2003

Market timing and cost of capital of the firm

Kyojik Song
Louisiana State University and Agricultural and Mechanical College, ksong1@lsu.edu

MARKET TIMING AND COST OF CAPITAL OF THE FIRM

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 (Finance)

by
Kyojik Song
B.A., Yonsei Univeristy, 1993
M.B.A., Iowa State University, 1999
December 2003

ACKNOWLEDGEMENTS

I have experienced a lot of difficulties during my study at LSU, and I sometimes wanted to give up pursuing my doctoral degree. Many people helped and encouraged me to finish this dissertation. I really need to appreciate them for their help and encouragement during my stay at LSU.

I would like to thank my major professor, Dr. Shane Johnson, for his guidance and efforts to complete this dissertation. He was professional enough to answer any of my questions, and made the dissertation interesting and challenging to me. I extend my thanks to other committee members, Dr. Ji-Chai Lin, Dr. Harley Ryan Jr., and Dr. M. Dek Terrel. I could make this research more interesting with their constructive criticism and suggestions. I also thank other faculty members, staff, and doctoral students in Dept. of Finance for their encouragement and friendship.

In addition, I would like to acknowledge the support I received from my family. I appreciate my mother, Gyusook Kim, and my father, the last, Byoungpyo Song for their support and hearty encouragement. Specially, I would like to thank my wife, Jung-A Yang, who has given up her job to be with me and has been the biggest supporter for my study. I also thank my lovely daughters, Jeana and Suzy for their patience. I could not spend much time on playing with you to finish my doctoral degree, but promise you I will spend more time with you from now on.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Graham and Harvey's (2001) survey evidence and Baker, Greenwood, and Wurgler (2003) indicate that firm managers try to time debt markets based on term spreads or excess bond returns when choosing the maturity of new debt issues. Whether debt market timing increases firm value via a reduced cost of capital is an empirical question. I examine differences in firm value across non-timers and timers, where timers are defined as firms that follow either a naïve strategy of choosing long-term debt when the term premium is low or a complex strategy from Baker et al. (2003) based on the predictability of future excess bond returns. Also, I combine a debt maturity function and a complex timing strategy to obtain a better classification of timers. Timers are assumed to choose different maturity from the predictions of the debt maturity function to follow a complex strategy.

First, I investigate whether the timing strategies affect the share price response to announcements of straight debt offerings. I find no evidence that timing strategies affect share price responses to announcements of debt offering. Second, I investigate whether timers have higher firm value than non-timers, as measured by Tobin's q. After controlling for various determinants of firm value, I find no differences in firm value between them. Third, I investigate whether firm value for timers increases more than that for non-timers after the debt issues. I find no differences in changes in value between them.

In addition, I consider that firms could have private information about their future credit quality and use the information to time debt markets. Timers issue short-term (long-term) debt when they expect increases (decreases) in credit quality. I find that

timers have lower firm value than non-timers. This result is consistent with previous findings that bond ratings changes follow financial and operational abnormal performance, and thus investors are able to predict bond ratings changes. Overall, although firms apparently try to time debt markets using market interest rates or future credit quality, they fail to increase firm value. The results suggest that corporate debt markets are efficient and well integrated with equity markets.

CHAPTER 1

INTRODUCTION

Modigliani and Miller (1958) show that in perfect and integrated capital markets financial policy is irrelevant in valuing a firm. Their key insight is that firm value is not related to the firm's capital structure with assumptions of perfect capital markets. In contrast to Modigliani and Miller's propositions, some studies find that managers can successfully time equity markets when they have private information.[1] Relaxing the assumptions of perfect capital markets, the studies assume that the managers are better informed about their future earnings than investors. Then, firm managers can implement timing strategy such that they issue equity when the firm is overvalued and avoid issuing equity when the firm is undervalued. Consistent with the studies, Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) show that seasoned equity offering (SEO) firms under-perform various benchmarks by about 30 percent on average over the three to five-year period after the issue. Loughran and Ritter (1995) argue that the long-run underperformance of equity issuers is consistent with the idea that managers issue equity when equity is overvalued. This evidence indicates that firms are successful in timing equity markets, and also suggests that there exist some inefficiencies in equity markets.

Recent studies focus on debt market timing strategies. Graham and Harvey (2001) survey evidence show that financial managers tend to choose maturity based on term spreads when they issue new debt securities. The survey evidence is consistent with empirical findings in Barclay and Smith (1995) and Guedes and Opler (1996) that debt

[1] See Lucas and McDonald (1990), Korajczyk, Lucas, and McDonald (1991), and Choe, Masulis, and Nanda (1993).

maturity is negatively related to term spreads. If the managers have better information about future movements of interest rates than investors, they can issue long-term debt when term spread is too low and issue short-term debt when term spread is too high. Whether this timing strategy decreases overall cost of capital is an empirical question. In perfect and integrated capital markets, there should not be any gain associated with switching between short-term and long-term debt. Suppose that a firm has a fixed leverage ratio, and it tries to time debt markets by switching between short- and long-term debt based on market conditions. If timing strategies can decrease the overall cost of its debt by changing maturities of debt securities, then it means that these strategies should increase the cost of equity because Modigliani and Miller theorem applies in the integrated markets and implies that the overall cost of capital should not change. Financial managers can decrease their cost of debt without changing cost of equity by timing debt markets only if markets are segmented because Modigliani and Miller theorem does not apply in segmented markets. Successful debt market timing strategies would then imply that debt markets are not well integrated with equity markets.

Baker, Greenwood, and Wurgler (2003) show that the share of long-term debt in total debt issues is largely explained by debt market conditions such as inflation, the real short term rate, and term spread, which also forecast excess bond returns. They argue that firms use market conditions to determine the lowest-cost maturity at which they can borrow. To explain their findings, they test whether the long-term share in debt issues is related to time-varying risk. Since the long-term share is inversely related to predictable excess bond returns, it should also be inversely related to time-varying risk if the market is efficient. However, they fail to find supporting evidence that the long-term share is related to various measures of risk. Their evidence is consistent with two possible explanations. First, managers know when the cost of debt is low and can successfully time inefficient and segmented capital markets. Second, managers try to time debt market, but the capital markets are efficient and integrated. However, Baker et al. do not present direct evidence distinguishing between the two explanations. Although their evidence indicates that firms try to time market interest rates, it does not address directly whether firms actually reduce their cost of capital and thereby increase firm value by debt market timing.

Titman (2002) points out that the observed debt market timing strategies can increase firm value, only if the equity market and debt markets are not integrated. If debt markets are inefficient and timing strategies are successful, one needs to explain why the inefficient debt markets can be exploited by only firm managers, which would require that firm managers are better informed than others about market interest rates. He acknowledges that it is difficult to test whether firm managers can reduce the overall cost of capital by timing debt markets.

In this dissertation, I test whether timing debt markets based on market interest rates or inside information about credit ratings increases the value of the firm, as measured by Tobin's q. By investigating the effect of timing strategies on firm value, I answer the unsolved problem in Baker et al. (2003) and Titman (2002) about whether managers successfully time debt market or managers try in vain to time an efficient debt markets.

I classify short- and long-term debt issuers into timers and non-timers using term spreads or excess bond returns. I assume that firms can follow a naïve timing strategy, which tries to time debt markets using term spreads, or Baker et al.'s (2003) timing strategy (hereafter complex strategy), which tries to time debt markets using predicted excess bond returns. Timers issue long-term debt when market interest rates (term spreads or excess bond returns) are relatively low, and issue short-term debt when market interest rates are high. In contrast, non-timers issue short-term debt when market interest rates are relatively low, and issue long-term debt when market interest rates are high. I also combine a debt maturity function in Guedes and Opler (1996) and a complex timing strategy to obtain a better classification of timers. Timers are assumed to choose a different maturity from the predictions of the debt maturity function to follow a complex timing strategy based on one-year-ahead excess bond returns.

In addition, I classify timers based on private information (future bond ratings changes). Flannery (1986) presents a theoretical model in which firms issue short-term debt expecting their credit quality to improve, and firms issue long-term debt expecting their credit quality to deteriorate. Timers are assumed to have private information about their rating changes within three years after the issuance of debt securities and use the information to choose maturity when they issue the debt securities.

In this research, I test whether firm value differs between timers and non-timers. If timing strategies are successful and if capital markets discern whether firms are timers or non-timers, then timers should have higher firm value than non-timers even before timing strategies are implemented. In a different scenario, the motivation of timers can be revealed to the markets after firms implement timing strategies. To test this possibility, I examine the effect of timing strategies on stock price response to the announcements of straight debt offering using a standard event study method. If timers have better information about future interest rates, timing strategies allow the timers to lock in lower interest rates. Then, changes in interest rates will increase the firm value of timers more than that of non-timers. To test this possibility, I investigate *changes in q* (from before to after the issuance of debt securities) across timers and non-timers.

Using a sample of 1,423 straight long-term debt offerings with available announcement dates during 1983-1997, I investigate whether timing strategies affect the mean share price response to the announcements of the debt offerings. For the full sample, the mean share price response is negative but is not significantly different from zero. I find that the share price response for timers is not significantly different from that for non-timers regardless of how I classify timers. Overall, timing strategies based on market interest rates or future bond ratings change do not affect the mean share price response to the announcements of straight debt offerings.

Then, I test whether timers have higher firm value than non-timers. I use q as a measure of firm value. Theoretically, q is defined as the ratio of the market value of the firm to the replacement costs of its assets. In this research, I use two different measures of q. Following Chung and Pruitt (1994), I use the market value of equity, the book value of long-term debt, and the book value of assets (a proxy for the replacement costs of its assets) to calculate q (hereafter C-P q). Also, I use the market value of long-term debt instead of the book value of long-term debt for the firms with available bond prices to re-calculate q (hereafter New q). Using a sample of 5,487 short- or long-term debt issuers over the period 1983-1997, I find no significant differences across timers and non-timers in firm value, regardless of whether I assume they follow a naïve timing strategy or a complex timing strategy , and regardless of whether I use C-P q or New q as a measure of firm value.[2] The results remain the same even after controlling for size, leverage effect, dividend policy, bond ratings, and inside ownership. Then, I examine whether any increase in firm value would show up after the issuance of debt securities by comparing the changes in q between timers and non-timers. Again, I find no significant differences between timers and non-timers.

I do find one interesting result when I classify timers based on future rating changes. I follow bond ratings changes during the three years after the debt issues. The debt issuers are classified as timers if short-term debt issuers experience credit quality improvement or if long-term debt issuers experience credit quality deterioration during the three-year period. I find that timers have lower firm values than non-timers in the year of or one year before they issue the debt securities. To investigate this result further, I divide the timers into firms with upgrades and firms with downgrades. The result shows that timers issuing short-term debt expecting upgrades do not have significantly different firm value than non-timers. In contrast, timers issuing long-term debt expecting downgrades have significantly lower value than non-timers. In addition, timers issuing long-term debt expecting downgrades lose firm value significantly more than non-timers during the year when they implement the timing strategy. This result is consistent with the findings in Pinches and Singleton (1978) and Holthausen and Leftwich (1986). They show that bond ratings changes follow abnormal financial and operational performance, and thus investors are able to predict bond ratings changes. These results also imply that timers fail to reduce the overall cost of capital although they try to time debt market using seemingly private information.

