037 (-0.75)	-0.0029 (-0.59)	-0.0023 (-0.47)	-0.0025 (-0.50)
TRANSFER	0.0272*** (3.05)	0.0287*** (3.26)	0.0308*** (3.54)	0.0294*** (3.35)
LINE	0.0055 (1.12)	0.0065 (1.33)	0.0065 (1.31)	0.0042 (0.94)
TERM	0.0051 (1.06)	0.0053 (1.10)	0.0056 1.17	0.0035 (0.77)
MATURE	-0.0075* (-1.80)	-0.0076* (-1.84)	-0.0075* (-1.80)	-0.0086** (-2.13)
RATE	0.0091** (2.30)	0.0090** (2.27)	0.0099*** (2.53)	0.0083** (2.12)
LOANMKT	0.0015 (1.07)	0.0009 (0.65)	0.0011 (0.81)	0.0005 (0.41)
NEGRUN	0.0070 (0.89)	0.0060 (0.77)	0.0086 (1.12)	0.0055 (0.71)
POSRUN	0.0084 (1.33)	0.0079 (1.26)	0.0089 (1.43)	0.0078 (1.24)
LOGSIZE	-0.0018** (-2.08)	-0.0008 (-1.13)	-0.0009 (-1.20)	- -
EXCHANGE	0.0079* (1.74)	0.0070 (1.58)	- -	0.0075* (1.70)
INVGRAD	0.0085 (1.61)	- -	- -	- -
COMPUSTAT	0.0045 (1.21)	- -	- -	- -
F-value	2.68***	2.76***	2.77***	2.87***
Adjusted R <sup>2</sup>	0.056	0.052	0.048	0.051
Chi-square	129.71	108.26	91.24	91.42
Observations	452	452	452	452

\*\*\* significant at 1 percent.  
 \*\* significant at 5 percent.  
 \* significant at 10 percent.



Chapter 5 indicate that significant differences in means for APES exist for these two monitoring variables, but not for INVGRAD or COMPUSTAT. Equation 3 retains only LOGSIZE as an external monitoring variable and equation 4 retains only EXCHANGE.

All regressions are significant at the 1 percent level with adjusted  $R^2$ s ranging from 0.048 to 0.056 (Table 6-2). Furthermore, adjusting the data by the inverse of the standard deviation of the market model prediction error reduces heteroskedasticity problems. In none of the regressions is White's (1980) general test for homoskedasticity rejected at the 10 percent level or less, with Chi-square test statistics ranging from 91.2 to 129.7<sup>12</sup>. The highest condition index of the regressions is 4.34, well below 30, the value considered indicative of multicollinearity (*SAS System for Regressions*, 1986 Edition, p. 81).

In each regression the coefficient on SECURE, the disclosure of a security provision in a loan, is negatively related to CPEs (-0.0029 to -0.0039 coefficients) but not

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<sup>12</sup>In addition to White's general test for homoskedasticity, five additional tests for specific forms of heteroskedasticity are performed on Equation 2. Two of the tests reject homoskedasticity and three do not. Regressions of the squared residual on the predicted dependent variable squared and the logarithm of the predicted dependent variable squared do not reject homoskedasticity, whereas regression on the predicted dependent variable does. Regression of the logarithm of the squared residual on the independent variables does not reject homoskedasticity, whereas regression of the absolute value of the residual on the independent variables does reject homoskedasticity.

significant ( $-0.44$  to  $-0.57$  t-statistics). This result is consistent with the insignificance in the event study of the security provision (Table 5-2, Panel B). The coefficients on UNSECURE, the disclosure that a loan is unsecured, are also negative but statistically insignificant. The insignificance of the relation between unsecured loans and market response is also consistent with event study results.

Overall the results of the multivariate regression are consistent with those of the event study and indicate that for the full data sample the specific disclosure that a loan is secured or unsecured is not a significant component of the positive market response found for loan announcements. In general, shareholders of borrowing firms do not benefit by providing collateral to lenders.

Consistent with event study results, transferred loans have a positive effect on CPEs ( $0.027$  to  $0.031$  coefficient for TRANSFER) that is significant at 1 percent regardless of the model employed ( $3.05$  to  $3.54$  t-statistic). In contrast, new and renewed loans have no effect on CPEs. These results support a view that the change of a banking relationship reveals more information than the initiation or renewal of a relationship.

Information on the maturity status of a loan is negatively related to CPEs for all equations as indicated by  $-0.0075$  to  $-0.0086$  coefficients for MATURE and statistically significant at least at the 10 percent level ( $-1.80$  to  $-2.13$

t-statistics). This result is consistent with event study results. Information on interest rates is positively related to CPEs (0.0083 to 0.0099 coefficients for RATE) and statistically significant at least at the 5 percent level (2.12 to 2.53 t-statistics) and also consistent with event study results. These results indicate that the market garners information from the disclosure of both maturity and interest rate information.<sup>13</sup>

Consistent with the event study findings of Chapter 5, the most important external monitoring variables are LOGSIZE (the natural logarithm of firm size) and EXCHANGE (exchange listing). In the presence of all external monitoring variables (equation 1) LOGSIZE is negatively related to CPEs with a coefficient of -0.0018 and significant at the 5 percent level (-2.08 t-statistic). In the same regression firms trading on NASDAQ have a positive relation with CPEs (0.0079 coefficient for EXCHANGE) that is significant at the 10 percent level (1.74 t-statistic). The external monitoring variables of INVGRAD, investment grade bonds, and COMPUSTAT, inclusion on COMPUSTAT, are not significant and are deleted in subsequent regressions<sup>14</sup>.

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<sup>13</sup>The negative coefficient for MATURE is a puzzle since it suggests that providing information on maturity significantly lowers the market's reaction to a loan announcement. This issue is further examined in section 6.2, but remains unresolved.

<sup>14</sup>A significant coefficient for COMPUSTAT or INVGRAD is not found when either is the sole monitoring variable in the regression. These results further confirm the importance of LOGSIZE and EXCHANGE as representative monitoring variables.

When both firm size and exchange listing are included in the same regression (equation 2), neither variable is significant at the 10 percent level. Firm size is also not significant when it is the sole monitoring variable in the regression (equation 3). Equation 4 indicates the importance of exchange listing as the representative monitoring variable. In this equation membership in NASDAQ is positively related to CPEs (0.0075 coefficient) and is significant at the 10 percent level (1.70 t-statistic). These results indicate that exchange listing is more powerful than firm size as an indication of the importance of bank monitoring for a firm. Although these results suggest that EXCHANGE should be retained as the sole monitoring variable in the multiple regressions, LOGSIZE is also retained as a control variable due to the importance of this variable found by Slovin, Johnson and Glascock. These are not substitute variables. As indicated in Table 5-5, only 36 percent of the small firms in this sample are traded on NASDAQ.

The greater market response to a loan announcement for NASDAQ traded firms suggests a different interpretation of the findings of Slovin, Johnson and Glascock. They argue that small firms are the primary beneficiaries of bank monitoring. They, however, use only firm size in their regressions to indicate the level of external monitoring of a borrowing firm. While supporting their general hypothesis

that lightly monitored firms benefit from bank monitoring, this study finds that size alone is not a sufficient indicator of the degree of external monitoring received by a firm. Among the measures of non-bank monitoring examined here, EXCHANGE is also important.

One of the implications of both the *positive market response*, *increased default risk* and *negative market reaction*, *increased default risk* hypotheses is that NYSE/Amex listed firms should be the primary users of secured debt. Over 69 percent of the secured loans in this sample are made to NYSE/Amex firms (Table 5-4, Panel B). The significance of a NASDAQ exchange listing in equation 4 suggests that loan announcements for NYSE/Amex listed firms contain less positive information for market participants than do announcements for NASDAQ firms. Separate regressions by exchange listing will empirically separate the importance of a security provision in a loan announcement for NYSE/Amex versus NASDAQ firms.

The difference in the means of equity for secured loans when compared to unsecured loans (Table 5-4) supports Smith and Warner's (1979) view that small firms are the primary users of secured debt. In addition, loans to small firms are the only sub-category for which a security provision is statistically significant in the event studies of Chapter 5. These combined results suggest that regressions separated by

firm size are necessary to determine the importance of a security provision in a loan announcement.

## 6.2 Multiple regressions separated by firm size and exchange.

The multiple regression for small firms is significant at the 1 percent level (2.35 F-value, Table 6-3, equation 3) with an adjusted  $R^2$  of 0.06, however White's general test for homoskedasticity is rejected at the 1 percent level (162.97 Chi-square), indicating that standard errors may be biased and tests of parameter significance unreliable. The positive and significant market reaction to a security provision for small firms found in event study results (Table 5-11, Panel B) is not found in the multiple regression. The coefficient for secure is negative (-0.0065) but insignificant (-0.64). This result may be due to heteroskedasticity. The multiple regression for large firms is significant at the 10 percent level (1.69 F-value, equation 4) with an adjusted  $R^2$  of 0.04, and White's general test for homoskedasticity is not rejected at the 10 percent level (86.7 Chi-square). Consistent with the event study results of Chapter 5 (Table 5-11, Panel A) no significant relation exists between CPE's and the fact that a loan is secured or unsecured. A negative (-0.0403) and significant (-2.20 t-statistic) relation exists between CPE's and transferred loans, a result opposite that of the regression of the full data sample.

Table 6-3

Weighted ordinary least squares regression of cumulative prediction errors of market model regression against various loan characteristic, prior information and monitoring variables separated by exchange listing and firm size. All variables weighted by the inverse of the standard deviation of the prediction error of the market model regression. T-statistics are in parentheses below the parameter estimates. Chi-square test statistics are for White's (1980) general test for homoskedasticity.

Equation	(1)	(2)	(3)	(4)
Variable	NASDAQ	NYSE/Amex	Small	Large
INTERCEPT	0.3564 (1.04)	0.0763 (0.36)	0.3976 (1.63)	-0.4630 (-1.51)
SECURE	-0.0278* (-1.90)	0.0037 (0.48)	-0.0065 (-0.64)	0.0048 (0.54)
UNSECURE	0.0251* (1.87)	-0.0100 (-1.32)	-0.0016 (-0.16)	0.0020 (0.24)
NEW	-0.0094 (-0.46)	0.0069 (0.77)	-0.0020 (-0.16)	0.0066 (0.62)
RENEW	0.0011 (0.11)	-0.0009 (-0.15)	-0.0001 (-0.01)	-0.0060 (-0.98)
TRANSFER	0.0309** (2.26)	0.0228** (1.78)	0.0453*** (4.18)	-0.0403** (-2.20)
LINE	0.0053 (0.44)	0.0067 (1.21)	-0.0032 (-0.39)	0.0127** (2.07)
TERM	0.0127 (1.05)	0.0050 (0.94)	0.0030 (0.40)	0.0055 (0.93)
MATURE	-0.0225* (-1.88)	-0.0037 (-0.82)	-0.0071 (-1.02)	-0.0070 (-1.47)
RATE	0.0131 (1.44)	0.0090** (1.99)	0.0065 (1.00)	0.0097** (2.07)
LOANMKT	0.0059* (1.70)	-0.0001 (-0.05)	-0.0007 (-0.37)	0.0017 (0.37)
NEGRUN	0.0154 (1.21)	0.0016 (0.15)	0.0096 (0.72)	0.0035 (0.39)
POSRUN	0.0178 (1.46)	0.0080 (1.07)	0.0030 (0.29)	0.0113 (1.49)
LOGSIZE	-0.0015 (-0.65)	-0.0008 (-1.02)	0.0002 (0.12)	0.0002 (0.23)
EXCHANGE	-	-	0.0041 (0.65)	0.0043 (0.71)
F-value	2.68***	1.14	2.35***	1.69*
Adj R <sup>2</sup>	0.16	0.00	0.06	0.04
Chi-square	89.10	117.74***	162.97***	86.68
Observations	113	339	254	198

\*\*\* significant at 1 percent.