---

[2] New q is used to analyze the sub-sample with available bond prices over the period 1988-1997.

Overall, the results show that timing strategies do not affect the share price response to the announcements of straight debt offerings. Regardless of whether timers use market interest rates or seemingly private information (future bond ratings changes), timers do not have higher firm value than non-timers or do not increase firm value more than non-timers. That is, although firm managers try to time debt markets using public information or seemingly private information, they do not succeed in increasing firm value by reducing the overall cost of capital. The results strongly suggest that corporate debt markets are efficient and well integrated with equity markets.

CHAPTER 2

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

In perfect and fully integrated capital markets, Modigliani and Miller (1958, 1963) demonstrate that firm value is independent of a firm's capital structure. Their main result is that the rewards for bearing relevant risks should be the same across securities. They show that if a levered firm and an unlevered firm are in the same risk class and they have identical cash flows, arbitrage opportunities make the market values of the levered firm and the unlevered firm equal. With respect to securities issuance, their propositions imply that there should be no gain from switching between debt and equity or between short-term and long-term debt.

Stiglitz (1974) extends the argument of Modigliani and Miller's theorem. He shows that if the state space is spanned by the securities markets, then changes in maturity do not add value to the present set of investment opportunities available. This theorem is based on a frictionless market with no taxes and no bankruptcy costs. These classical models show that in a perfect market with no frictions, the debt-equity choice is of no consequence and the debt maturity choice is also not relevant for value maximizing financial managers.

However, if the strict assumptions of frictionless markets are relaxed, changes in debt maturity could change firm value. Numerous researchers show that debt maturity choice has important implications in the firm if they assume some frictions in the financial markets. In this chapter, I explain how timing strategy in equity markets and timing strategy in debt markets are different, and why timing strategies in debt markets are relevant for only segmented markets. Then, I review literature about how the frictions in the financial markets are related to the debt maturity choice. Based on this literature review, I develop the main hypotheses that I can test in this dissertation.

2.1 Market Timing

Previous studies support the proposition that firm managers tend to time equity markets based on asymmetric information between themselves and outside investors. Under asymmetric information, firms raising external capital face an adverse selection problem. Assuming the existence of asymmetric information, Myers and Majluf (1984) and Myers (1984) develop the pecking order hypothesis that firms prefer internal capital to external capital. Firm managers prefer less risky securities when they go to external markets. Lucas and McDonald (1990) develop the equity-timing model based on asymmetric information. Their model indicates that firms tend to issue equity after they experience a large and extended positive abnormal share price run-up. Also, equity issues on average follow stock price increases in the market as a whole, and stock prices drop significantly on the announcement of an equity issue.

The empirical evidence is consistent with the predictions suggested by equity timing models. Korajczyk, Lucas, and McDonald (1991) show that because financial managers know that equity issues are associated with negative returns, they try to issue equity at a time of smaller information asymmetries. They find that firms issue equity in times with relatively smaller firm-specific information asymmetries, e.g., immediately after an earnings announcement. Similarly, Choe, Masulis, and Nanda (1993) find that firms offering seasoned equity experience less of a negative reaction to announcements in up markets than in down markets. Jung, Kim, and Stulz (1996) investigate the ability of the pecking-order model, the agency model, and the timing model to explain a firm's financial structure and the stock price reaction to its decisions. In their model, they use the actual long-term post issue abnormal returns as a proxy for management's expectations of future performance. They find that firms underperforming the most are more likely to issue equity, but the result is not statistically significant. As they suggest, their results do not support the timing model, possibly due to the low power of their test stemming from a relatively large cross-sectional standard deviation of post-issue performance and corresponding large standard errors. They also find that firms without valuable investment opportunities and with debt capacity issue equity. This evidence supports the agency model because equity issue for these types of firms enhances managerial discretion.

Empirical research on the long-run performance of equity offerings also supports the timing hypothesis. Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995) show that SEO firms under-perform various benchmarks by about 30 percent on average over three to five-year periods after the issue. Loughran and Ritter (1995) argue that the long-run underperformance of equity issuers is consistent with the idea that managers issue equity when equity is overvalued.

In a recent paper, Baker and Wurgler (2000) document that the aggregate share of equity issues relative to the sum of debt and equity issues for a specific year is a predictor of stock market performance for the subsequent year over the period of 1928-1997. They suggest that the negative relation between equity share and stock market returns supports inefficiency or market timing. They also investigate the effect of timing equity markets on the capital structure of these firms and find that leverage is negatively related to historical market valuations. They conclude that market timing has a persistent effect on capital structure.

Recently, researchers document evidence suggesting that financial managers also try to time debt markets by switching between short- and long-term debt, conditional on market interest rates. Graham and Harvey (2001) survey 392 CFOs about capital structure and the cost of capital. Their results suggest that firm managers attempt to time debt market interest rates by switching between short-term and long-term debt. They borrow short-term when they think that short-term interest rates are low relative to long-term rates or vice versa. The survey evidence is consistent with empirical evidence documented in the previous literature. Barclay and Smith (1995) and Guedes and Opler (1996) find that debt maturity is negatively related to term spread.

Baker, Greenwood, and Wurgler (2003) find that inflation, the real short-term rate, and the term spread predict excess bond returns, and the same variables also have predictive power in explaining the share of long-term debt in total debt issues. That is, the share of long-term debt is negatively related to future excess bond returns. They argue that the results are consistent with survey evidence that financial managers try to time debt market using market interest rates. They suggest three possible explanations for their findings: (1) *Rational investors, Rational managers*. Based on the assumption that the debt market is efficient and integrated with equity market, the long-term debt share in debt issues are correlated with time-varying excess bond returns. This explanation suggests that timing debt markets cannot reduce the cost of capital. (2) *Rational managers, Irrational investors*. Managers can choose maturity when the cost is relatively low and successfully time inefficient and segmented capital markets. How does this affect cost of capital? (3) *Irrational managers, Rational investors*. Managers try to time debt markets even though the capital markets are efficient and integrated. They test whether the long-term share in debt issues is related to time-varying risk. Since the long-term share is inversely related to predictable excess bond returns, it should also be inversely related to time-varying risk if the market is efficient. However, they fail to find supporting evidence that the long-term share is related to various measures of risk, and remove the first alternative from the possible explanations. Also, they do not present direct evidence differentiating the second from the third explanation. Therefore, although their evidence indicates that firms try to time market interest rates, it does not address directly whether firms actually reduce their cost of capital and thereby increase firm value by debt market timing.

As Titman (2002) points out, the observed debt market timing strategies can increase firm value only if the equity market and debt markets are not integrated. Based on Modigliani and Miller theorem, the required return premium associated with any risk is the same in both equity markets and debt markets if those markets are integrated. Suppose a firm has a fixed leverage ratio, and it tries to time debt markets by switching between short-term and long-term debt based on market conditions. If timing strategies can decrease the overall cost of its debt, then it means that these strategies should increase the cost of equity because Modigliani and Miller theorem applies in the integrated markets and implies that the overall cost of capital is not changed. Yet, Modigliani and Miller theorem does not apply in segmented markets. Accordingly, if we find that timing debt markets can reduce the overall cost of capital, the results will suggest that the bond markets and equity markets are segmented.

In terms of information asymmetry, there exists a fundamental difference between debt market timing based on term spread or predicted excess bond returns, and equity market timing based on private information. Managers try to time equity markets based on their private information about the future value of their firm, while managers usually try to time debt markets based on public information such as the term spread or predictable excess bond returns. If managers do not have an informational advantage when they time debt markets, a timing strategy will not increase the firm value.

In addition, firms may time debt markets based on their private information about their future credit ratings. Firm managers can have better information about future changes of credit ratings of their firm. Flannery (1986) shows that if firm managers are better informed than outside investors, they will choose to issue debt securities that are overvalued. This theoretical result suggests that firm managers will issue short-term debt if they expect their ratings to improve, and vice versa. If firms are subject to large informational asymmetries, the effect of timing debt markets based on private information on firm value may be significant. Graham and Harvey (2001) provide survey evidence that only a small percentage of firms borrow short-term because they expect their credit rating to improve.

Whether firm managers can reduce their firms' costs of capital by timing debt markets is testable. Although previous literature shows that firm managers tend to time debt markets, it does not tell us directly whether they have a successful timing ability. As Baker et al. (2003) point out, the evidence of timing debt markets suggests that managers time a segmented and inefficient debt market or that managers try to time an efficient debt market even though they cannot reduce their cost of capital. This dissertation tests directly whether timing debt markets based on market interest rates or inside information about credit ratings increases the value of the firm.

2.2 Agency Costs of Debt and Debt Maturity

Agency problems might exist when a principal employs an agent to perform a service on his or her behalf. These problems arise from conflicts of interests between the principal and the agent. The argument that agency costs of debt influences maturity of corporate debt has been well recognized theoretically and empirically. Jensen and Meckling (1976) argue that debt creates certain incentive effects. In their model, the firm owner can transfer wealth from bondholders to himself as equity holder by selling bonds with a promise to take less risky projects and then actually take riskier projects. With risky debt outstanding, the equity holder can be viewed as holding a European call option on the total value of firm with an exercise price equal to the face value of debt. Because the value of the call option increases with the risk of underlying assets, the equity holder has the incentive to take riskier projects. Therefore, bondholders try to include various covenants in the indenture to limit the managerial behavior that results in reductions in the value of bonds. That is, the owner-manager bears the agency costs associated with debt issuance eventually in the model.

Myers (1977) models an incentive problem associated with debt overhang. In the model, the value of the firm as a going concern depends on its future investment strategy. When debt matures after the firm's investment option expires, managers who want to maximize shareholder value can have incentives to make sub-optimal investment decisions. The managers may pass up positive net present value projects in some future states because the value of equity is a decreasing function of any promised payment to the creditors in the model. In some future states, any promised payments to debt-holders may lead the firm to abandon a project with positive net present value. Thus, the firm with risky debt outstanding cannot capture the full benefits from exercise of the investment options because they accrue partially to debt-holders. Myers (1977) argues that shortening debt maturity might mitigate the incentive problem because managers and debt-holders can re-contract before the growth options are exercised. If debt matures prior to the exercise of the investment option, the agency problem can be eliminated. He predicts that firms with greater growth opportunities, which may experience greater underinvestment problems, have incentives to use short-term debt. Also, he predicts that firms with greater growth opportunities have lower leverage.

Previous empirical findings are consistent with this prediction. For instance, Barclay and Smith (1995) and Guedes and Opler (1996) find empirically a negative relation between debt maturity and growth opportunities. Using data from 1965 to 1985, Smith and Watts (1992) document that firms with more growth options have lower leverage, lower dividend yields, higher executive compensation, and greater use of stock-option plans. Using international data from G-7 countries, Rajan and Zingales (1995) find a negative correlation between the proxy for growth opportunities (market to book ratio) and leverage in most countries. Also, Johnson (1997) documents that growth opportunities are associated with debt choice among the firms. He finds that there is no relation between the use of public debt and growth opportunities, a positive relation between use of private debt and growth opportunities, and a negative relation between the use of bank debt and growth opportunities.

Bodie and Taggart (1978) argue that the existence of non-callable long-term debt in a firm's capital structure will give managers an incentive for risk shifting in the presence of growth opportunities. If the firm has non-callable risky debt in its capital structure, bondholders will share with stockholders in the profitable future investments thus reducing the firm's incentive to invest in positive NPV projects in the future. This incentive problem rationalizes the existence of the call provision because stockholders might be able to receive all of the gains from their discretionary powers over future investment opportunities by calling the long-term debt.

Also, Barnea, Haugen, and Senbet (1980) argue that shortening the maturity of debt and issuing long-term debt with a call provision play the same role in eliminating those agency problems mentioned in the above. In their model, the call feature mitigates the wealth transfer problem to the extent that the true nature of the firm is revealed before the maturity of the debt. Also, short-term debt might mitigate the asset substitution incentive since the prices of short-term debt are less sensitive to risk shifting compared to those of long term debt.

2.3 Asymmetric Information and Debt Maturity

When there is no asymmetric information between outside investors and firm insiders, the securities of a firm will be priced correctly regardless of its financial structure. However, if insiders have better information than outside investors, they will choose to issue the securities that are overvalued most in the market. Because outside investors know this motivation of insiders, they can infer insiders' information from the firm's capital structure choices.

Some researchers develop signaling models showing that there exists a relation between debt maturity and borrowers' private information about their credit quality. Financial managers can have better information about future changes in credit ratings of their firm. Flannery (1986) shows that if financial managers are better informed than outside investors, they will choose to issue debt securities that are overvalued. This theoretical result suggests that financial managers will issue short-term debt if they expect their ratings to improve, and long-term if they expect them to worsen. In his two-period signaling model, a separating equilibrium obtains if there are additional transaction costs to issuing short-term debt. The extra costs prevent bad firms from mimicking good firms. Then, good firms issue short-term debt to signal their inside information about firm quality, and only bad firms issue long-term debt. Kale and Noe (1990) show that a separating equilibrium can also be obtained with no transaction costs when changes in firm value are positively correlated over time. Provided that a Good type firm's cash flows are correlated, the Bad-type firm will suffer mispricing losses if it mimics the Good firm by issuing short-term debt at period zero. In the setting, after the Bad firm is priced as the Good firm, it will have a higher default risk premium if it has a lower realization at period one. Because of this higher default risk premium and positively correlated cash flows, the Bad firm will avoid mimicking the Good firm. Then, the Good firm will issue short-term debt and the Bad firm will issue long-term debt.

Robbins and Schatzberg (1986) argue that the papers based on agency costs, like Bodie and Taggart (1978) and Barnea, Haugen, and Senbet (1980), have not succeeded in showing any advantage of callable bonds over short-term debt. They assume insider information among the firm's managers, and assume that managers have no other source of compensation than that paid by the firm's owners, which is based on the firm's residual value. First, they show that issuing either callable bonds or short-term debt is an effective mechanism for signaling good prospects. Neither equity nor non-callable debt fails to achieve a separating equilibrium because non-callable debt or equity does not provide for financial recontracting once the firm's prospects are revealed. When managers have poorer inside information, they will choose to issue equity over non-callable debt because doing so reduces risk to their compensation. Second, they show that by choosing callable debt, managers can signal their inside information and also reduce their risk. If the firm issues callable bonds, it retains a moderate amount of its earnings in all states of the world and its residual value is stabilized. The managers who have compensation contracts based on the firm's residual value should choose callable bonds over short-term debt.

Several papers, e.g., Bodie and Taggart (1978), Barnea, Haugen, and Senbet (1980), and Robbins and Schatzberg (1986), indicate that short-term debt or callable debt can mitigate agency costs, and might be an effective mechanism to signal managers' private information. They imply that long-term non-callable debt should be a dominated security. However, I find in this research that more than 50 percent of long-term bonds issued over the sample period 1983-1997 do not have call provisions, which is not consistent with the arguments of these papers.

Titman (1992) also extends Flannery's (1986) research. His model assumes that interest rates are uncertain and interest rate swaps are available. When interest rates are high, managers have an incentive to take the lower NPV risky projects, which creates financial distress costs. He shows that some firms try to reduce uncertainty about future interest expenses due to high financial distress costs. The main result of the paper is that the firms, which have favorable information, borrow short-term and use swaps to hedge interest rate risk.

2.4 Liquidity Risk and Debt Maturity

Firms may face higher liquidity risk when they choose short-term debt. Short-term debt can create liquidity risk because lenders ignore the borrower's control rents and are unwilling to refinance when bad news arrives. Diamond (1991) analyzes debt maturity choice as a tradeoff between a borrower's private information about its future credit rating and liquidity risk. Because lenders cannot benefit from the future control rents, banks liquidate too often from the borrower's optimal standpoint. A firm's willingness to select short-term debt depends on the private information on its future credit ratings. When it expects its credit ratings to improve sufficiently, it will issue short-term debt, and then issue long-term debt after its credit ratings improve. Therefore, in Diamond model optimal maturity structure depends on the tradeoff between a preference for short maturity due to expecting their credit ratings to improve and liquidity risk. Diamond predicts that firms with high credit ratings issue short-term debt because they are willing to bear the liquidity risk of refinancing short-term debt, and firms with somewhat lower ratings prefer long-term debt because they try to avoid high liquidity risk. Firms with lowest credit ratings should borrow short-term because they do not have any choice but to borrow short-term.

Diamond (1993) extends his 1991 paper, and considers the priority of debt in addition to maturity. He provides a model of how highly levered firms with private information about their credit quality choose the seniority and maturity of their debt. In the paper, borrowers with better private information try to increase the sensitivity of financing costs to new information for a given protection of managerial control. To protect large control rents, good borrowers want some short-term debt and bad borrowers want all long-term debt. The maturity and priority structure of debt preferred by good borrowers is chosen by all borrowers. The choice of all long-term debt would reveal that a borrower was bad type, and then no loan would be made. Good borrowers want less liquidation than lenders would choose, but they do not want to eliminate liquidation for unexpectedly realized low credit ratings. Therefore, a mix of short- and long-term debt will be used to balance borrowers' and lenders' desires. The main result of the paper is that borrowers who choose both maturities select senior short-term debt and junior long-term debt. The long-term debtholders will allow the issue of additional future debt even if it dilutes the value of their long-term debt. Borrowers who receive very low future credit ratings are liquidated, and other borrowers who receive moderately low future credit ratings are not liquidated.

Sharpe (1991) shows that when the firm is unfortunate in the early going, the use of short-term debt can lead to inefficient liquidation. When a firm experiences financial difficulty, an increase in its financing costs makes the managers consume more perks. If lenders are not willing to offer concessionary loan rates, short-term debt contracts might result in credit rationing and inefficient liquidations. He shows that under symmetric information and less costly recontracting, agency costs can be lower under long-term contracting.

Due to liquidity risk, some firms have an incentive to borrow long-term. However, Stiglitz and Weiss (1981) show that the interest rate a lender charges may affect the riskiness of the pool of loans by either: 1) sorting potential borrowers or 2) affecting the actions of borrowers. In their model, interest rate may serve as a screening device. Because a lender will increase its interest rate only up to the point where its return is maximized, there exists credit rationing. Because less risky borrowers drop out of the market as interest rates increase (adverse selection), a lender does not simply increase interest rates. Thus, low quality firms find it difficult to borrow long-term because the adverse selection problem is severe in the long-term debt market. The implications in Stigliz and Weiss (1981) are consistent with Guedes and Opler's (1996) empirical evidence that firms with speculative grade bond ratings usually borrow in the middle of the maturity spectrum because they are screened out of the long-term debt market. Also, Denis and Mihov (2003) find that credit quality plays an important role in the choice of debt. Firms with the highest credit quality typically issue public debt with an average maturity of 15 years, and firms with the medium credit quality borrow from banks with an average maturity of three years. Firms with the lowest credit quality borrow from non-bank private lenders with an average maturity of eight years.

The papers based on agency costs or asymmetric information argue that short-term debt can reduce agency costs or can be an effective mechanism to signal managers' private information. However, when a firm issues short-term debt, it bears the risk of being forced into inefficient liquidation because refinancing may not be available. Therefore, when a firm issues short-term debt, it should trade off between liquidity risk and the benefits of reducing agency costs or signaling private information. Using a simultaneous equation approach, Johnson (2003) finds that short-term debt attenuates the negative effect of growth opportunities on leverage. He also finds that short debt maturity increases liquidity risk, and thus negatively affects leverage. The results confirm that when firms choose short-term debt, they balance the positive effect of decreasing underinvestment problems against the negative effect of increasing liquidity risk.

2.5 Tax Issues and Debt Maturity

There is a long history of debate regarding whether taxes are relevant in financing decisions. Modigliani and Miller (1958, 1963) show that if corporate interest expense is tax deductible, debt financing results in an increase in the total distributable cash flows to security holders. Following their papers, subsequent researchers propose a "tradeoff theory" of capital structure that financial managers can optimize capital structure as a tradeoff between tax advantages and prospective financial distress costs (see Brennan and Schwartz (1978), Kim (1978), and Scott (1976)). However, Miller (1977) argues that debt financing is not relevant because the corporate tax gain from debt is neutralized by a commensurate tax disadvantage to debtholders.

Brennan and Schwartz (1978) use the option pricing framework of Black and Scholes (1973) and Merton (1973) to show that short-term debt is optimal with corporate taxes. Their model assumes corporate tax savings, the possibility that at some future date the firm may have no taxable income against which the interest payments on the debt may be offset, and the existence of an unlevered firm. They show that it is optimal for a levered firm to issue short-term debt and roll it over because the optimal leverage ratio decreases with maturity. Boyce and Kalotay (1979) show that when term structure of interest rates rises, long-term debt is optimal.

Brick and Ravid (1985) extend the models of Brennan and Schwartz (1978) and Boyce and Kalotay (1979) by allowing for default, possible agency costs, and a non-flat term structure of interest rates. They show that if the term structure of corporate coupon rates is increasing, long-term debt is optimal because the tax benefit of debt is accelerated. If term structure is decreasing, short-term debt is optimal for the same reason.