\*\* significant at 5 percent.

\* significant at 10 percent.



The multiple regression for NYSE/Amex listed firms is insignificant (1.14 F-value, equation 2). Although NYSE/Amex firms are the majority users of secured debt in this sample, the lack of significance for security for NYSE/Amex firms can be attributed to the fact that bank loan announcements are not a significant source of information disclosure for these firms.

The multiple regression for NASDAQ listed firms is significant at the 1 percent level (2.68 F-value, equation 1) with an adjusted  $R^2$  of 0.16. The data does not reject White's general test for homoskedasticity (89.1 Chi-square). Information on a security provision in a loan contract is negatively related to CPEs (-0.028 coefficient for SECURE) and significant at the 10 percent level (-1.90 t-statistic). Furthermore for unsecured loans a positive (0.025 coefficient for UNSECURE) and significant (1.87 t-statistic) relationship exists with CPEs. These results support a view that the information disclosed about a security provision in a bank loan is significant primarily for firms that do not have other sources of external monitoring. These findings are consistent with the *negative market response, increased default risk* and the *negative market response, no default differential* explanations for secured debt, and support the view that bank monitoring provides valuable information to the market for NASDAQ listed firms.

The negative and significant response for secured loan announcements found in the multiple regression for NASDAQ firms is not consistent with the positive but insignificant results found for a security provision for NASDAQ firms in the event study (Table 5-11, Panel D). Furthermore, a positive and significant relation between market returns and a security provision is found in the event study for small firms (Table 5-11, Panel B), but no significant relation is found in multiple regression results. The only hypothesis supported by both the positive market reaction for small firm secured loan announcements and the negative relation between market response and security for NASDAQ listed firms is the *increased default risk* hypothesis. However, the majority (69 percent, Table 5-4, Panel B) of secured loans are made to NYSE/Amex firms, and for these firms neither event study results nor multiple regression results demonstrate a significant relationship between a security provision and market returns. These results indicate that the share price implications of the various theories of secured debt may not be resolved through market reaction based empirical procedures.

Equation 1 indicates that NASDAQ listed firms have a positive (0.03 coefficient) and significant (2.26 t statistic) share price increase when loans are transferred from one group of banks to another. This result is consistent with the event study results and the multiple

regression results for the full sample, and further supports the view that changes in banking relationships convey more information to market participants than the establishment or renewal of a banking relationship.

Disclosure of maturity information is negative ( $-0.02$  coefficient for MATURE) and significant ( $1.88$  t-statistic) for NASDAQ firms. This result is consistent with the multiple regression results for the full data sample, but is not consistent with the event study result of a positive but insignificant relation (Table 5-8, Panel E). The negative relation between maturity information and share price returns is puzzling since it suggests that information disclosure of maturity information is detrimental to the borrowing firm's shareholders.

LOANMKT, the relative amount of the loan financing, has a positive ( $0.0059$ ) coefficient and is significant at the 10 percent level ( $1.70$  t-statistic). This indicates that a leverage effect exists for NASDAQ firms.

### 6.3 Summary

Multiple regression of the market response against variables indicative of loan characteristics, pre announcement information and levels of non-bank monitoring provide results that conflict with the event study results of Chapter 5. Event study results indicate a positive relation between a security market response to a security provision for small firms. Multiple regression, however, is unable to

confirm this result for small firms. Multiple regression reveals a negative relation between security and market response for NASDAQ listed firms, while event study results produce no significant relation. The *increased default risk* hypothesis is the only explanation consistent with both positive and negative market reaction to secured debt loan announcements. However, the majority (69 percent) of announced secured loans are made to NYSE/Amex firms. For these firms neither the monitoring services of banks nor the inclusion of a security provision in a loan contract conveys new information to market participants. To resolve the conflict in results between Chapter 5 and this Chapter, and to incorporate the information contained for NYSE/Amex firms, an alternative method of separating the various explanations of secured debt is employed. To separate the various hypotheses for secured debt, the difference in default risk between secured and unsecured loans must be determined. One method of resolving whether secured loans have more default risk than unsecured loans is to examine firms that have secured debt for signs of financial distress. The finding of this characteristic for secured loans announcements would offer further evidence for the *increased default risk premium* hypotheses, regardless of market reaction. Chapter 7 examines this issue using discriminant analysis and logit regressions for those firms in the sample with sufficient accounting data.

## Chapter 7: Financial Distress and Security

The use of the market reaction to discriminate between adverse selection, underinvestment problem resolution, incentive contracting, bankruptcy and bank monitoring explanations for collateral contains two deficiencies. First, over seventy-three percent of the loan announcements in the sample do not disclose whether a loan is secured or unsecured, eliminating the major portion of the data sample from testing market reactions based on differences between secured and unsecured loans. The large percentage of unknown security status loans suggests that characteristics of loans for firms that do not disclose this information may differ from those of firms with announced secured loans and loans to firms with announced unsecured loans. Second, no consensus exists for the expected market reaction to secured loan announcements. A security provision in a loan contract has a positive effect on the share price of small firms according to the event study results of Chapter 5. The multiple regression results of Chapter 6 find no significant relation between market responses and secured loan announcements for small firms. Event study results do not find significant market reaction for NASDAQ listed firms with secured loans, whereas a significant negative relation is found using multiple regression. Both the event study results of Chapter 5 and the multiple regressions of Chapter 6 fail to find a

significant relation between market response and a security provision for NYSE/Amex firms, which contain 69 percent of the secured loans in the sample. These results indicate that secured bank loan announcements may not convey significant information to the market because of other forms of monitoring received by the majority of the firms that obtain secured loans.

An alternative to using the market reaction to separate the various explanations for secured debt is measuring the amount of default risk of a firm. The purpose of this Chapter is to determine which hypotheses can be supported by the data through the use of financial ratios indicative of financial distress (as proxies for increased default risk). The sample is reduced to those firms in the full data sample with the necessary information on COMPUSTAT. Section 7.1 analyzes the relation between information on a security provision in a loan contract and various loan characteristics, pre-announcement information and forms of monitoring of the firm to determine if information available on loan announcements for secured loans differs from that available for unsecured loans and unknown security status loans. Section 7.2 characterizes the firms with sufficient accounting data on COMPUSTAT to calculate financial ratios indicative of financial distress. Section 7.3 describes the results for Altman's (1968) predictive model of financially distressed firms. Section 7.4 uses logit regression with

various other financial ratios that are indicative of financial distress. Section 7.5 analyzes the relation between market returns and the ratios in order to determine if the market's response is affected by known indicators of financial distress. Section 7.6 is a summary.

#### 7.1 Relation of information on a security provision and loan characteristics, pre-announcement information and forms of external monitoring

The event study results of Chapter 5 and the multiple regression results of Chapter 6 indicate that for some firms the information disclosed for secured and unsecured loans affects share price. However, over seventy-three percent of the sample contains loans with no information on a security provision (Table 5-4). There are two possible explanations for the lack of information on security. First, the loans are actually unsecured and the contracting parties only consider a security provision in a loan to be material information that should be disclosed. Second, the loan contracting parties do not consider the issue of security to be material information. Under either of these views, some firms disclose less information than those that identify their loans as secured or unsecured. The use of logit regression can indicate whether the information available for secured loan announcements differs from that of unsecured loan announcements and that of loan announcements that are silent with respect to security.

The unordered multinomial logit regression model described in Chapter 4 is employed to determine if the variables identified in section 3.2 can consistently predict whether a loan is secured, unsecured or of unknown security status. The independent variables are the same ones employed in equation 2 of Table 6-2.

The use of information available at loan announcement has little power to separate secured loan announcements, unsecured loan announcements and announcements that disclose neither. The likelihood ratio test statistic is 72.2 (Table 7-1), which is significant at the 1 percent level and indicates that some of the parameters are significantly different from zero. However, the model correctly predicts only 10 of the 71 secured loan announcements and none of the unsecured loan announcements. As noted by Greene (1990), unbalanced sample sizes commonly cause weak predictive results in multinomial logit models. This suggests that the lack of separation of secured and unsecured loans on the basis of announcement information for the model is caused primarily by the large number of loans with unknown security status.

Elimination of loan announcements with unknown security status improves the classification ability of the model. For the 119 observations where security status is disclosed the model correctly classifies 78.9 percent of the secured loans and 70.8 percent of the unsecured loans (Table 7-2). For



Table 7-1

Unordered Multinomial Logit regression of information on a security provision in a loan announcement against variables indicative of loan announcement information, pre-announcement information and various forms of external monitoring for 452 clean observations. T-statistics reported in parentheses.

Variable	Secured Parameter Estimate	Unsecured Parameter Estimate
INTERCEPT	-1.296* (-1.90)	-1.151 (-1.36)
NEW	0.682 (0.80)	1.248* (1.90)
RENEW	0.081*** (3.36)	0.205 (0.47)
TRANSFER	0.483 (0.87)	-0.212 (-0.27)
LINE	0.809** (1.96)	-0.332 (-0.79)
TERM	0.032 (0.72)	-0.665 (-1.53)
MATURE	-0.381 (-1.15)	0.238 (0.65)
RATE	-0.028 (-0.08)	0.177 (0.53)
LOANMKT	0.223** (1.99)	-0.600* (-1.94)
POSRUN	0.709 (1.51)	0.147 (0.22)
NEGRUN	-11.513 (-0.07)	-1.013 (-0.94)
LOGSIZE	-0.254*** (-2.33)	-0.064 (-0.51)
EXCHANGE	0.121 (0.37)	0.216 (0.56)
-2 LOG Likelihood Ratio		72.196***
Pseudo R <sup>2</sup>		0.105

## Predicted

Actual	Unknown	Secured	Unsecured	Total
Unknown	324	9	0	333
Secured	61	10	0	71
Unsecured	48	0	0	48
Total	433	19	0	452

\*\*\* significant at 1 percent.  
 \*\* significant at 5 percent.  
 \* significant at 10 percent.

Table 7-2

Binomial logit regression of secured versus unsecured loan announcements against variables indicative of loan announcement information, pre-announcement information and various forms of external monitoring for 119 clean observations. T-statistics reported in parentheses.

Variable	Parameter Estimate	Odds Ratio
INTERCEPT	0.149 (0.12)	1.161
NEW	-0.359 (-0.35)	0.698
RENEW	0.892 (1.54)	2.440
TRANSFER	1.131 (1.01)	3.099
LINE	2.061*** (2.93)	7.854
TERM	1.605** (2.10)	4.978
MATURE	-1.121** (-1.99)	0.326
RATE	-0.842 (-1.54)	0.431
LOANMKT	0.937** (2.48)	2.552
POSRUN	-0.391 (-0.40)	0.676
NEGRUN	-8.839 (-0.05)	0.000
LOGSIZE	-0.312 (-1.64)	0.732
EXCHANGE	0.079 (0.14)	1.082
-2 LOG Likelihood Ratio		43.938***
Pseudo R <sup>2</sup>		0.274

## Predicted

Actual	Unsecured	Secured	Total
Unsecured	34	14	48
Secured	15	56	71
Total	49	70	119

\*\*\* significant at 1 percent.  
 \*\* significant at 5 percent.

secured loans, LINE and LOANMKT have positive coefficients (and odds ratios) in this model as well as the full model containing unknown loan announcements, indicating that secured loans are provided to firms that receive lines of credit and have high loan to market value of equity ratios.

## 7.2 Characteristics of firms with COMPUSTAT data

As indicated in Table 5-5, 238 observations or 52.7 percent of the total sample, contain sufficient accounting information on COMPUSTAT to reconstruct balance sheets and income statements. However, only 21 or 29.6 percent of the 71 total secured observations are on COMPUSTAT, indicating that secured loan observations are under-represented in the COMPUSTAT sample. Furthermore, of the 21 secured observations, only 4 or 18.2 percent of the 22 total NASDAQ secured observations are on COMPUSTAT, indicating that the secured loan announcements that have a significant negative relation to market response are severely under-represented in the COMPUSTAT sample. The 17 NYSE/Amex secured observations on COMPUSTAT represent 34.7 percent of the full sample NYSE/Amex secured observations and provide evidence of the low frequency of secured loans among firms that are of sufficient importance to warrant monitoring by Standard and Poor's.

The inclusion of a firm on COMPUSTAT does not displace the importance of bank monitoring. As shown in Table 5-10, Panel D, COMPUSTAT firms have a 0.91 percent APE, significant

at the .01 level (2.81 z-statistic). Non-COMPUSTAT firms have similar returns (1.02 percent APE, 2.62 z-statistic). There is no significant difference in means between the APE's of the two samples. The positive APE's for firms with COMPUSTAT information suggest that bank loan announcements are an important source of information for market participants even though accounting information on the firm is available through COMPUSTAT.

Although both COMPUSTAT and non-COMPUSTAT firms have overall significant APE's, this result is not attributable to the fact security status is known. Both secured and unsecured loan announcements have insignificant APE's for the subset of firms with COMPUSTAT information (Table 5-11, Panel G) and those not included on COMPUSTAT (Table 5-11, Panel H). For both of these groups only loan announcements where no disclosure on security status is made have positive and significant APE'S, a result consistent with event study results of the full data sample.

When COMPUSTAT firms are disaggregated by size, small firms have positive APE's (2.35) that are significant at the 1 percent level (4.98 z-statistic, Table 7-3, Panel B). Furthermore, APE's are positive and significant at least at the 5 percent level regardless of security classification. Loan announcements for large COMPUSTAT firms do not generate significant APE's (Table 7-3, Panel A). When firms with COMPUSTAT information are classified by exchange, NASDAQ

Table 7-3

Average two day prediction error of all clean observations for firms with information on COMPUSTAT separated by size and exchange and grouped by security provision.

Group	Standardized			N	pct. pos.
	pct. APE	residual z-stat.	cross- sectional z-stat.		
Panel A: Large firms.					
Secured	-1.45	-0.96	-0.95	7	28.6
Unsecured	-1.12	-1.66	-1.69	17	41.2
Unknown	-0.32	-0.13	-0.14	96	38.5
Total	-0.50	-0.98	-0.92	120	38.3
Panel B: Small Firms					
Secured	4.76**	2.23	1.74	14	64.3
Unsecured	1.53**	2.08	1.50	13	61.5
Unknown	2.10***	4.01	2.61	91	57.1
Total	2.35***	4.98	3.36	118	58.5
Panel C: NYSE/Amex					
Secured	1.13	0.87	0.70	17	52.9
Unsecured	-0.07	-0.49	-0.50	24	54.2
Unknown	0.73*	1.92	1.53	166	46.4
Total	0.67*	1.80	1.47	207	47.8
Panel D: NASDAQ					
Secured	9.29	1.10	0.76	4	50.0
Unsecured	0.42	1.27	0.61	6	33.3
Unknown	1.78***	2.63	1.40	21	57.1
Total	2.48***	3.12	1.72	31	51.6

\*\*\* significant at 1 percent.

\*\* significant at 5 percent.

\* significant at 10 percent.



Table 7-4

Average two day prediction error of all clean observations for firms without information on COMPUSTAT separated by size and exchange and grouped by security provision.

Group	Standardized			N	pct. pos.
	pct. APE	residual z-stat.	cross- sectional z-stat.		
Panel A: Large firms.					
Secured	-0.49	-0.04	-0.04	12	58.3
Unsecured	3.26***	2.36	1.80	9	66.7
Unknown	-0.13	-0.61	-0.54	57	49.1
Total	0.20	0.28	0.24	78	52.6
Panel B: Small Firms					
Secured	1.04	0.78	0.56	38	57.9
Unsecured	-1.31	-1.04	-1.65	9	22.2
Unknown	1.96***	3.60	3.05	89	62.9
Total	1.49***	3.06	2.49	136	58.8
Panel C: NYSE/Amex					
Secured	1.27	1.26	0.90	32	56.3
Unsecured	0.92	0.47	0.48	11	45.5
Unknown	0.33	0.08	0.05	89	51.7
Total	0.61	0.81	0.67	132	52.3
Panel D: NASDAQ					
Secured	-0.39	-0.50	-0.43	18	61.1
Unsecured	1.04	0.89	0.61	7	42.9
Unknown	2.40***	3.80	3.34	57	66.7
Total	1.67***	3.19	2.70	82	63.4

\*\*\* significant at 1 percent.

\*\* significant at 5 percent.

\* significant at 10 percent.

Table 7-5

Weighted ordinary least squares regression of cumulative prediction errors of market model regression against various loan characteristic, pre-announcement information and monitoring variables for firms with and without COMPUSTAT information. All variables weighted by the inverse of the standard deviation of the prediction error of the market model regression.

Equation	(1)	(2)
Variable	All COMPUSTAT	All Non-COMPUSTAT
INTERCEPT	-0.0494 (-0.19)	0.3437 (1.44)
SECURE	-0.0087 (-0.73)	-0.0014 (-0.17)
UNSECURE	-0.0044 (-0.51)	0.0004 (0.04)
NEW	0.0011 (0.12)	-0.0056 (-0.32)
RENEW	0.0032 (0.42)	-0.0092 (-1.35)
TRANSFER	0.0454*** (3.96)	-0.0159 (-1.08)
LINE	0.0040 (0.57)	0.0037 (0.51)
TERM	-0.0013 (-0.19)	0.0123* (1.79)
MATURE	-0.0066 (-1.19)	-0.0088 (-1.33)
RATE	0.0078 (1.47)	0.0090 (1.47)
LOANMKT	0.0036 (1.28)	-0.0008 (-0.46)
NEGRUN	-0.0051 (-0.45)	0.0138 (1.26)
POSRUN	0.0112 (1.17)	0.0119 (1.33)
LOGSIZE	0.0002 (0.28)	-0.0013 (-1.18)
EXCHANGE	0.0118 (1.41)	0.0038 (0.66)
F-value	3.468***	0.999
Adj R <sup>2</sup>	0.1272	-0.0001
Chi-square	97.1305	98.4077
Observations	238	214

\*\*\* significant at 1 percent.  
 \*\* significant at 5 percent.  
 \* significant at 10 percent.

listed firms have an overall positive (2.48 APE) response that is significant at the 1 percent level (3.12 z-statistic, Table 7-3, Panel D), however neither secured nor unsecured loan announcements have significant APEs. NYSE/Amex firms also have a positive response (0.67 APE) that is significant at the 10 percent level, but no significant response exists for secured or unsecured loan announcements (Table 7-3, Panel C). No categorization of non-COMPUSTAT firms produces a significant APE for secured loans (Table 7-4, Panels A through D). The significant APEs for a security provision only for small COMPUSTAT firms provides further evidence that financial ratio analysis is necessary to separate the various theories of secured debt.

Multiple regressions of prediction errors against the variables identified in Chapter 4 and analyzed in Chapter 6 are performed with the data sample divided by information availability on COMPUSTAT, and also further subdivided by exchange listing and firm size. The regression for firms with information on COMPUSTAT contain an F-value of 3.468, and indicate a goodness of fit at the 1 percent level (Table 7-5, equation 1). A security provision is not a significant component of CPE's, a result consistent with the full data sample (Table 6-2, equation 2). Furthermore, no significant relation exists between CPE's and knowledge that a loan is unsecured for COMPUSTAT firms, a result that is also consistent with that of the full sample. Transferred loans

have a positive (0.04) and significant (3.96 t-statistic) relationship to CPE's, consistent with the full data sample. However, information on maturity and the interest rate is not significantly related to CPE's for COMPUSTAT firms, contrary to the results for the full data sample.

When the full data sample is divided by exchange, the regression for NYSE/Amex listed firms is insignificant, whereas the regression for the NASDAQ listed firms is significant (Table 6-3). When firms with information on COMPUSTAT are divided by exchange listing, both regressions are significant, with that for NASDAQ listed firms at the 10 percent level (2.28 F-value, Table 7-6, equation 1) and for NYSE/Amex firms at the 5 percent level (1.97 F-value, Table 7-6, equation 2).

A negative but insignificant (-1.13 t-statistic) relation exists between CPE's and a security provision for COMPUSTAT firms listed on NASDAQ (Table 7-6, equation 1), in contrast to the negative and significant relation found for the NASDAQ subset of the full data sample (Table 6-3, equation 1). Thus the only significant relation between security and CPE's found for multiple regression within subsamples of the full data set (for NASDAQ firms) is not supported for the subset of these firms with accounting information on COMPUSTAT. The positive (0.08 coefficient) and significant (2.52 t-stat) relation between CPE's and the fact that a loan is unsecured for COMPUSTAT firms that are listed on NASDAQ is consistent

Table 7-6

Weighted ordinary least squares regression of cumulative prediction errors of market model regression against various loan characteristic, pre-announcement information and monitoring variables for firms with COMPUSTAT information. All variables weighted by the inverse of the standard deviation of the prediction error of the market model regression.