Brick and Ravid (1991) assume stochastic interest rates. In addition to the acceleration of tax benefits documented by Brick and Ravid (1985), interest rate uncertainty makes the long-term debt increase debt capacity. When interest rate uncertainty is present and the term structure is increasing, the acceleration motivation works in the same direction as the debt capacity factor. When the term structure is declining, the two factors operate in opposite directions. The main result of the paper is that in the case of increasing or flat term structure or even sometimes a decreasing term structure of interest rates, long-term debt is optimal. If the term premium is sufficiently negative, then long-term debt is optimal.

Kim, Mauer, and Stohs (1995) examine the influence of corporate debt maturity policy on investor tax-timing options. They show that when investors optimally realize capital losses and defer capital gains, a long-term debt maturity strategy maximizes investor tax-timing option value. Option pricing theory indicates that the value of a tax-timing option increases with maturity and also increases with variation in interest rates. Their model has two testable predictions. First, firms lengthen debt maturity as interest rate volatility increases. Second, firms lengthen debt maturity as the term premium increases. Using a data set of 328 industrial firms during the period 1980 to 1989, they find a positive relation between debt maturity and interest rate volatility. Yet, they find a negative relation between debt maturity and term spread over the first half of the sample period and a positive relation over the second half. Also, Barclay and Smith (1995), Barclay and Smith (1996), and Guedes and Opler (1996) find a negative relation between term spread and maturity, which is inconsistent with the argument of tax timing option but consistent with market timing.

2.6 Research Design and Hypothesis Development

In this dissertation, I try to answer the unsolved problem in Baker et al. (2003) and Titman (2002) about whether managers have timing ability in debt markets or managers try in vain to time an efficient debt market. I test whether timing debt markets based on public information or inside information increases firm value.

To test the hypotheses, I classify short-term debt issuers and long-term debt issuers into timers and non-timers using several methods. First, I assume that financial managers use term spread to choose the maturity spectrum of debt. I term this a *Naïve strategy*. I obtain monthly term spreads over the sample period, 1983-1997. If firms issue long-term debt when the term spread is lower than the median I classify those firms are timers, and vice versa. If firms issue short-term debt when the term spread is lower than the median, those firms are non-timers, and vice versa.

Second, I assume that financial managers use excess bond returns estimated in Baker et al. (2003) to choose the debt maturity. I term this a *Complex Strategy*. I use actual excess bond returns, one-year-ahead excess bond returns, and three-year-ahead excess bond returns. If firms issue long-term debt when the excess bond returns are lower than the median excess bond returns over the sample period, I classify those firms as timers, and vice versa. If firms issue short-term debt when the excess bond returns are relatively low, I classify those firms as non-timers, and vice versa.

Third, I classify timers and non-timers using complex strategy based on one-year-ahead excess bond returns in combination with an optimal debt maturity function. Using the structural model of debt maturity choice in Guedes and Opler (1996), I use *ex-ante* characteristics of each firm to predict a short-term issue or a long-term issue. If the firms issue debt at a different maturity spectrum from the prediction of debt maturity function to follow complex strategy, I classify them as timers. If firms issue debt at the same maturity spectrum as the debt maturity function predicts regardless of complex strategy, I classify them as non-timers.

Fourth, I assume that financial managers have inside information about the change in bond ratings of their firms. I follow the bond rating changes for three years after short-term and long-term debt issues. If short-term debt issuers experience increases in credit quality within three years after the issue, I classify them as timers. If long-term debt issuers experience decreases in credit quality within three years after the issue, I also classify them as timers.

Then, I investigate the effect of timing strategies on firm value. If the timing strategies can reduce the overall cost of capital, the capital markets should reflect the strategies in firm value. First, I test whether the information about timing strategy is revealed to the market at the announcement of straight debt issues. Using event study methods, I test whether stock price responses to the announcement of the debt issues for timers are different from that for non-timers. Also, I test whether the announcement effects of straight debt offering are cross-sectionally related to timing strategies after controlling for other determinants of the effects. To complement the event study, I also test whether the mean change in q (firm value measure) for timers over three years or 5 years after debt issuance is higher than that for non-timers.

Second, if the timing strategies are successful and if investors can separate timers and non-timers, then timers should have higher firm value than non-timers. Thus, using a multivariate regression approach I test whether q is related to timing strategies even after controlling for other determinants of q.

In summary, I test the following three main null hypotheses in this research:

H_0 : The average share price response to the announcements of long-term straight debt issues for timers is equal to that for non-timers.

To complement the above null hypothesis and to test the possibility that any increase in firm value shows up after debt issuance, I examine *changes in Tobin's q* (from before to after debt issue) across timers and non-timers. By implementing timing strategies, firm managers can lock in lower interest rates. Then, changes in interest rates in the future will increase firm value.

H_0 : The average *change in q* for timers is equal to that for non-timers.

Then, I test whether timers have higher value than non-timers because there is a possibility that capital markets already reflect the motivation of timers in firm value.

H_0 : The average q for timers is equal to that for non-timers.

If I find that timing strategies increase firm value, the results would suggest that managers successfully time inefficient and segmented bond markets. If the timing strategies do not increase the value of the firm, the results would suggest that managers try in vain to time an efficient market. In this way, I try to address the unsolved problem in Titman (2002) and Baker et al. (2003) about whether financial managers try to time debt markets in vain or financial managers successfully time an inefficient and segmented capital markets.

Also, I investigate investment banks' timing ability based on market conditions. The ability of investment banks to sell debt issues can be more important to debt issuers because debt issues are not as actively traded as equity issues. The debt timing strategy of financial managers might come from the advising of investment banks that are involved in the debt issuance process. Thus, I investigate whether reputation of investment banks affect the timing strategies.

The literature ties quality to reputation. In fact, a firm's ability to repeatedly deliver goods and/or services of high quality is the cornerstone of the reputation building process (Klein and Leffler (1981); Shapiro (1983)). Additionally, numerous studies have examined the tradeoff between preserving reputation and the potential gains related to providing a low quality product and found that for firms that expect continued operations, the benefits do not outweigh the costs.[3] Puri (1999) develops a model of the certification role of financial intermediary on security issues, and shows that high-reputation

[3] See Maksimovic and Titman (1991) for a detailed theoretical treatment of this topic.

intermediaries have large incentives to maintain their reputation, which leads to high certification standards and higher prices of securities that go public.

The certification role of underwriters is extensively examined empirically in security issue process. A professional service provider's reputation can impact the market value of their client and the client's stakeholders rely on the service provider to mitigate the asymmetric information problem that has been shown to lead to market failure.[4] Carter and Manaster (1990) and Carter, Dark, and Singh (1998) find a negative relation between initial public offering (IPO) underpricing and underwriter reputation. More importantly, Carter and Manaster (1990) provide evidence that low dispersion issuers signal their low risk characteristics by engaging prestigious underwriters who, in order to preserve their high reputation, market only IPOs of low dispersion firms. Megginson and Weiss (1990) find that the presence of venture capitalists reduces IPO underpricing in a sample of firms in the period 1983-1987. Similarly, the choice of auditor also provides firms with an opportunity to signal their value.[5] Thus, the investment bank, the venture capitalist, and the auditing firm (i.e. the service providers) assume both a certification and a monitoring role. These papers use tombstone ranks or market share to measure the reputation of investment banks.

Even though previous literature has extensively examined the certification role of investment banks in the equity issue process, a limited number of empirical papers analyze the underwriters' role on corporate bond issues. Logue and Rogalski (1979) examine the effect of investment bank reputation on underwriter fees and interest rates. They do not find any differential fees or interest rates among prestigious underwriters.

---

[4] See Akerlof (1970).
[5] See DeAngelo (1981), Titman and Trueman (1986), and Beatty (1989).

Livingston and Miller (2000) show that offering yields and issuance expenses paid by the issuer are lower for debt underwritten by the more prestigious investment banking firms. They argue that the evidence indicates investment banker reputation acts to certify the value of a debt issue to investors. To investigate the impact of the underwriter's role on the timing strategy, I measure reputation of underwriters using tombstone ranks or market share following the literature mentioned in the above. Then, I test whether the reputation of underwriters increase firm value of timers.

CHAPTER 3

DATA DESCRIPTION AND CLASSIFICATION OF TIMERS

In this chapter, I explain the process of the data selection and examine characteristics of the firms that are included for this research. I investigate the characteristics of short- and long-term debt issuers. Then, I explain the classification methods of timers. I classify the short- and long-term debt issuers into timers and non-timers using market interest rates or future bond ratings changes. Also, I combine the predictions of debt maturity function and one-year-ahead-excess bond returns to obtain a better classification of timers.

3.1 Data Description

The primary data on public debt issues of U.S. firms over the period of 1983-1997 are obtained from Security Data Corporation (SDC) *New Issues Database.*[6] After I remove unit issues with other securities and issues by foreign companies, I obtain offering date, filing date, proceeds, maturity, coupon rate, offered yield to maturity (YTM), spread to treasury bills, main SIC code of the firm issuing the debts and the name of lead underwriter from the SDC database. I use the following criteria to select the debt issues that are included in the sample:

i) The issuing company is an industrial firm or utility firm. To satisfy this criterion, I omit debt securities issued by firms with SIC codes of 6000-6999. This criterion excludes more than half of all the issues in the population.

[6] SDC New Issues Database covers only investment bank underwriten debt issues, which is limitation of this research.

ii) The debt security is a straight note, bond, or debenture, which means I omit convertible instruments, certificates, Liquid Yield Option Notes (LYONs)[7], and extendable or retractable notes .

iii) The debt security should not be backed by mortgages, which means I omit mortgage bonds and lease obligation bonds.

iv) The debt security should have fixed-rate coupon payments. To test the debt market-timing hypothesis, I remove the debt securities with float-rate coupon payments.

v) I remove the debt securities with time to maturity of more than 30 years because those debt securities have equity-like characteristics.

After satisfying criteria (i)-(v), 5,105 debt issues remain. Out of 5,105 debt issues, 264 issues have term to maturity of less than three years. Most of those short-term debt issues are medium-term notes (MTNs).[8] Medium term notes are registered with the Securities and Exchange Commission under the shelf registration rule (Rule 415), which gives a firm the right to issue securities on a continuous basis. Finally, I have 4,841 long-term debt issues, which mainly consist of bonds, notes, and debentures.

I first investigate the characteristics of long-term debt issues with terms to maturity of more than three years. Panel A of Table 1 presents the descriptive statistics on the 4,841 long-term debt issues over the period, 1983-1997, year by year. The number of long-term debt issues increases over time. Specifically, firms have issued more long-term debt in the middle of the 1980s (1985-1987) and early in the 1990s (1991-1993).

[7] Consistent with Guedes and Opler (1996), I find that LYONs were issued infrequently.
[8] Traditionally, the term, "medium term note", was used to describe debt issues with maturity greater than one year but less than 15 years. Yet, this is not a true characteristic anymore. The maturities of medium term notes are sometimes less than one year or more than 30 years. For instance, Walt Disney Corporation issued a security with a 100-year maturity off its medium-term shelf registration in July 1993.