Equation	(1)	(2)	(3)	(4)
Variable	NASDAQ	NYSE/Amex	Small	Large
INTERCEPT	1.7190 (1.48)	0.0943 (0.32)	0.4368 (1.04)	-0.7606** (-1.99)
SECURE	-0.0601 (-1.13)	-0.0019 (-0.15)	-0.0103 (-0.48)	-0.0079 (-0.57)
UNSECURE	0.0813*** (2.52)	-0.0186* (-1.86)	0.0143 (0.98)	-0.0118 (-1.06)
NEW	-0.0771 (-1.21)	0.0035 (0.36)	0.0028 (0.16)	0.0153 (1.21)
RENEW	0.0263 (0.67)	0.0083 (1.08)	0.0146 (1.09)	-0.0003 (-0.03)
TRANSFER	0.1124*** (2.67)	0.0465*** (3.21)	0.0688*** (4.28)	-0.0049 (-0.20)
LINE	0.0372 (1.02)	0.0038 (0.51)	0.0012 (0.09)	0.0029 (0.37)
TERM	0.0267 (0.74)	-0.0030 (-0.40)	-0.0099 (-0.74)	-0.0020 (-0.26)
MATURE	-0.0182 (-0.53)	-0.0072 (-1.29)	0.0100 (0.80)	-0.0089 (-1.54)
RATE	-0.0144 (-0.45)	0.0093* (1.70)	-0.0039 (-0.39)	0.0064 (1.09)
LOANMKT	0.0065 (0.89)	0.0005 (0.15)	0.0015 (0.41)	0.0061 (0.88)
NEGRUN	-0.0011 (-0.02)	-0.0066 (-0.55)	0.0117 (0.48)	-0.0077 (-0.65)
POSRUN	0.0315 (0.57)	0.0162 (1.63)	-0.0053 (-0.02)	0.0150 (1.53)
LOGSIZE	-0.0182** (-2.05)	0.0002 (0.19)	-0.0027 (-0.73)	0.0022* (1.76)
EXCHANGE	- -	- -	0.0102 (0.97)	0.0011 (0.05)
F-value	2.279*	1.975**	2.52***	1.746*
Adj R <sup>2</sup>	0.3565	0.0579	0.1539	0.0807
Chi-square	29.7781	80.7414	95.0782	71.2556
Observations	31	207	118	120

\*\*\* significant at 1 percent.  
 \*\* significant at 5 percent.  
 \* significant at 10 percent.



consistent with the results for the NASDAQ subset of the full sample. For NYSE/Amex firms the results differ with a negative ( $-0.018$  coefficient), significant ( $-1.86$  t-stat, Table 7-6, equation 2) relation between UNSECURE and CPES found for NYSE/Amex firms with information on COMPUSTAT, but an insignificant relation ( $-0.010$  coefficient,  $-1.32$  t-stat, Table 6-3, equation 2) for NYSE/Amex firms in the full sample (but the regression for NYSE/Amex firms in the full sample is insignificant,  $1.14$  F-value).

For firms with COMPUSTAT information, loans that are transferred have a positive, significant relation to CPE's regardless of whether the firm is listed on NASDAQ ( $0.11$  coefficient,  $2.67$  t-statistic) or NYSE/Amex ( $0.04$  coefficient,  $3.21$  t-statistic). This result is consistent with those of the full sample and offer further evidence of the importance to market participants of a change in a banking relationship.

A positive ( $0.009$  coefficient) and significant ( $1.70$  t statistic) exists between CPE's and interest rate information for NYSE/Amex firms with COMPUSTAT information and contrasts with the insignificant relation for NASDAQ listed firms with information on COMPUSTAT as well as NASDAQ listed firms contained in the full data sample. A negative ( $-0.018$ ) and significant ( $-2.05$  t-statistic) relation exists between the logarithm of firm size and CPE's for NASDAQ firms with COMPUSTAT information and is not consistent with the

insignificant relation found for NYSE/Amex firms with COMPUSTAT information as well as NASDAQ firms in the full data sample.

When COMPUSTAT firms are separated by size, TRANSFER is the only variable with a coefficient significantly different from zero (0.69 coefficient, 4.28 z-statistic, Table 7-6, equation 3) for small firms, a result consistent with the full data sample and those for NASDAQ traded firms with information on COMPUSTAT. For large firms with COMPUSTAT information, the only significant variable is LOGSIZE, which is positively correlated with CPE's (0.022 coefficient, 1.76 z-statistic, Table 7-6, equation 4), a result opposite that found for NASDAQ traded COMPUSTAT firms. The paucity of significant variables for COMPUSTAT firms when separated by size further supports the view that exchange listing is an important determinant of the significance of information in a loan announcement.

Very little information is contained in loan announcements for firms not on COMPUSTAT. The F-value of the regression for firms that do not have accounting information on COMPUSTAT is 0.999, indicating a lack of goodness of fit at the 10 percent level (Table 7-5, equation 2). The lack of significance of the non-COMPUSAT regression is unexpected. These firms should be lightly monitored, bank loan announcements should be a significant source of information to the market for these firms. When regressions are

separated by size and exchange only large non-COMPUSTAT firms have an F-value indicating that some of the coefficients in the regression are significantly different from zero at the 10 percent level (Table 7-7, equations 1 through 4). For large non-COMPUSTAT firms, UNSECURE has a positive (0.030 coefficient) relation to CPE's that is significant at the 5 percent level (2.05 t-statistic, Table 7-7, equation 4), a result consistent with COMPUSTAT NASDAQ firms but different in sign from COMPUSTAT NYSE/Amex firms. Transferred loans have a negative (-0.086) relation with CPE's at the 1 percent level (-3.22 t-statistic), a result opposite that of the full data sample and COMPUSTAT NASDAQ, COMPUSTAT NYSE/Amex and COMPUSTAT small firms. RATE is positively related to CPE's (0.018 coefficient) and significant at the 5 percent level (2.22 t-statistic), a result consistent with large firms in the full data sample and COMPUSTAT NYSE/Amex firms. LOGSIZE has a negative relation with CPE's (-0.0037 coefficient) that is significant at the 10 percent level (-1.94 t-statistic), a result not found for large firms in the full data sample and opposite that found for large COMPUSTAT firms.

In summary, event study results and multiple regressions of variables representative of loan characteristics, pre announcement information and forms of external monitoring against market returns for firms on COMPUSTAT are not consistent within sub-categories nor with those of non COMPUSTAT firms or the full data sample and provide further

Table 7-7

Weighted ordinary least squares regression of cumulative prediction errors of market model regression against various loan characteristic, pre-announcement information and monitoring variables for firms without COMPUSTAT information. All variables weighted by the inverse of the standard deviation of the prediction error of the market model regression.

Equation	(1)	(2)	(3)	(4)
Variable	NASDAQ	NYSE/Amex	Small	Large
INTERCEPT	0.7439* (1.95)	0.0369 (0.11)	0.5313* (1.67)	0.1080 (0.20)
SECURE	-0.0173 (-1.09)	0.0107 (1.06)	-0.0049 (-0.42)	0.0167 (1.41)
UNSECURE	-0.0003 (-0.17)	-0.0008 (-0.07)	-0.0228 (-1.63)	0.0309** (2.05)
NEW	-0.0055 (-0.25)	0.0046 (0.16)	0.0203 (0.69)	-0.0153 (-0.73)
RENEW	0.0026 (0.23)	-0.0139 (-1.52)	-0.0073 (-0.74)	-0.0116 (-1.20)
TRANSFER	-0.0005 (-0.03)	-0.0521* (-1.94)	0.0028 (0.15)	-0.0868*** (-3.22)
LINE	0.0018 (0.14)	0.0052 (0.55)	-0.0144 (-1.32)	0.0163 (1.55)
TERM	0.0301** (2.13)	0.0094 (1.16)	0.0106 (1.15)	0.0065 (0.57)
MATURE	-0.0436*** (-3.17)	0.0050 (0.63)	-0.0151 (-1.63)	0.0065 (0.63)
RATE	0.0076 (0.74)	0.0111 (1.36)	0.0047 (0.51)	0.0185** (2.22)
LOANMKT	-0.0036 (-0.71)	0.0008 (0.38)	-0.0047* (-1.71)	0.0007 (0.10)
NEGRUN	0.0180 (1.34)	0.0167 (0.81)	0.0091 (0.54)	0.0152 (1.04)
POSRUN	0.0336*** (2.40)	0.0013 (0.10)	0.0189 (1.44)	0.0026 (0.19)
LOGSIZE	-0.0000 (-0.01)	-0.0019 (-1.45)	0.0024 (1.07)	-0.0037* (-1.94)
EXCHANGE	- -	- -	0.0010 (0.13)	0.0042 (0.53)
F-value	1.512	0.964	1.231	1.721*
Adj R <sup>2</sup>	0.0760	-0.0036	0.0234	0.1159
Chi-square	74.6344	82.9496	76.8078	72.5823
Observations	82	132	136	78

\*\*\* significant at 1 percent.  
 \*\* significant at 5 percent.  
 \* significant at 10 percent.

evidence of the need to examine financial ratios in order to test the hypotheses explaining the role of secured debt.

### 7.3 Secured loans and Altman's bankruptcy model

Altman creates a discriminant analysis model for predicting bankruptcy based on key financial ratios. (See section 3.3.2 for a detailed discussion.) The application of Altman's model to the prediction of secured debt can indicate whether secured debt is used by lenders when they believe that the borrower is financially distressed. The dependent variable is whether the loan announcement indicates that the loan is secured, unsecured or unknown. The financial ratios used by Altman are summarized below:

WCTA	Working capital to total assets. This ratio measures liquidity and should be smaller for firms experiencing distress.
RETA	Retained earnings to total assets. This ratio should be smaller for small firms and firms with deteriorating earnings.
EBITTA	Earnings before interest and taxes to total assets. This ratio should be low for firms with relatively unproductive assets or reduced operating earnings.
MVEBKTL	Market value of equity to book value of total liabilities. This ratio measures how much the firm's assets can decline in value before the firm

becomes insolvent and should be low for firms with a high probability of default.

SLSTA      Sales to total assets. This ratio contributes to the overall discriminating ability of the model.

For the sample of COMPUSTAT firms described in section 7.1, Altman's discriminant analysis model<sup>15</sup> is unable to separate secured loans from unsecured loans and loans whose security status is unknown. Although the overall error rate of the model is 21.4 percent, the model incorrectly categorizes 85.7 percent of the secured loans and 80 percent of the unsecured loans (Table 7-8). One possible explanation for the poor performance of Altman's discriminant analysis model is that 78.5 percent of the loans in the COMPUSTAT sample do not disclose security status.

All of the miscategorized secured and unsecured loans in Altman's model are reclassified as unknown. None of the secured loans are classified as unsecured, neither are any of the unsecured loans classified as secured. Although only 9 of the 51 secured and unsecured loans are not classified as unknown, those 9 firms can be separated by financial distress criterion and properly classified according to whether collateral is present in a loan.

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<sup>15</sup>Results are reported using quadratic discriminant analysis (separate covariance matrices for the various samples) since, if secured debt indicates that firms are financially distressed, the covariance matrix of financial ratios for firms with secured loans should differ from that of firms with unsecured loans. Should a common covariance matrix exist, quadratic discriminant analysis and linear discriminant analysis produce identical results.

Table 7-8

Quadratic discriminant analysis of information announced information on security for 238 loan announcements of COMPUSTAT firms.

SECURE	Frequency	Probability
Unknown	187	0.785714
Secured	21	0.088235
Unsecured	30	0.126050

Number of Observations and Percent Classified into SECURE:

SECURE	Unknown	Secured	Unsecured	Total
Unknown	178 95.19	2 1.07	7 3.74	187 100.00
Secured	18 85.71	3 14.29	0 0.00	21 100.00
Unsecured	24 80.00	0 0.00	6 20.00	30 100.00
Total	220	5	13	238
Percent	92.44	2.10	5.46	100.00
Priors	0.7857	0.0882	0.1261	

Error Count

Estimates for SECURE:

	Unknown	Secured	Unsecured	Total
Rate	0.0481	0.8571	0.8000	0.2143



When unknown security status announcements are discarded in order to more clearly focus on the differences between secured and unsecured loan announcements, Altman's model properly categorizes 85 percent of the secured loans but only 40 percent of the unsecured loans (Table 7-9). This indicates that secured loans can be properly categorized on the basis of financial distress indicators, but the majority of unsecured loans are indistinguishable from secured loans based on these ratios. These results are not supportive of separation of explanations of secured debt based upon Altman's financial distress ratios and discriminant analysis. They indicate that whereas security may be based on indications of financial distress, the explicit lack of security is not an indicator of the lack of distress.<sup>16</sup>

As an alternative to discriminant analysis, multinomial logit regressions are also performed on the COMPUSTAT data set using Altman's ratios. Although the likelihood ratio test statistic (19.6, Table 7-10) indicates that some of the parameters of the model are significantly different from zero at the 5 percent level, this model does a poor job of categorizing secured, unsecured and unknown security status loans. All of the secured and unsecured loans are predicted

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<sup>16</sup>The discriminant analysis model employed describes the common characteristics of firms that receive secured, unsecured or undisclosed security status loans. This model does not predict when security should be required for a given loan.

Table 7-9

Quadratic discriminant analysis of information announced information on security for 51 secured and unsecured loan announcements of COMPUSTAT firms.

SECURE	Frequency	Probability
Secured	21	0.411765
Unsecured	30	0.588235

Number of Observations and Percent Classified into SECURE:

SECURE	Secured	Unsecured	Total
Secured	18	3	21
	85.71	14.29	100.00
Unsecured	18	12	30
	60.00	40.00	100.00
Total	36	15	51
Percent	70.59	29.41	100.00
Priors	0.4118	0.5882	

Error Count  
Estimates for SECURE:

	Secured	Unsecured	Total
Rate	0.1429	0.6000	0.4118

Table 7-10

Unordered Multinomial Logit regression of information on a security provision in a loan announcement against Altman's financial distress variables for 238 clean observations. T-statistics reported in parentheses.

Variable	Secured Parameter Estimate	Unsecured Parameter Estimate
INTERCEPT	-0.544 (-0.93)	-2.091*** (-4.48)
WCTA	-1.533 (-0.92)	-0.311 (-0.24)
RETA	-3.108 (-1.45)	-2.010 (-1.28)
EBITTA	-4.462 (-0.82)	4.635 (1.25)
MVEBTL	-0.639 (-1.32)	0.340** (1.99)
SALESTA	-0.073 (-0.29)	-0.100 (-0.46)
-2 LOG Likelihood Ratio		19.575**
Pseudo R <sup>2</sup>		0.061

Actual	Predicted			Total
	Unknown	Secured	Unsecured	
Unknown	186	0	1	187
Secured	21	0	0	21
Unsecured	30	0	0	30
Total	237	0	1	238

\*\*\* significant at 1 percent.  
 \*\* significant at 5 percent.  
 \* significant at 10 percent.

Table 7-11

Binomial Logit regression of information on a security provision in a loan announcement against Altman's financial distress variables for 51 secured and unsecured observations. T-statistics reported in parentheses. Probability(event) is secured.

Variable	Secured Parameter Estimate	Odds Ratio
INTERCEPT	2.201** (2.11)	9.040
WCTA	-1.179 (-0.48)	0.307
RETA	-1.400 (-0.49)	0.246
EBITTA	-12.394* (-1.79)	0.000
MVEBTL	-1.138** (-2.20)	0.370
SALESTA	-0.114 (-0.29)	0.891
-2 LOG Likelihood Ratio		15.258***
Pseudo R <sup>2</sup>		0.220

Predicted			
Actual	Secured	Unsecured	Total
Secured	14	7	21
Unsecured	7	23	30
Total	21	30	51

\*\*\* significant at 1 percent.  
 \*\* significant at 5 percent.  
 \* significant at 10 percent.

to be in the same category as loans that do not disclose security information.

Table 7-11 indicates that when limited to loans that are known to be secured or unsecured, binomial logit regression based on Altman's financial ratios correctly classifies 66 percent of the secured loans and 77 percent of the unsecured loans. The coefficient for the market value of equity to the book value of total liabilities ratio is negative (-1.14) and significant at the 5 percent level (-2.20 t-statistic) with an odds ratio of 0.37 indicating that firms with declining asset values receive secured loans. The ratio of earnings before interest and taxes to total assets is negative (-12.39 coefficient) and significant at the 10 percent level (-1.75 t-statistic) with higher ratios for firms with unsecured loans (0.00 odds ratio) indicating that firms with reduced operating earnings obtain secured loans. These results indicate that firms with higher levels of financial distress receive secured loans and support the *increased default risk* hypothesis.

#### 7.4 Logit analysis using financial distress ratios

As an alternative to methods based on Altman's financial ratios, logit regressions based on more general conditions of financial distress explanations for secured debt are also employed. The dependent variable has three possible values depending of whether the announcement indicated that the loan is secured, unsecured or unknown with respect to security

status. The financial distress variables used for this analysis are defined in Chapter 4 and briefly summarized here.

WCTA        The working capital to total assets ratio measures the liquidity of the firm and should be smaller for distressed firms.

LEVERAGE   The book debt to market value of equity ratio should be higher for distressed firms.

INTCOVER   Distressed firms should have high ratios of interest expense to cash flows.

BKEQMKEQ   High book to market equity ratios should prevail for poor performing firms.

Consistent with the results of the multinomial logit regression on announcement data and the multinomial regression and discriminant analyses based on Altman's financial ratios, the large percentage of unknown security status loan announcements renders multinomial logit regression for the full data sample ineffective. All of the loans in the sample are classified as unknown when alternative financial distress ratios are used (Table 7-12), even though the regression is significant at the 5 percent level (18.9 Log-Likelihood ratio).

When limited to secured and unsecured loans, logit regression indicates that the alternative financial ratios are approximately as effective as Altman's in predicting secured loans based on financial distress. Sixty-six percent

Table 7-12

Unordered Multinomial Logit regression of information on a security provision in a loan announcement against financial distress variables for 238 clean observations. T-statistics reported in parentheses.

Variable	Secured Parameter Estimate	Unsecured Parameter Estimate
INTERCEPT	-3.033*** (-4.43)	-0.091 (-1.56)
WCTA	-2.528 (-1.54)	0.253 (0.19)
LEVERAGE	0.033 (0.21)	0.076 (0.45)
INTCOVER	4.084** (2.15)	-1.957 (-0.90)
BKEQMKEQ	0.240 (1.07)	-0.825** (-2.16)
-2 LOG Likelihood Ratio		18.876**
Pseudo R <sup>2</sup>		0.059

## Predicted

Actual	Unknown	Secured	Unsecured	Total
Unknown	187	0	0	187
Secured	21	0	0	21
Unsecured	30	0	0	30
Total	238	0	0	238

\*\*\* significant at 1 percent.  
 \*\* significant at 5 percent.  
 \* significant at 10 percent.

Table 7-13

Binomial Logit regression of information on a security provision in a loan announcement against financial distress variables for 51 secured and unsecured observations. T-statistics reported in parentheses. Probability(event) is secured.

Variable	Secured Parameter Estimate	Odds Ratio
INTERCEPT	-2.281** (-2.34)	0.107
WCTA	-4.518* (-1.65)	0.011
LEVERAGE	-0.167 (-0.74)	0.846
INTCOVER	6.888** (2.16)	980.928
BKEQMKEQ	1.449*** (2.63)	4.260
-2 LOG Likelihood Ratio		17.993***
Pseudo R <sup>2</sup>		0.260

## Predicted

Actual	Secured	Unsecured	Total
Secured	14	7	21
Unsecured	5	25	30
Total	19	32	51

\*\*\* significant at 1 percent.  
 \*\* significant at 5 percent.  
 \* significant at 10 percent.



of the secured loans are properly classified as are eighty three percent of the unsecured loans (Table 7-13). The most significant variable for separating loans is the ratio of the book value of equity to the market value of equity (2.63 t statistic) with an odds ratio of 4.26, indicating that firms with high book to market value of equity receive secured loans. The interest coverage ratio is significant at the 5 percent level (2.16 t-statistic) with a 980.9 odds ratio indicating that firms with higher interest expense as a percentage of cash flows receive secured loans. The working capital to total assets ratio is significant at the 10 percent level (-1.65 t-statistic) with a 0.01 odds ratio, indicating that firms with lower liquidity receive secured loans.

The results of logit analysis using alternative ratios indicative of financial distress support the logit results using Altman's ratios and indicate that firms with low liquidity, high interest expense as a percentage of cash flows and higher ratios of the book value of equity to the market value of equity receive secured loans. Further support is found for the *increased default risk* hypothesis. This finding is consistent with Berger and Udell's (1989) and Booth's (1991) finding of higher risk premiums for secured loans. This result, along with the positive reaction for a security provision for small firms found in Chapter 5 is consistent with Smith and Warner's (1979) and Stulz and

Johnson's (1985) view that collateral is used for firms that pursue risky projects (increased default risk) and that collateral decreases the monitoring costs of resolving moral hazard problems for these firms. It is also consistent with the implication of the bankruptcy studies of Franks and Torous (1989), Weiss (1990), and Slovin, Sushka and Waller, (1992) that collateral is employed for firms with high bankruptcy probability (increased default risk) due to the adequate protection afforded the lender by collateral in the event that the borrower declares bankruptcy. The share price of the firm increases because the receiving or renewal of credit (which the market did not wholly anticipate) gives the firm an option to continue operating and increase shareholder wealth. The negative relation of secured debt to market returns found for NASDAQ traded firms in the multiple regression studies of Chapter 6 are consistent with the role of collateral under bankruptcy, the high probability of bankruptcy restricts credit availability (and the ability to pursue positive net present value growth opportunities) for the firm. The negative relation of secured debt and market returns is also consistent with Barro's (1976) view that collateral is used to resolve moral hazard problems.