Table 1. Characteristics of Long-term Debt Issues

Panel A reports the number of long-term debt issues, average term to maturity (in days), total proceeds, average proceeds, average coupon rate, YTM (offered yield to maturity), spread to long-term government bonds (basis point), and C-M (Carter-Manaster's) underwriter ranks year by year. *Panel B* reports the number of long-term debt issues, and mean, median, minimum, maximum, and standard deviation of each variable. *Panel C* reports the number of long-term debt issues, and mean and median of each variable for the sub-samples based on bond ratings. *Panel D* reports the number of long-term debt issues, and mean and median of each variable for the sub-samples based on call provision.

Panel A. Characteristics of long-term debt issues year by year

Year	# of LT debt issues	Term to maturity (days)	Total Proceeds ($ in billions)	Mean Proceeds ($ in millions)	Coupon (%)	Offered YTM (%)	Spread to Treasury (basis point)	C-M underwriter ranks
1983	136	6145	12.2	89.4	11.8	12.4	176.3	7.97
1984	131	4961	12.6	96.0	13.2	13.8	173.1	8.13
1985	266	5381	27.1	101.9	12.2	12.3	194.8	8.59
1986	438	5215	56.6	129.3	10.0	10.1	257.1	8.67
1987	280	4963	36.1	128.8	10.7	10.7	253.2	8.71
1988	227	4580	31.6	139.0	10.9	10.9	212.9	8.73
1989	170	4957	25.5	150.2	10.8	10.8	248.6	8.79
1990	137	4269	18.1	132.0	9.7	9.8	126.2	9.00
1991	405	4515	40.5	100.0	8.9	9.0	128.9	8.92
1992	487	4527	57.1	117.2	8.5	8.5	168.0	8.85
1993	561	4914	61.5	109.6	7.8	7.8	191.8	8.81
1994	278	4066	26.4	94.9	8.5	8.6	184.1	8.83
1995	441	4674	40.4	91.5	7.5	7.6	114.1	8.77
1996	352	4167	32.7	92.8	7.5	7.7	130.5	8.85
1997	532	4532	38.3	72.0	7.1	7.2	91.2	8.90
Full sample	**4841**	**4734**	**758.6**	**106.70**	**9.0**	**9.2**	**175.6**	**8.77**

(table 1 continued)

Panel B. Characteristics of long-term debt issues for total sample

Variable	N	Mean	Median	Minimum	Maximum	Standard deviation
Term to maturity (days)	4831	4734	3657	1094	10950	3063
Proceeds (in $ Millions)	4841	106.7	86.5	0.62	1137.4	101.2
Coupon rate (%)	4841	9.0	8.6	3.5	17.5	2.3
YTM (%)	4283	9.2	8.8	3.6	18.5	2.4
Spread to Treasury (basis point)	4131	175.6	100	3.0	1060	163.9
C-M underwriter ranks	4823	8.77	9.10	1.1	9.1	0.64

Panel C. Characteristics of long-term debt issues by bond ratings

Variables	Investment grade bonds			Speculative grade bonds			Not rated		
	N	Mean	Median	N	Mean	Median	N	Mean	Median
Term to maturity (days)	3524	5021	3657	1207	3893	3655	100	4771	3756
Proceeds (in $ Millions)	3530	102.8	86.5	1210	124.1	90.3	101	32.6	18.1
Coupon rate (%)	3530	8.1	7.8	1210	11.5	11.5	101	11.7	12.0
YTM (%)	3109	8.3	8.0	1100	11.6	11.6	74	12.7	12.0
Spread To Treasury (basis point)	2982	91.4	80	1088	400	402	61	282	307
C-M underwriter ranks	3520	8.89	9.1	1206	8.5	8.9	97	7.2	8.0

Panel D. Characteristics of long-term debt issues with call vs. w/o call provision

Variable	Debt issues without call			Debt issues with call		
	N	Mean	Median	N	Mean	Median
Term to maturity (days)	2776	4088	3651	2055	5607	3663
Proceeds (in $ Millions)	2778	97.1	72.4	2063	119.7	90.9
Coupon rate (%)	2778	7.84	7.50	2063	10.7	10.5
YTM (%)	2352	7.94	7.65	1931	10.7	10.5
Spread to Treasury (basis point)	2237	99.1	77.0	1894	266.0	220.0
C-M underwriter ranks	2773	8.90	9.10	2050	8.58	9.00

The terms to maturity for long-term debt issues decrease over the time period. The average term to maturity is 6,145 days (16.8 years) in 1983, and it decreases to 4,532 days (12.4 years) in 1997. Total proceeds and mean proceeds from debt issues are expressed in 1983 constant dollars. The pattern of total proceeds shows that firms sought more financing from the debt market in the middle of 1980s and early in the 1990s. Mean proceeds are less than 1 million dollars in 1983 and 1984, and they are more than 1 million dollars during 1985-1993. Then, mean proceeds fall to less than 1 million dollars during 1994-1997. The reduction of mean proceeds during 1994-1997 might be related to the boom in the stock market in those periods. Firms tend to issue long-term debt at coupon rates slightly lower than, or close to market interest rates, which means that firms usually issue long-term debt at par value. The spread to Treasury bonds tends to fluctuate over time. The spreads are more than 200 basis points and highest during 1986-1989, and the spreads has fallen since 1990.

Following Livingston and Miller (2000), I use Carter-Manaster's (1990) tombstone ranks as the reputation measures which are available on Jay Ritter's website, or market share of each investment bank in debt market. The last column of Panel A shows the mean C-M underwriter ranks (Carter-Manaster's tombstone ranks) each year. The mean tombstone ranks increase over the time in the 1980s and peak at 9.0 in 1990. Tombstone ranks have fallen since 1991.

Panel B shows the number of long-term debt issues, and the mean, median, minimum, maximum, and standard deviation of term to maturity, proceeds, coupon rate, YTM, spread to Treasury, C-M underwriter's ranks for the whole long-term debt issues. The mean of term to maturity is about three years higher than the median, which means that the term to maturity is skewed to the right. The minimum term to maturity is three years and the maximum is 30 years. The mean proceeds are 106.7 million dollars and the proceeds are also skewed to the right. The mean coupon rate is nine percent and the mean yield to maturity is 9.2 percent. The mean spread to Treasury is 175.6 basis points and the median is 100 basis points, which indicates that the spread is also skewed to the right. The mean tombstone ranks are 8.77, and the maximum and minimum ranks are 9.1 and 1.1, respectively.

Panel C shows the characteristics of long-term debt issues based on Moody's and Standard & Poor's bond ratings. Of the 4, 841 new long-term debt issues over the period of 1983-1997, 3,530 issues (72.9 percent) have investment-grade bond ratings at the time of issue, 1,210 issues (25.0 percent) have speculative-grade bond ratings, and 101 issues (2.1 percent) are not rated. The mean term to maturity of investment grade bonds is 5,021 days (the median is 3,657 days), and the mean term to maturity of speculative grade bonds is 3,893 days (the median is 3,655 days). Interestingly, the mean and median proceeds ($124.1 million and $90.3 million) of speculative grade bonds are higher than those ($102.8 million and $86.5 million) of investment grade bonds. Non-rated debt issues have much smaller proceeds with mean and median of $32.6 millions and $18.1 millions. As expected, the coupon rate, yield to maturity, and spread to Treasury of investment grade bonds are much lower than those of speculative grade bonds and non-rated bonds. Also, investment grade debt issues tend to be underwritten by more prestigious investment banks.

The call provision of debt issues could be related to debt market timing. Panel D compares debt issues with calls to debt issues without calls. Of the 4, 841 long-term debt issues, 2,063 issues (42.6 percent) have call provisions.[9] Debt issues with call provisions tend to be large compared to debt issues without call provisions, and also have higher coupon rates, yields to maturity, and spreads to treasury as expected due to the call provisions. Carter-Manaster's ranks show that firms tend to employ more prestigious investment banks when they issue debt securities without calls.

Using the proceeds of each debt issue, I calculate the debt market share of each underwriter based on my sample of straight debt issues over the period, 1983-1997. Table 2 reports the market share for the top seventeen underwriters. The top seventeen underwriters account for 97 percent of the market based on proceeds. The top underwriter in the debt market, Goldman Sachs, accounts for 16.6 percent of debt issues, and Merrill Lynch, Morgan Stanley, Saloman Brothers, First Boston, Lehman Brothers, Drexel, et al., Donaldson et al., J.P. Morgan, and Kidder Peabody are among the other top ten underwriters.[10] Interestingly, Drexel et al. and Donaldson et al. have underwritten mainly speculative grade bonds while the other top ten underwriters have underwritten mainly investment grade bonds. Drexel et al. has underwritten 20 investment grade debt issues, but has underwritten 245 speculative grade debt issues. Also, Donaldson et al. have underwritten 45 investment grade issues, but have underwritten 95 speculative grade issues.

To match the long-term debt issues with accounting data from *Research Insight*, I aggregate the debt issues by the same firm each year and match the issuers with the firms in the database. In this way, I obtain 2,289 long-term debt issuers over the sample period,

[9] This result is inconsistent with Robbins and Schatzberg's (1986) argument that non-callable long term debt is a dominated security. Out of 4,841 straight long-term debt issues over the sample period 1983-1997 in this research, about 57 percent of the debt issues does not have a call provision.
[10] In the paper of Livingston and Miller (2000), Bear Stearns and Dillon Reed are ranked as top ten underwriters instead of Drexel et al. and Kidder Peabody.

Table 2. Market Share for Top Seventeen Underwriters

This table reports the seventeen investment bankers with the largest market share of total gross proceeds (in $ Billions, 1983 constant dollar), and the number of issues (in parentheses) underwritten for industrial debt issues over the period 1983 through 1997.