The positive market reaction found for small firms may be reconciled with the negative relation between market response and collateral found for NASDAQ listed firms. Small firms may benefit from the reduced monitoring costs of collateral,

whereas NASDAQ listed firms may bear the increased costs of collateral. The differences in market reaction may also be reconciled when collateral is used because of its adequate protection under bankruptcy, the market has different priors about small and NASDAQ listed firms. The use of collateral to solve moral hazard and bankruptcy problems are compatible. Collateral is used to resolve moral hazard problems since the firm pursues riskier projects (increased default risk) and the lender repossesses the asset in the event that the firm defaults. One of the options available to the firm if it has severe financial problems (high default risk) is to declare bankruptcy. Collateral gives the lender adequate protection should the firm choose this option.

#### 7.5 Market returns and financial distress

In order to determine the importance of indicators of financial distress to market returns, multiple regressions are performed on cumulative event window prediction errors (CPE's) using Altman's ratios and the alternative ratios. In addition to ratios indicative of financial distress, separate regressions are performed including information on a security provision and firm size and exchange. Security information is included because it may be important in the presence of information indicative of financial distress for the firm. Firm size and exchange are included because of their relation to security and market returns found in Chapters 5 and 6.

Negative correlation ranging from -0.39 to -0.49 and significant at the 1 percent level exists between INTCOVER (Table 7-14), a variable suggested by Whited as indicative of financial distress and three of ratio's suggested by Altman: RETA, EBITTA and MVEBTL. This result indicates that firms with high levels of interest expense as a percentage of cash flow have reduced earnings, lower levels of retained surplus and declining asset values. In addition correlations exist among Altman's variables, RETA has a positive correlation with WCTA (0.32) and EBITTA (0.34). LOGSIZE is negatively correlated to INTCOVER (-0.33) and EXCHANGE (-0.31) indicating that small firms have higher percentages of interest expense as a percentage of cash flows and are listed on NASDAQ. SECURED and UNSECURED have a high negative correlation (-0.91). The absolute value of all other correlations is below 0.30.

The regression of all of the variables indicative of financial distress against CPE's has an F-value of 1.611, statistically not significant (Table 7-15, equation 1). However, when limited to Altman's ratios, the regression is significant at the 5 percent level (2.38 F-value, Table 7-15, equation 2). A negative relation exists between earnings before interest and taxes to total assets (EBITTA) and CPE's, indicating that larger market responses are found for loan announcements for firms with reduced operating earnings. This is consistent with the view that the capital renewal or

Table 7-14

Pearson correlation coefficients for various financial distress, monitoring and security information variables for 238 COMPUSTAT observations. The probability of the correlation coefficient being significantly different from zero is listed below the associated correlation.

Variable	WCTA	RETA	EBITTA	MVEBTL	SALESTA	LEVERAGE
WCTA	1.000 0.0					
RETA	0.321 0.00	1.000 0.0				
EBITTA	0.182 0.00	0.344 0.00	1.000 0.0			
MVEBTL	0.205 0.00	0.276 0.00	0.266 0.00	1.000 0.0		
SALESTA	0.231 0.00	0.133 0.03	0.221 0.00	-0.045 0.48	1.000 0.0	
LEVERAGE	-0.230 0.00	-0.122 0.05	-0.093 0.15	-0.105 0.10	-0.122 0.05	1.00 0.0
INTCOVER	-0.179 0.00	-0.470 0.00	-0.491 0.00	-0.394 0.00	-0.161 0.01	0.14 0.0
BKEQMKEQ	0.040 0.53	0.073 0.26	-0.051 0.42	-0.142 0.02	0.006 0.91	0.02 0.6
LOGSIZE	-0.197 0.00	0.213 0.00	0.157 0.01	0.148 0.02	-0.198 0.00	0.00 0.9
SECURE	-0.041 0.52	-0.078 0.23	0.041 0.52	0.176 0.00	-0.038 0.55	-0.10 0.0
UNSECURE	0.015 0.80	-0.015 0.80	0.120 0.06	0.229 0.00	-0.019 0.75	-0.11 0.0
EXCH	0.031 0.62	0.001 0.97	0.133 0.03	0.261 0.00	0.013 0.83	0.07 0.2

Table 7-14 cont'd.

Variable	INTCOVER	BKEQMKEQ	LOGSIZE	SECURE	UNSECURE	EXCHANGE
INTCOVER	1.000 0.0					
BKEQMKEQ	-0.087 0.17	1.000 0.0				
LOGSIZE	-0.336 0.00	-0.085 0.18	1.000 0.0			
SECURE	-0.079 0.21	0.001 0.98	-0.028 0.65	1.000 0.0		
UNSECURE	-0.142 0.02	-0.093 0.15	0.036 0.57	0.912 0.00	1.000 0.0	
EXCHANGE	0.006 0.92	-0.053 0.41	-0.316 0.00	0.098 0.12	0.078 0.22	1.00 0.0

Table 7-15

Ordinary least squares regression of cumulative prediction errors of market model regression against various financial distress ratios for firms with COMPUSTAT information.

Equation	(1)	(2)	(3)
Variable	All Variables	Altman's Variables	Alternative Variables
INTERCEPT	0.0403*** (2.58)	0.0304*** (3.69)	0.0087 (0.97)
WCTA	-0.0240 (-1.07)	-0.0252 (-1.15)	-0.0377* (-1.79)
RETA	-0.0304 (-0.94)	-0.0199 (-0.65)	-
EBITTA	-0.1485** (-2.18)	-0.1290* (-2.04)	-
MVEBTL	-0.0018 (-0.69)	-0.0014 (-0.55)	-
SLSTA	-0.0006 (-0.16)	-0.0003 (-0.10)	-
LEVERAGE	0.0001 (0.15)	-	0.0001 (0.17)
INTCOVER	-0.0350 (-0.88)	-	0.0272 (0.86)
BKEQMKEQ	0.0007 (0.38)	-	0.0014 (0.75)
F-value	1.611	2.382**	1.364
Adj R <sup>2</sup>	0.0202	0.0283	0.0062
Chi-square	35.1380	12.3214	12.2796
Observations	238	238	238

\*\*\* significant at 1 percent.

\*\* significant at 5 percent.

\* significant at 10 percent.



Table 7-16

Ordinary least squares regression of cumulative prediction errors of market model regression against various financial distress ratios, information on a security provision, exchange listing and the logarithm of firm size for firms with COMPUSTAT information.

Equation	(1)	(2)	(3)
Variable	All Variables	Altman's Variables	Alternative Variables
INTERCEPT	0.1301*** (3.84)	0.0887*** (3.14)	0.1052*** (3.22)
WCTA	-0.0552** (-2.48)	-0.0537** (-2.44)	-0.0678*** (-3.21)
RETA	-0.0056 (-0.18)	0.0147 (0.48)	-
EBITTA	-0.1411** (-2.15)	-0.0881 (-1.40)	-
MVEBTL	-0.0020 (-0.75)	-0.0003 (-0.11)	-
SALESTA	-0.0055 (-1.45)	-0.0040 (-1.08)	-
LEVERAGE	-0.0000 (-0.00)	-	0.0001 (0.14)
INTCOVER	-0.0994** (-2.52)	-	-0.0454 (-1.36)
BKEQMKEQ	-0.0005 (-0.30)	-	0.0000 (0.00)
SECURE	0.0013 (0.09)	0.0011 (0.08)	-0.0024 (-0.17)
UNSECURE	-0.0053 (-0.18)	-0.0032 (-0.11)	-0.0139 (-0.47)
EXCHANGE	0.0045 (0.35)	0.0038 (0.03)	-0.0013 (-0.11)
LOGSIZE	-0.0142*** (-4.89)	-0.0123*** (-4.37)	-0.0139*** (-5.00)
F-value	3.711***	4.180***	4.411***
Adj R <sup>2</sup>	0.1210	0.1077	0.1033
Chi-square	52.7188	31.9062	93.36***
Observations	238	238	238

\*\*\* significant at 1 percent.

\*\* significant at 5 percent.

\* significant at 10 percent.

infusion provided by a lender is positively received by the market for firms with poor earnings. The intercept is significant at the 1 percent level (3.69 t-statistic) and indicates that most of the variation in CPE's is not explained by Altman's variables. The low  $R^2$  of the model, 0.02, further supports the view that Altman's financial ratios have weak power in explaining loan announcement excess returns. No significant relation exists between loan announcement PE's and the alternative variables indicative of financial distress (1.36 F-value, Table 7-15, equation 3). Overall, these results indicate that loan announcement market excess returns are not very sensitive to the availability of financial distress information about the firm. These results support the view that the loan announcement provides information not derivable from the available accounting information. The bank's decision to provide or renew funds is based on information not available to the market.

The explanatory power of all three equations is significant at the 1 percent level when information on security provision, exchange and firm size is included in the regressions (Table 7-16). For the full model (Table 7-16, equation 1), as well as the models with Altman's distress ratios (Table 7-16, equation 2) and alternative distress ratios (Table 7-16, equation 3), the most significant factor for explaining CPE's is the logarithm of firm size (LOGSIZE), which is negative and significant at the 1 percent level.

This result differs from regressions of market response on exchange and firm size in the presence of loan announcement and pre-announcement information for the COMPUSTAT sample (Table 7-3, equation 1), and the full sample (Table 6-2, equation 2) and indicates that bank monitoring for small firms is affected by information contained in the loan announcement. Knowledge that a loan is secured (SECURE) or unsecured (UNSECURE) is insignificant for all three equations, which is consistent with prior results and further supports the view that information on financial distress is needed in order to separate the various hypotheses on secured debt.

These results also support the view that information on secured debt (SECURE and UNSECURE) is derivable from publicly available information. Thus disclosure is not usually information to the market except in specific limited information cases (NASDAQ traded firms).

For all of the models (Table 7-16, equations 1 through 3) a significant negative relation exists at the 5 percent level between CPE's and working capital to total assets (WCTA), indicating a higher market response to loan announcements for less liquid firms. For the full model, earnings before interest and taxes to total assets (EBITTA) is inversely related to market response ( $-0.14$  coefficient), indicating that firms that have lower earnings have higher market responses. Both of these results suggest that market

response is more sensitive to loan announcements for distressed firms. A significant ( $-2.57$  t-statistic) inverse relation exists between interest expense to cash flow ratios (INTCOVER) and CPE's ( $-0.099$  coefficient), indicating that firms with less financial distress have higher market responses, an effect opposite that of WCTA and EBITTA. The significance of EBITTA and INTCOVER only in equation (1), together with the negative sign in both while the two are significantly negatively correlated, suggests that their significance stems from some (unobserved) interaction between the two variables.

#### 7.6 Summary

This study provides evidence that while the granting of a loan reveals private information to the market, the decision to require security is in large part determined by the lender from publicly available information on financial distress. Logit regression of variables indicative of financial distress indicate that firms that receive secured loans exhibit signs of financial distress and have reduced market value. Firms with deteriorating asset values, decreasing liquidity, reduced earnings, high interest expense to cash flow ratios and high ratios of the book to market values of equity receive secured loans. These results support the *increased default risk* hypothesis for secured debt. These results are consistent with the findings of Berger and Udell and Booth who find increased risk premiums

for secured loans. They support Smith and Warner, Stulz and Johnson and Barro's view that collateral is used to solve moral hazard problems. They also support the findings of Franks and Torous, Weiss, and Slovin, Sushka and Waller, that collateral gives the lender adequate protection under bankruptcy. The use of collateral to solve moral hazard and bankruptcy problems can be considered as parts of a single dilemma. Lenders require collateral as an aid in monitoring firms with risky projects (moral hazard). Since these firms have higher probabilities of bankruptcy, collateral also gives the lender adequate protection should the firm declare bankruptcy.

## Chapter 8: Summary and Conclusions

The purpose of this thesis is to determine the role of a security provision in a loan contract. Existing literature suggests that collateral can be used to solve problems of adverse selection (Chan and Kanatas, 1985), underinvestment (Stulz and Johnson, 1985), incentive contracting (Barro, 1976, Smith and Warner, 1979, Stiglitz and Weiss, 1981, Stiglitz, 1985, Stulz and Johnson, 1985 and Igawa and Kanatas, 1990) and bankruptcy (Franks and Torous, 1989, Weiss, 1990 and Slovin, Sushka and Waller, 1992). It is also suggested that collateral dilutes the monitoring services provided by banks (Diamond, 1984). These explanations may be empirically separated by two criteria: the effect of collateral on shareholder wealth and the relation between collateral and the default risk of the firm. Explanations for collateral based on resolution of adverse selection and underinvestment problems predict a positive market reaction to secured debt due to smaller default risk associated with secured debt. Incentive contracting and bankruptcy explanations for collateral are consistent with either positive or negative market reactions, but with larger default risk. Monitoring dilution explanations predict either negative or no market reaction for secured loans, but with no differential in default risk between secured and unsecured loans.

A confounding issue in using market reaction to separate the competing theories of secured debt is that empirical evidence supports Diamond's (1984) view that positive market reactions to loan announcements are attributable to the monitoring activities of lenders. However, controversy still exists over the exact source(s) of borrower share price increases. Mikkelsen and Partch (1986) find lines of credit to be the primary cause of overall positive borrower share price increases associated with bank loans, James (1987) finds term loans to be the source, Lummer and McConnell (1989) find positive market response concentrated in renewed loans and Slovin, Johnson and Glascock (1992) find positive share price effects primarily for small firms. Further confounding an investigation of the joint effects of collateral and bank monitoring on share price is Booth's (1992) view that monitoring by other external agents (investment banks, bond rating agencies) reduces the effectiveness of bank monitoring. Reinganum (1990), Chan and Chen (1991) and Fama, French, Booth and Siquefield (1993) provide evidence that the level of public monitoring received by a firm may depend on the exchange that the firm is traded on. Thus an empirical separation of the various theories of secured debt based on market reaction is subject to the caveat that no market reaction may exist for secured loan announcements because lenders employ information that is

already known by the market when requiring collateral in a loan contract.

Consistent with previous empirical studies, the average market reaction is positive and statistically significant from zero for the entire set of bank loan announcements. The market reaction differs across various subsets of the observations, being not significantly different from zero in the likely presence of non-bank monitors: large firms, NYSE/Amex firms and firms with investment grade bonds. Significant positive market reactions are observed for small firms, NASDAQ firms, and firms without investment grade bonds. These differences support the concept of banks as monitors primarily for firms in a "low public information" environment.

Within the above subsets of the data (size, exchange, presence of investment grade bonds), the market reaction for *secured* loans is positive and significant only for small firms. For all other categories secured loans, and for all unsecured loans, the market reaction for each subset is not significantly different from zero. Significant and positive market reaction for small firms, NASDAQ firms, and firms without investment grade bonds is also observed when the security status of the loan is unknown. In all subsets, the difference in average market reaction between secured and unsecured loans is not significantly different from zero. These results indicate that, in general, the market reaction



is not significantly affected by the security status of a loan.

The lack of significance of the security provision can result from several conditions. There is a security effect, but information about the loan is anticipated by (leaked to) the market prior to the loan announcement, offsetting its impact on share price at announcement. There is an effect, but it is masked by the impact of other loan conditions. There is no effect because the lender uses publicly available information to determine whether security is required. Each of these is considered in turn.

Using price changes preceding the announcement to indicate the presence of news about the firm, no significant difference is found between the average market reaction when the prior news is adverse and when it is neutral (although only the latter of the two is significantly different from zero). The market response when the prior news is favorable, however, is greater than that for either adverse or neutral news, and is significant and positive. Therefore, favorable prior news does not appear to include information about the loan, but is associated with a greater market reaction to the loan announcement. The result for adverse prior news is inconclusive, being statistically not different from either zero (implying there is leakage) or the market reaction to neutral news (implying no leakage).

Any association between the security provision and prior news is weak. The correlation between security and adverse news is negative and small, but statistically significant ( $\rho = -0.09$ ,  $p\text{-value} = 0.05$ ), while that between security and favorable news is positive, small, and also significant ( $\rho = 0.12$ ,  $p\text{-value} = 0.01$ ). The explicit absence of a requirement for collateral is not significantly correlated with either positive or negative prior news. Therefore, although the market response to the loan announcement differs when the observations are segmented by the nature of the news preceeding the announcement, the evidence does not indicate that this news mitigates any effect of the security provision. In multivariate regressions, pre-announcement information (i.e. prior price movements) has no effect on the market reaction, further rebutting the argument for information leakage.

The second condition leading to the lack of significance of the security provision is if the effect of security on share price is masked by other loan conditions. Multivariate regressions are conducted to determine if the influence of the security provision on the market reaction is obscured in the event studies by other factors. The results indicate that little of the market response to a loan announcement is explained by characteristics of the loan, prior price movements, or the presence of non-bank monitors (overall

adjusted  $R^2 = 0.056$ ). The coefficients on the security variables are not different from zero.

When the observations are segmented by size or exchange, the results from the multivariate regressions are not consistent with those from the event studies. The event studies suggest that there is a positive market reaction to a security provision for small firms, but no effect for NASDAQ or other subsets of observations. In the multivariate regressions, the coefficients on the security provision variables are significant only for the NASDAQ firms. In particular, a provision requiring collateral *reduces* the market reaction, while the explicit absence of such a provision *increases* the average market reaction among NASDAQ firms. For this subset of the observations, the evidence indicates collateral has an adverse effect on the market reaction to the announcement. Whether this influence of the security provision is due to the market perceiving increased default risk or reduced monitoring is not determined by these regressions.

The third possible explanation for the general lack of significance of a security provision is that the lender uses publicly available information to determine whether security will be required. To further explore the issue of default risk, and to determine if the inclusion of a security provision is based on private or publicly available information, various discriminating analyses are conducted.

Excluding those observations for which the security provision is unknown, logit regression of security against characteristics of the loan, prior price movements, and proxies for the presence of non-bank monitors are able to correctly classify 90 (76 percent) of the 119 observations (34 of 48 unsecured and 56 of 71 secured). In particular, significant positive coefficients are found associating the requirement for security to the loan being a line of credit or a term loan (as opposed to no disclosure of type of loan), and to larger loan size relative to the market value of the firm's equity, while a significant negative coefficient is found for the disclosure of the loan's maturity.

When discriminant analysis is conducted using financial statement information (from COMPUSTAT) to classify the observations by the security requirement, a model with Altman's (1968) z-score variables correctly classifies 30 (59 percent) of the 51 observations. This model classifies the firms with secured loans accurately (18 of 21 or 86 percent), but does less well with the unsecured loans (12 of 30 or 40 percent). Logit regressions of the same variables classifies the sample more accurately, being correct for 37 (72 percent) of the total observations, 14 (67 percent) of the secured, and 23 (77 percent) of the unsecured. An alternative set of variables related to financial distress (based on Chan and Chen 1991, Whited 1990, and Fama, French, Booth and Sinquefeld 1993) but still using COMPUSTAT data, fares

slightly better, correctly classifying 39 (76 percent) of the total observations, 14 (67 percent) of the secured, and 25 (83 percent) of the unsecured. Secured loans can be distinguished from unsecured loans on the basis of the firm having greater financial distress. The requirement for security appears to be determined by the lender using publicly available information, rather than private information obtained in the loan negotiation.

Restricting the sample to COMPUSTAT firms imposes a possible bias related to the ready availability of information on these firms. However, no significant difference in market reaction is observed between COMPUSTAT and non-COMPUSTAT firms. When the observations are segmented by information environment, greater explanatory power is observed for the control variables (characteristics of the loan and prior price movements) with the COMPUSTAT firms than with the non-COMPUSTAT firms, opposite to what would be expected if COMPUSTAT imposed a bias against the loan announcement imparting information to the market.

There are three overall conclusions from these analyses. First, the average market reaction to bank loan announcements is positive. Second, the presence of a security provision has a non-positive effect on the market reaction, and is associated with greater default risk. Moreover, the bank's assessment of default risk is not based on private information, but on publicly available information. Third,

if the market reaction to a loan announcement reflects the benefits of monitoring by the lender, this role for banks is mitigated by the presence of other monitors of the firm. Their presence reduces the market reaction to these announcements of bank loans to statistical insignificance.

The results of this study with respect to security may be extended in two related areas: 1) examining the role of a security provision in bonds and 2) examining the substitutability of leases for secured debt. Preliminary bond data for the years 1980-1984 yields 242 secured bond announcements in the *Journal*. However 219 of these are mortgage bonds of utility companies, indicating that regulatory concerns or tradition may induce utility companies to issue secured bonds. The issue to be resolved is why industrial concerns do not issue secured bonds. Perhaps the numerous parties involved in contracting and the long maturity of bonds precludes the use of bonds as a financing mechanism if the market perceives a firm to have high default risk (and require collateral).

Leases are a substitute for secured debt. The lessor retains the underlying asset in the event of default by the lessee. Unlike bonds, leases have few contracting parties and can be renegotiated in the same manner as a loan. The issues to be resolved are under what conditions is a lease employed over a security provision, and whether the availability of lease financing explains the aversion to

secured bonds outside the utility and transportation industries.

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## Appendix A: Summary of Existing Theory and Evidence of the Role of Collateral in a Loan Contract

### Theories on the Role of Collateral.

#### Adverse selection:

Collateralized debt solves adverse selection problem for lenders: Chan and Kanatas 1985, Igawa and Kanatas 1990.

Predictions: Positive market reaction, decreased default risk (firms with high quality projects receive loans).

Evidence: Against market reaction: Lummer and McConnell 1989, Slovin, Johnson and Glascock 1992. Against default risk: Berger and Udell 1986, Booth 1992.

#### Underinvestment problem:

Collateralized debt solves Myers (1977) underinvestment problem: Stulz and Johnson 1985.