Investment bank	Investment Grade	Speculative Grade	Total Proceeds	Market Share (%)
Goldman Sachs	72.0 (695)	13.4 (97)	85.8 (793)	16.6
Merrill Lynch	48.6 (486)	19.1 (135)	67.9 (629)	13.1
Morgan Stanley	50.9 (409)	14.7 (97)	65.7 (507)	12.7
Saloman Brothers	50.4 (420)	11.2 (81)	61.7 (502)	11.9
First Boston	45.9 (367)	12.5 (86)	58.4 (454)	11.3
Lehman Brothers	35.2 (323)	8.5 (71)	43.7 (395)	8.5
Drexel, et al.	1.2 (20)	33.9 (245)	40.1 (282)	7.8
Donaldson, et al.	3.7 (45)	12.0 (95)	15.8 (142)	3.1
J.P. Morgan	12.1 (158)	1.3 (15)	13.4 (174)	2.6
Kidder Peabody	7.5 (112)	2.3 (31)	9.8 (143)	1.9
Dillon Reed	7.7 (59)	1.7 (24)	9.4 (83)	1.8
Smith Barney	5.2 (62)	2.1 (26)	7.3 (92)	1.4
Bear Stearns	2.4 (33)	4.2 (45)	7.0 (83)	1.4
PaineWebber	3.7 (29)	1.3 (18)	5.0 (48)	1.0
BT Securities	0.2 (1)	2.6 (24)	2.8 (25)	0.5
Citicorp Securities Markets	1.5 (112)	1.2 (17)	2.8 (129)	0.5
Prudential Securities	0.3 (5)	1.8 (24)	2.7 (43)	0.5
Top 17 Total	**352.7 (3336)**	**143.9 (1131)**	**499.4 (4524)**	**96.69**
Total Market	**363.0 (3530)**	**150.2 (1210)**	**516.5 (4841)**	**100**

1983-1997. I collect accounting data from *Research Insight* and insider ownership data from *Compact Disclosure* and *Value Line Investment Survey* for each issuer.[11]

Panel A of Table 3 reports characteristics of long-term debt issuers year by year. Following Chung and Pruitt (1994), C-P q is measured as market value of equity plus liquidation value of preferred stock plus book value of debt divided by book value of assets. The average C-P q of long-term debt issuers tends to be higher in the 1990s compared to the 1980s. The average total assets of long-term debt issuers are larger in 1990 and 1991. The long-term leverage ratio, long-term debt plus current portion of long-term debt divided by book value of assets, is relatively higher in the late 1980s and in the early 1990s. Dividend payout ratio, measured as the three-year average of cash dividends declared on the common stock divided by income before extraordinary items and discontinued operations less preferred dividend requirements, fluctuates over the period.[12] The dividend payout ratio is higher during the period of 1989-1992 and in 1995. The ratio of market value to book value of equity also fluctuates over the period, and is relatively higher in the 1990s.[13] The ratio of research & development expenditure to sales is very stable over the period, and increases to three percent from two percent in 1996 and 1997. Finally, inside ownership, which is the ratio of shares owned by executives and directors to the number of shares of common stock outstanding, is relatively lower in the 1990s.

---

[11] I mainly use *Compact Disclosure* to collect inside ownership data. Yet, I use *Value Line Investment Survey* to collect the data for the issuers during 1983-1988 since Compact Disclosure is available after 1988.

[12] I remove those observations with negative dividend payout ratio and with the ratio of higher than 500 percent because these outliers might change the regression results.

[13] Also, I remove those observation with negative market to book ratio of equity and with the ratio of higher than 100 due to the same reason.

Table 3. Characteristics of Long-term Debt Issuers

Panel A reports the characteristics of long-term debt issuers year by year. The panel presents means of each variable used in this research. C-P q is the market value of equity plus liquidation value of preferred stock plus book value of debt divided by book value of total assets. Long-term leverage ratio is long-term debt divided by total assets. Dividend payout ratio indicates three-year average of cash dividends paid to common stock holders divided by earnings before extraordinary and discontinued operation items. Market to book ratio of equity is the ratio of market value of equity to book value of equity. R&D to sales ratio is research & development expenditure divided by net sales. Insider ownership is the ratio of shares owned by executives and directors to the number of shares of common stock outstanding. *Panel B* reports the number of firms, and the mean, median, minimum, maximum, and standard deviation of each variable for the full sample.

Panel A. Characteristics of long-term debt issuers year by year

Year	C-P q	Total assets ($ in million)	Long-term leverage ratio	Dividend payout ratio	Market to book ratio of equity	R&D to sales ratio	Inside ownership (%)
1983	.85	3,317.0	.42	.39	2.06	.02	14.33
1984	.83	3,358.4	.42	.24	1.80	.02	17.87
1985	.89	3,838.2	.42	.31	2.17	.02	10.98
1986	1.14	4,245.6	.44	.40	2.05	.02	10.35
1987	1.01	3,863.6	.47	.35	2.25	.02	6.14
1988	1.01	4,817.5	.51	.45	1.82	.02	14.95
1989	1.14	8,597.5	.53	.49	2.10	.02	7.18
1990	1.03	13,278.5	.42	.48	1.70	.02	7.46
1991	1.29	10,769.8	.43	.46	2.48	.02	7.80
1992	1.30	8,704.8	.50	.50	2.65	.03	10.75
1993	1.27	6,497.5	.53	.41	3.56	.02	9.62
1994	1.17	6,192.1	.53	.44	3.22	.02	10.92
1995	1.30	9,176.7	.46	.51	2.99	.02	9.06
1996	1.37	9,794.6	.46	.41	3.43	.03	10.42
1997	1.62	6,770.6	.47	.32	4.97	.03	6.92
Total	**1.21**	**7,037.7**	**.47**	**.42**	**2.83**	**.02**	**9.75**

(table 3 continued)

Panel B. Characteristics of long-term debt issuers for full sample

Variable	N	Mean	Median	Minimum	Maximum	Standard deviation
C-P q	1,658	1.21	1.06	.01	17.72	.77
Total assets ($ in millions)	2,095	7,037.7	2,499.5	.26	262,867.0	18,000.7
Long-term leverage ratio	1,908	.47	.45	0	.98	.22
Dividend payout ratio	1,598	.42	.30	0	479.5	57.12
Market to book ratio of equity	1,598	2.83	1.97	0.01	62.24	3.89
R&D to sales ratio	1,006	.02	.01	0	.26	.03
Inside ownership (%)	1,754	9.75	1.81	0	99.99	16.71

Panel B of Table 3 reports the number of long-term debt issuers and the mean, median, minimum, maximum, and standard deviation of each variable for the full sample. C-P q has a mean of 1.21 and a median of 1.06, which implies that the q is skewed to the right. The mean of total assets is about $7 billion, but the median is about $2.5 billion, which means that the size of the issuers is also skewed to the right. The mean and median of three-year average dividend payout ratio and market to book ratio of equity are 42 percent and 30 percent, and 2.83 and 1.97, respectively. The mean and median of research & development expenditure to sales ratio are two percent and one percent, respectively. Inside ownership is skewed to the right with a mean of 9.75 percent and a median of 1.81 percent.

Financial managers may have to switch between long-term debt and short-term debt to implement timing strategies. Therefore, I need to have a sample of short-term issuers. Following Baker et al. (2003), I use notes payable from *Research Insight*, which includes bank debt, commercial paper, and other private short-term debt, to construct the sub-sample of short-term debt issuers.[14] Graham and Harvey (2001) find that large-cap and dividend-paying firms are more likely to time debt markets. I restrict the sub-sample to dividend-paying industrial firms since I remove financial firms for the sub-sample of long-term debt issuers. Then, I compare the level of notes payable from the previous year and assume as short-term debt issuers the firms that increase notes payable more than 5 percent from the previous year in a given year. In this way, I obtain 3,198 short-term debt issuers over the sample period, 1983-1997. The final sample of this research consists of 2,289 long-term debt issuers and 3,198 short-term debt issuers.

Table 4 reports the comparison of characteristics across short- and long-term debt issuers. Long-term debt issuers are slightly higher q than short-term debt issuers with a mean of 1.21 versus 1.16 and with a median of 1.05 versus 1.00. The mean difference test shows no statistically significant difference, but the non-parametric Kruskal-Wallis test shows that the median of q for long-term debt issuers is significantly larger than that for short-term debt issuers. Long-term debt issuers also have significantly higher total assets and higher long-term leverage ratios. Interestingly, short-term debt issuers maintain significantly higher dividend payout ratios, compared to long-term debt issuers. Long-term debt issuers have higher market to book ratios of equity, but lower ratios of

[14] The item of notes payable from *Research Insight* includes bank acceptances, bank overdrafts, loans payable to officers of the company, loans payable to parents, and consolidated and unconsolidated subsidiaries, loans payable to stockholders, notes payable to banks and others, brokerage houses' drafts payable, telephone companies' interim notes payable and advances from parent company, and commercial paper.

Table 4. Comparison of Short- vs. Long-term Debt Issuers

The table reports the number of short- and long-term debt issuers, mean and median of each variable, and mean and median difference test results (t-test and non-parametric Kruskal-Wallis test) across two sub-samples. C-P q is market value of equity plus liquidation value of preferred stock plus book value of debt divided by book value of total assets. Total assets are presented in million dollars. Long-term leverage ratio is long-term debt divided by total assets. Dividend payout ratio indicates three-year average of cash dividends paid to common stock holders divided by earnings before extraordinary and discontinued items. Market to book ratio of equity is the ratio of market value of equity to book value of equity. R&D to sales ratio is research & development expenditure divided by net sales. Insider ownership is the ratio of shares owned by executives and directors to the number of shares of common stock outstanding.

Variable	Short- or Long-term debt issuers	N	Mean	Median	Mean difference test (t-test)	Kruskal-Wallis test (χ^2)
C-P q	Short-term	2,889	1.16	1.00		
	Long-term	1,658	1.21	1.05	-2.11**	15.15***
Total assets ($ in millions)	Short-term	3,198	4,531.2	807.17		
	Long-term	2,095	7,037.7	2,499.5	-5.11***	297.19***
Long-term leverage ratio	Short-term	3,002	.32	.31		
	Long-term	1,916	.47	.45	-25.62***	392.96***
Dividend payout ratio	Short-term	2,873	.49	.39		
	Long-term	1,598	.42	.30	4.10***	58.75***
Market to book ratio of equity	Short-term	2,873	2.34	1.77		
	Long-term	1,598	2.83	1.97	-4.57***	25.26***
R&D to sales ratio	Short-term	1,731	.03	.02		
	Long-term	1,006	.02	.01	3.17***	7.19***
Inside ownership (%)	Short-term	1,692	16.72	3.47		
	Long-term	1,754	9.75	1.81	1.47	37.15***

** and *** Indicates significant difference at 5 percent and 1 percent level, respectively.

research & development expenditure to sales. Finally, short-term debt issuers have significantly higher inside ownership. In summary, long-term debt issuers tend to be large, more leveraged, more diffused, and lower dividend paying firms. Also, they have higher q and higher market to book ratios of equity.

I obtain monthly Treasury bill and Treasury bond yields, interest rates on commercial paper and corporate bonds, consumer price index, the yearly returns of long-term government bonds and short-term government bills, and the yearly returns of long-term corporate bonds and commercial paper from *Stocks, bonds, bills, and inflation: 2001 Yearbook* of Ibbotson Associates. Also, aggregate debt issues data are obtained from the Federal Reserve *Flow of Funds* database. The data are taken from the credit market liabilities of the nonfarm nonfinancial corporate business sector in *Flow of Funds* database.[15]

3.2 Four Classification Methods of Timers

3.2.1 Naïve Timing Strategy

Guedes and Opler (1996), Barclay and Smith (1995), and Stohs and Mauer (1995) show that debt maturity is inversely related to term spread. Also, Graham and Harvey (2001) survey evidence indicates that financial managers tend to choose debt maturity based on term spread. From these empirical results, I can assume that firms tend to issue short-term debt when the term structure is steeper and issue long-term debt when the term structure is flatter. I call this financing policy the naïve timing strategy. Figure 1 shows the monthly term spread trend over the period of 1983-1997. The term spread is the interest rate on 30-year Treasury bonds minus the interest rate on 3-month Treasury bills. The government bill and bond series come from the *Center for Research in Security Prices (CRSP)*. The term spread fluctuates over the period 1983-1985, and then shows a

[15] The data are taken from Table L.102 in the accounts for nonfarm nonfinancial corporate business sector.