Predictions: Positive market reaction, decreased default risk (positive net present value project not feasible with unsecured debt).

Evidence: Against market reaction: Lummer and McConnell 1989, Slovin, Johnson and Glascock 1992. Against default risk: Berger and Udell 1986, Booth 1992.

#### Incentive contracting:

Collateral solves moral hazard problem for lender and is forfeited to lender in the event of default: Barro 1976.

Predictions: Negative market reaction, increased default risk (increased loan costs for borrower due to bankruptcy deadweight costs).

Evidence: Against market reaction: Lummer and McConnell 1989, Slovin, Johnson and Glascock 1992. For default risk: Berger and Udell 1986, Booth 1992.

## Appendix A cont'd.

Collateralized debt solves moral hazard problem of lenders: Smith and Warner 1979, Stulz and Johnson 1985.

Predictions: Positive market reaction, increased default risk (shareholders gain from reduced monitoring costs of collateral).

Evidence: Against market reaction: Lummer and McConnell 1989, Slovin, Johnson and Glascock 1992. For default risk: Berger and Udell 1986, Booth 1992.

Collateralized debt is a screening device for lenders: Stiglitz and Weiss, 1981.

Prediction: Positive, neutral or negative market reaction depending on level of collateral required by lender.

Evidence: Not applicable.

Collateralized debt reduces risk of lenders: Stiglitz 1985.

Predictions: Negative or neutral market reaction, no default risk differential (Lenders fund low risk projects).

Evidence: For market reaction: Lummer and McConnell 1989, Slovin, Johnson and Glascock 1992. Against default risk: Berger and Udell 1986, Booth 1992.

## Bankruptcy:

Collateralized debt has adequate protection under bankruptcy and solves claim dilution problems for holders of secured debt: Franks and Torous 1989, Weiss 1990, Slovin, Sushka and Waller 1992.

Predictions: Negative, neutral or positive market reaction depending upon market's prior knowledge of firm's distress, increased default risk.

Evidence: For default risk: Berger and Udell 1986, Booth 1992.

NYSE firms have high default risk (and are candidates for collateralized debt): Chan and Chen 1991, Fama, French, Booth and Sinquefeld 1993.

Evidence: For: Chan and Chen 1991, Fama, French, Booth and Sinquefeld 1993.

### Appendix A cont'd.

#### Theories on the Monitoring Role of Commercial Banks

Lenders provide monitoring services for borrower's shareholders: Diamond 1984, 1991, Ramakrishnan and Thakor 1984, Fama 1985.

Prediction: Positive market reaction.

Evidence: For: (Continuing banker/borrower relationship) Lummer and McConnell 1989, (Small firms) Slovin, Johnson and Glascock 1992.

#### Theories on the Cross-monitoring of External Agents

Cross monitoring by commercial banks, investment banks and bond rating agencies reduces overall monitoring costs: Booth 1992.

Prediction: Monitoring by investment banks and bond rating agencies reduces importance of bank monitoring.

Evidence: For: Booth 1992.

NASDAQ firms have high investor interest: Reinganum 1990.

Evidence: For: Reinganum 1990.

## Appendix B: Hypotheses Separating the Various Roles for Collateral

H<sub>1</sub>: Collateralized loans have a *positive market response*.

H<sub>1a</sub>: The positive reaction to collateralized loans is a result of *decreased default risk*. The presence of collateral indicates reduced default risk of the borrower when solving adverse selection, (Chan and Kanatas, 1985), or moral hazard (Igawa and Kanatas, 1990) problems. Riskless collateralized loans solve the underinvestment problem (Stulz and Johnson, 1985). A positive market reaction for secured loans is expected due to high borrower quality (Chan and Kanatas, Igawa and Kanatas) or project feasibility (Stulz and Johnson). Normal market responses are expected for unsecured loans since the firms are average or do not have reduced interest rates.

H<sub>1b</sub>: Collateralized loans have a positive market reaction through *increased default risk*. Collateral decreases the monitoring costs of resolving moral hazard problems for lenders. The borrower's shareholder value increases due to decreased monitoring costs (Smith and Warner, 1979, Stulz and Johnson, 1985). Shareholder wealth is unaffected by unsecured loans since monitoring costs are not decreased. Collateral is used to give adequate protection to lender when borrower declares bankruptcy (Franks and Torous, 1989, Weiss, 1990, Slovin, Sushka and Waller, 1992). The share price of the firm increases because the receiving or renewal of credit (which the market did not wholly anticipate) gives the firm an option to continue operating and increases shareholder wealth. Unsecured loans receive either neutral or positive market reactions depending on the market's assessment of the probability of bankruptcy for the firm.

## Appendix B cont'd.

$H_2$ : Collateralized loans have a *negative market response*.

$H_{2a}$ : The negative market reaction of collateralized loans is a result of *increased default risk*. The increased monitoring cost of collateral to resolve moral hazard are borne by the borrower, whose share price decreases (Barro, 1976). Unsecured loans do not affect share price since monitoring costs are unaffected. Collateral is used to give adequate protection to the lender when the borrower declares bankruptcy (Franks and Torous, 1989, Weiss, 1990, Slovin, Sushka and Waller, 1992). The share price of the firm decreases because the high probability of bankruptcy restricts credit availability (and the ability to pursue positive net present value growth opportunities) for the firm. Unsecured loans receive either neutral or positive market reactions depending on the market's assessment of the probability of bankruptcy for the firm.

$H_{2b}$ : Although a negative market reaction exists for collateralized loans *no default risk differential* exists for them. Share price for both secured and unsecured loans is negative since lenders provide loans for projects with low risk and low return (Stiglitz, 1985). The borrower's share price is reduced for collateralized loans since lenders monitor an asset (collateral) instead of the activities of firm's managers (interpretation of Diamond, 1984). Unsecured loan announcement should be positive since shareholders receive the benefit of bank monitoring.

$H_3$ : Collateralized loans have a *neutral market response* and *no default risk differential* exists between secured and unsecured loans. Share price for both secured and unsecured loans is unaffected since lenders' interests are not aligned with shareholders' (Stiglitz, 1985). The borrower's share price is unaffected for collateralized loans since lenders monitor an asset (collateral) instead of the activities of firm's managers (interpretation of Diamond, 1984). Unsecured loan announcements should be positive since shareholders receive the benefit of bank monitoring. Shareholder wealth may not be affected for either secured or unsecured loan announcements if the firm receives monitoring from other agents that reduce the importance of bank monitoring (Booth, 1992).



## Appendix C: Variables Employed

APE	Average cumulative prediction error of the market model regression for a group of observations.
BKEQMKEQ	Book to market equity ratio. Poor performing firms should have high ratios.
COMPUSTAT	Binary variable with a value of 1 if COMPUSTAT information is available on the firm.
CPE	Cumulative two day prediction error of the market model regression for a particular observation.
EBITTA	Earnings before interest and taxes to total assets. This ratio should be low for firms with relatively unproductive assets.
EXCHANGE	Binary variable indicating the exchange that the firm is listed on (0 for NYSE/Amex, 1 for NASDAQ).
INTCOVER	Ratio of interest expense to cash flow (operating earnings before depreciation + depreciation + non-operating income + special items + net interest income).
INVGRAD	Binary variable indicating the existence of investment grade bonds (1) or not (0).
LEVERAGE	The book debt to market value of equity ratio, which should be higher for distressed firms.
LINE	Binary variable indicating whether the loan is announced as a line of credit or revolving line (1), or not (0).
LOANMKT	Loan value divided by the market value of equity of the firm one week prior to event.
LOGSIZE	Natural logarithm of firm size measured the market value of equity one week prior to event.
MATURE	Binary variable indicating whether maturity information is disclosed in the announcement (1 if disclosed, 0 otherwise).

## Appendix C cont'd.

MVEBCTL	Market value of equity to book value of total liabilities. This ratio should be low for firms with a high probability of default.
NEGRUN	Binary variable indicating negative-valued pre-announcement information. It is coded as 1 if the firm has significant (10 percent, one tailed) share price rundown starting 30 and ending 11 days before the event, 0 otherwise.
NEW	Binary variable indicating whether the loan is disclosed as new in the announcement (1) or not (0).
POSRUN	Binary variable indicating positive-valued pre-announcement information. It is coded as 1 if the firm has significant (10 percent, one tailed) share price runup starting 30 and ending 11 days before the event, 0 otherwise.
RATE	Binary variable indicating whether rate information is available in the announcement (1) or not (0).
RENEW	Binary variable indicating whether the loan is announced as renewed (1) or not (0).
RETA	Retained earnings to total assets. This ratio should be smaller for small firms as well as firms with deteriorating earnings.
SECURE	Binary variable indicating whether the loan is announced as secured (1) or not (0).
SLSTA	Sales to total assets. This ratio contributes to the overall discriminating ability of Altman's discriminant analysis model.
TERM	Binary variable indicating whether the loan is announced as a term loan or revolving line and term loan (1) or not (0).
TRANSFER	Binary variable indicating whether the announcement indicates that the loan has been transferred from one bank or group of banks to another (1) or not (0).
UNSECURE	Binary variable indicating whether the loan is announced as unsecured (1) or not (0).

## Appendix C cont'd.

WCTA      Working capital to total assets. This ratio should be smaller for firms experiencing reduced operating earnings.

## Vita

Mr. Faulk was born in Rayne, Louisiana to Mr. and Mrs. Kenneth Faulk. He received a Bachelor of Science degree from the University of Southwestern Louisiana in May of 1971. He received a Master of Business Degree from Louisiana State University in 1980. Mr. Faulk served in the United States Army. He has worked in the banking industry in various capacities. Mr. Faulk expects to receive a Doctorate in Business Administration with a concentration in Finance from Louisiana State University in the Fall of 1993.

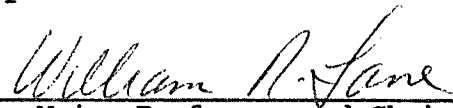
# DOCTORAL EXAMINATION AND DISSERTATION REPORT

**Candidate:** Gregory Kenneth Faulk

**Major Field:** Business Administration (FINANCE)

**Title of Dissertation:** An Examination of the Role of Collateral in the Loan Contracting Process

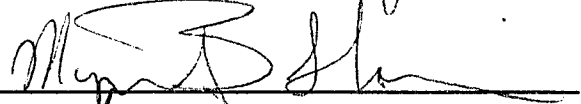
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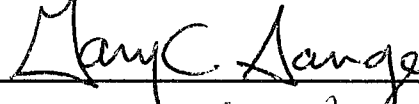
  
Major Professor and Chairman

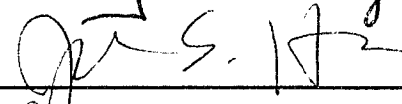
  
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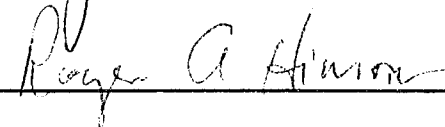
**EXAMINING COMMITTEE:**

  
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**Date of Examination:**

August 4, 1993