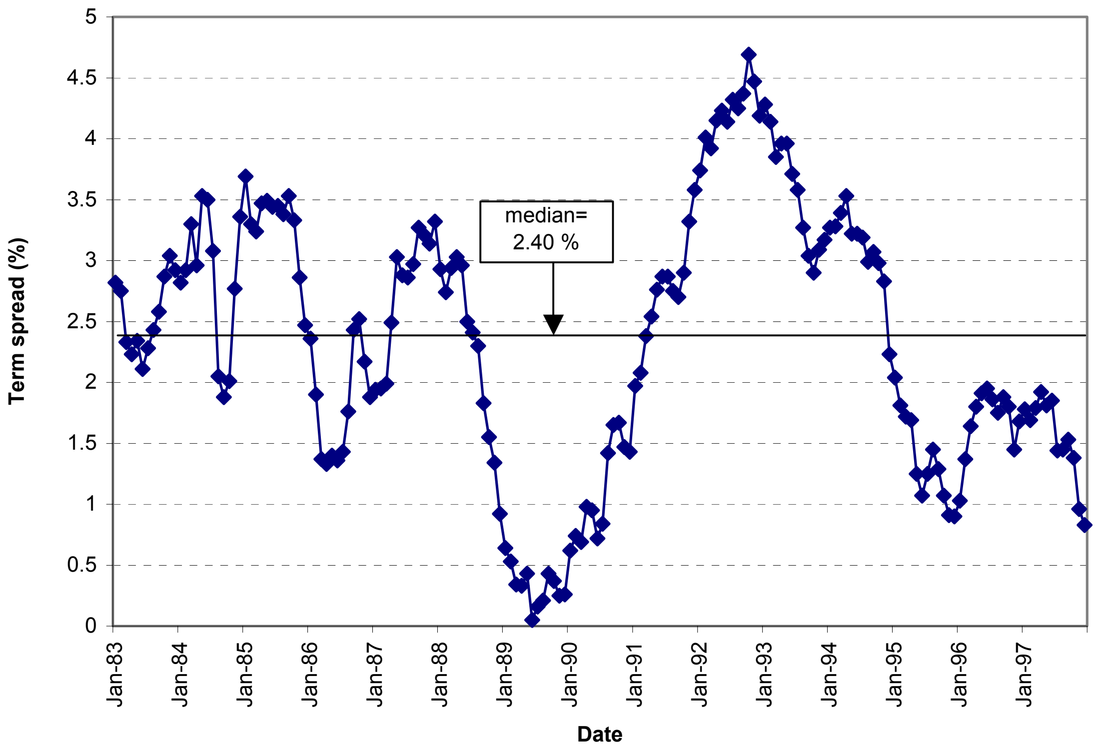


Figure 1. Monthly Term Spreads during 1983-1997

mean reverting pattern since the middle of 1980s. The term spread decreased to almost zero percent in the late 1980s, peaked at about 4.5 percent in 1993, and has declined since 1993.

The monthly median term-spread over the period is 2.40 percent. I assume that if firms issue long-term debt in the year when the term spread is lower than the median, they are market-timers. If firms issue long-term debt in the year when the term spread is higher than the median, they are apparently non-market timers. Therefore, timers issue long-term debt and non-timers issue short-term debt in 1986, 1988-1991, and 1995-1997.

Also, timers issue short-term debt and non-timers issue long-term debt in 1983-1985, 1987, and 1992-1994.

3.2.2 Complex Timing Strategy

Baker et al. (2003) show that predicted excess bond returns are related to inflation, the real short-term rate, and the term spread. Following Baker et al. (2003), I forecast excess government bond returns ($r_{GL_{t+3}} - r_{GS_{t+3}}$) and excess corporate bond returns:

$$r_{GL_{t+3}} - r_{GS_{t+3}} = a + b\pi_t + c(y_{GS_t} - \pi_t) + d(y_{GL_t} - y_{GS_t}) + e(y_{CS_t} - y_{GS_t}) +$$

$$f((y_{CL_t} - y_{GL_t}) - (y_{CS_t} - y_{GS_t})) + u_{t+3},$$

where π is the actual inflation rate (the annual percentage change in the consumer price index)[16], the real short-term rate($y_{GS} - \pi$) is the Treasury bill return minus actual inflation, the term spread($y_{GL} - y_{GS}$) is the difference between the Treasury bond yield and the Treasury bill return, the credit spread ($y_{CS} - y_{GS}$) is the difference between commercial paper yield and Treasury bill return, and the credit term spread$((y_{CL} - y_{GL}) - (y_{CS} - y_{GS}))$ uses the corporate bond yield and the other yields just introduced.

To forecast excess bond returns, I use the same market interest rate data that Baker et al. (2003) use in their paper. I obtain yearly Treasury bill and Treasury bond yields, commercial paper yield, and long-term corporate bond yield over the sample period 1944-2000, from Ibbotson Associates. The *Stocks, bonds, bills, and inflation: 2001 Yearbook* from Ibbotson uses data from the *Wall Street Journal* to calculate

[16] Baker et al. (2003) also use expected inflation rate when they estimate the excess bond return equation. Because the results are not qualitatively different, I only use actual inflation rate.

December Treasury bill returns for 1977-2000, and CRSP U.S. Government Bond File until 1976. The government bond return series uses the same data as the government bill return series, and the return series has a term of approximately 20 years and use a reasonably current coupon rate. Also, the government bond series does not reflect potential tax benefits, impaired negotiability, or special redemption or call privileges. The corporate bond returns series uses the Salomon Brothers Long-Term High-Grade Corporate Bond Index, which includes most Aaa- and Aa- rated bonds, for 1996-2000, a backdated Salomon Brothers return series for 1946-1968, and a return index derived from the Standard & Poor's High-Grade Corporate Composite yield index for 1926-1945 assuming a four percent yield and a 20 year maturity. Commercial paper return series and yield series are obtained from the Federal Reserve *Flow of Funds* database.

Table 5 shows the regression results of the above equation using yearly data over the period 1944-2000.[17] The results on one-year-ahead excess government bond returns and three-year ahead excess government bond returns are shown in Panel A. One-year-ahead excess government bond returns are significantly positively related to inflation, the real short-term rate and the term spread. The coefficients on credit spread and credit term spread are not significant. Three-year-ahead excess government bond returns are significantly positively related to inflation and real short-term rate, but are not significantly related to term spread, credit spread, and credit term spread. Panel B shows the regression results on one-year-ahead excess corporate bond returns and three-year-ahead excess corporate bond returns. The results for corporate bond returns are similar to the results for government bond returns. The one-year-ahead excess corporate bond

[17] Baker et al. (2003) use the data over 1954-2000, and they mention in the paper that if the data over 1944-2000 are used, the regression results are stronger. Therefore, I use the data over the period, 1944-2000.

Table 5. Debt Market Conditions and Excess Bond Returns, 1944-2000

The table reports regression results predicting excess bond returns using inflation (π), the real short-term rate ($y_{GS} - \pi$), the term spread ($y_{GL} - y_{GS}$), the credit spread ($y_{CS} - y_{GS}$), and the credit term spread $((y_{CL} - y_{GL}) - (y_{CS} - y_{GS}))$. We use yearly data of each variable during 1944 – 2000.

$$r_{GL_{t+1}} - r_{GS_{t+1}} = a + b\pi_t + c(y_{GS_t} - \pi_t) + d(y_{GL_t} - y_{GS_t}) + e(y_{CS_t} - y_{GS_t}) + f((y_{CL_t} - y_{GL_t}) - (y_{CS_t} - y_{GS_t})) + u_{t+1}$$

Panel A estimates excess government bond returns ($r_{GL} - r_{GS}$) and *Panel B* estimates excess corporate bond returns ($r_{CL} - r_{CS}$).

Panel A. Excess government bond returns

Variable	$r_{GL_{t+1}} - r_{GS_{t+1}}$	$r_{GL_{t+3}} - r_{GS_{t+3}}$
Intercept	-.04* (-1.80)	-.03 (-.95)
Inflation	.98* (1.93)	.97* (1.83)
Real ST rate	1.01*** (3.21)	.84** (2.16)
Term spread	3.07*** (2.94)	.69 (.43)
Credit spread	-5.05 (-1.27)	-1.75 (-.36)
Credit term spread	-2.21 (-0.55)	-1.33 (-.28)
N	56	54
R^2	.24	.06

(table 5 continued)

Panel B. Excess corporate bond returns

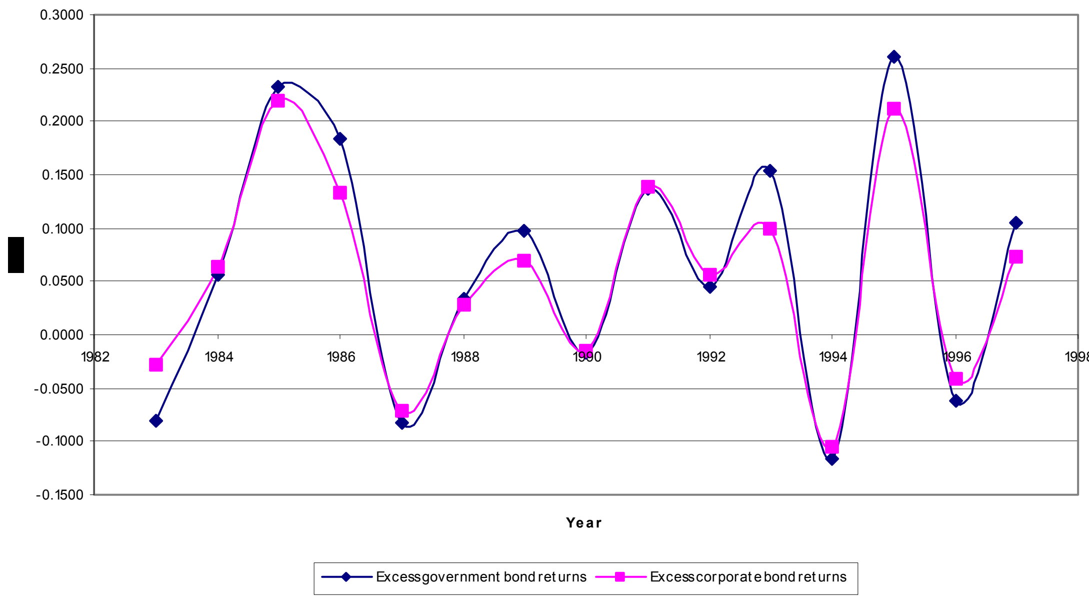
Variable	$r_{CL_{t+1}} - r_{CS_{t+1}}$	$r_{CL_{t+3}} - r_{CS_{t+3}}$
Intercept	-.04*	-.03
	(-1.99)	(-1.05)
Inflation	.78*	.95
	(1.71)	(1.67)
Real ST rate	.80***	.87**
	(2.70)	(2.07)
Term spread	2.54***	.33
	(2.84)	(.21)
Credit spread	-2.40	-2.07
	(-.65)	(-0.42)
Credit term spread	1.05	-2.23
	(.29)	(-.45)
N	56	54
R^2	.31	.07

The numbers in parentheses are t-statistics that are calculated based on standard errors correct for heteroskedasticity and autocorrelation.
* Indicates statistical significance at .10 level.
** Indicates statistical significance at .05 level.
*** Indicates statistical significance at .01 level.

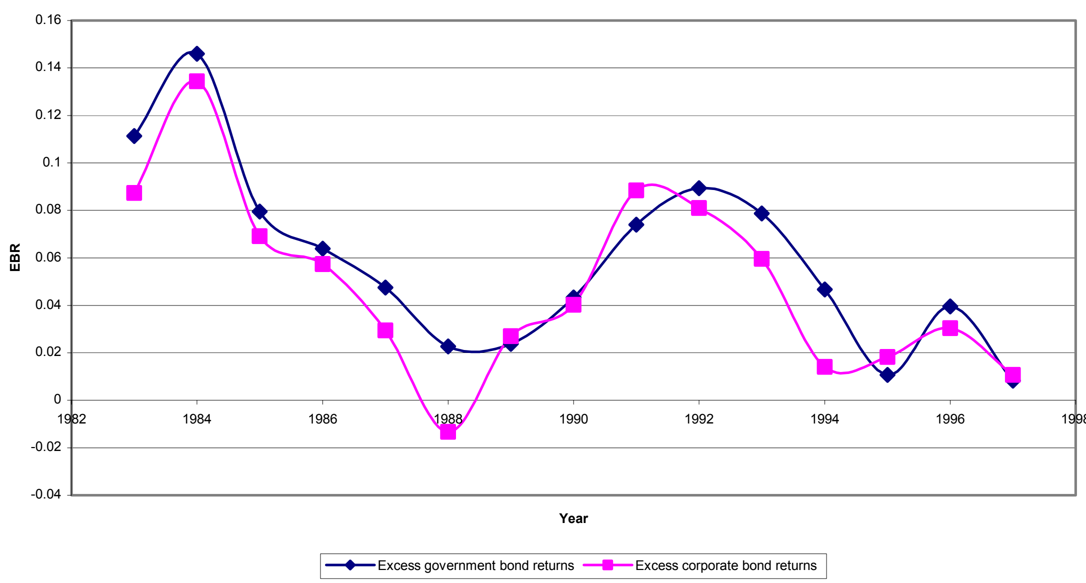
returns are positively related to inflation, real short-term rate, and term spread. Also, the three-year-ahead excess corporate bond returns are positively related to real short-term rate.

Because Baker et al. (2003) show that excess bond returns are correlated to the long-term share in debt issues, I assume that financial managers use the predicted excess bond returns to time the bond market. Also, I assume that financial managers use current excess bond returns to time debt market. Panel A of Figure 2 shows actual excess

Panel A. Actual excess bond returns



Panel B. One-year-ahead predicted excess bond returns



(figure 2 continued)

Figure 2. Excess Bond Returns during 1983-1997

Panel C. Three-year-ahead excess bond returns

government bond returns and excess corporate bond returns over the period 1983-1997. The two return series are almost identical and quite unstable. First, I assume that when the actual excess bond returns are negative as in 1983, 1987, 1989, 1994 and 1996, those firms that issue long-term debt are timers, and vice versa. When actual excess bond returns are positive, those firms that issue long-term debt are classified as non-timers, and vice versa.

Second, I use the fitted value of excess bond return equations to classify timers and non-timers. Because the predicted returns for government bonds and corporate bonds have similar patterns in Panel B and C, I only use the results for corporate bond returns. For one-year-ahead predicted excess bond returns in Panel B, the median is 3.04 percent. I assume that timers issue long-term debt and non-timers issue short-term debt when the predicted excess bond return is less than the median (3.04 percent), and vice versa. Therefore, timers issue long-term debt and non-timers issue short-term debt during 1987-1989 and 1994-1997. Timers issue short-term debt and non-timers issue long-term debt during 1983-1986 and 1990-1993. Also, I use three-year-ahead predicted excess bond returns in Panel C in the same way. The median predicted return is 1.46 percent.

3.2.3 Debt Maturity Function

Guedes and Opler (1996), Barclay and Smith (1995), and Stohs and Mauer (1995) show that debt maturity is determined by firm size, asset maturity, growth opportunities, bond rating, term spread, and tax timing option. If financial managers in fact follow a timing strategy, they can choose the debt maturity that is not indicated by the debt maturity function. I combine a complex strategy and a debt maturity function to obtain a better classification of timers. I estimate the debt maturity function using the variables in Guedes and Opler (1996), and then obtain predicted values for debt maturity. I assume that if a firm issues long-term debt following complex timing strategy when the predicted value indicates short-term debt issue, it is a timer. As shown in the table below, timers issue debt following a complex timing strategy against the maturity predicted by the debt maturity function.

		Debt maturity function	
		Short-term	Long-term
Complex timing strategy	Short-term	Non-timers	Timers
	Long-term	Timers	Non-timers

I modify the debt maturity function used in Guedes and Opler (1996) where they use actual maturity of new debt issues, and I dichotomize the new debt issues into short-term and long-term debt issues. Long-term debt issues are obtained from SDC as seen in Table 3. Because only a limited number of short-term debt issues with a maturity of less than three years are covered in SDC, I use notes payable (Item 206) from *Research Insight* to identify short-term debt issuers following Baker et al. (2003). If a firm increases notes payable more than five percent from previous year, it is assumed to have issued short-term debt in a given year. As mentioned above, I have 3,198 short-term debt issues and 2,289 long-term debt issues in the final sample.

I estimate a probit model to obtain predicted values of long-term or short-term debt issues using the accounting data at the end of the previous year of each debt issue. Long-term debt takes a value of one, and short-term debt takes a value of zero. Independent variables include the following variables:

Natural log of asset maturity that is measured as gross property, plant, and equipment (PPE)/depreciation

Dummy variable for investment grade bond rating

Firm size that is measured as natural log of net sales

Growth opportunity measures, which are **market to book ratio** of assets and **research & development expense divided by net sales**

Business risk measure (**Industry standard deviation of ROA growth**) that is industry earnings variability measured as the standard deviation of growth in earnings before taxes and depreciation divided by assets over previous 5 years by 3-digit Standard Industrial Classification (SIC) industry

Marginal tax rate measures, which are **net operating loss carryforwards divided by sales** and **income tax paid divided by assets**

Term spread that is long-term government bond yield minus short-term government bill yield in the middle of the year

Taxes/assets * term premium if the term premium is bigger than the medium (2.4%)

Interest rate volatility, which is the standard deviation of monthly 20-year Treasury bond returns over the year

Taxes/assets * interest rate volatility if the interest rate volatility is bigger than the medium (2.7 percent)

In Table 5, I report the results of the probit model estimation for the debt maturity function. The partial derivative (marginal effect) of *y* with respect to each independent variable and the corresponding z-statistics are reported.[18] The marginal effects are computed at the means of each independent variable. Model 1 includes every variable used in Guedes and Opler (1996).[19] Firms with more long-term assets have lower liquidity risk and lower agency costs of debt, and thus can better support long-term debt. However, the marginal effect of asset maturity on the probability to choose long-term debt is not significant. Firms with investment grade bond ratings have higher probability

[18] Unlike OLS, the partial derivative (marginal effect) in probit model is not determined by only parameter estimates (β). $\frac{\partial \Pr(y=1 \mid x)}{\partial x_k} = \phi(X\mathrm{B})\beta_k$. The sign of the marginal effect is determined by β_k, since the probability density function (PDF) of normal distribution (ϕ) is always positive. The magnitude of the change depends on the magnitude of β_k and the value of $X\mathrm{B}$. That is, the magnitude of marginal effect depends on the values of the other variables and their coefficients because PDF is computed at $X\mathrm{B}$.

[19] Guedes and Opler (1996) also use stock return before the issue and stock return after the issue as explanatory variables. Yet, when the stock is overvalued, the firm tends to issue equity, not debt. Therefore, the coefficients on the stock return variables are not significant, so I don't use the variables here.

Table 6. Debt Maturity Function

Probit model is used to estimate debt maturity function over the sample period 1983-1997. Long-term debt issues take a qualitative variable of one while short-term debt issues take a qualitative variable of zero.

Variable	Expected sign	Model 1	Model 2
Log of Asset maturity	Positive	-.00004 (-1.03)	-.00005 (-1.26)
Dummy for investment grade bond ratings	Positive	.22*** (15.17)	.20*** (14.33)
Log of net sales	Positive or Negative	-.00081*** (-5.78)	-.00079*** (-5.59)
Market to book ratio of assets	Negative	-.00035*** (-12.44)	-.00036*** (-12.75)
R&D/sales	Negative	-.00003** (-2.06)	
Industry standard deviation of ROA growth	Positive	-0.00048 (-1.62)	-.00047 (-1.64)
Net operating loss carryforwards/sales	Negative	.00004 (.98)	
Income taxes paid/assets	Positive	-.00001 (-1.51)	
Term premium	Negative	-1.95*** (-3.40)	-2.38*** (-4.70)
Taxes/assets when term premium is > 2.4 %	Positive	-.58 (-1.47)	
Interest rate volatility	Positive	-7.77*** (-12.26)	-6.31*** (-13.17)
Taxes/assets when interest rate volatility > 0.027	Positive	.59 (1.47)	
Number of observations		2,231	4,886
Log likelihood – Restricted log likelihood (χ^2)		366 (732.5***)	341 (680.3***)

** Indicates statistical significance at .05 level.
*** Indicates statistical significance at .01 level.

of choosing long-term borrowings, which is consistent with a liquidity risk explanation. Firm size, measured as log of net sales, can measure liquidity risk or agency costs of debt. The result indicates that large firms have a higher probability of choosing short-term maturity, which is consistent with Guedes and Opler (1996) but inconsistent with Barclay and Smith (1995). The marginal effect of firm size is consistent with the liquidity risk explanation, but is not consistent with the agency cost explanation. The marginal effects of market-to-book ratio of assets and research & development-to-sales ratio are significantly negative, which is consistent with the prediction of Myers (1977) agency theory. The effect of business risk, measured as industry standard deviation of return on assets (ROA) growth, is insignificantly negative, which is inconsistent with the liquidity risk explanation because firms in high-risk industry should choose long-term debt when interest rates are volatile. The marginal effect of marginal tax rates of issuers, measured as the ratio of net operating loss carryforwards to sales and the ratio of income taxes paid to assets, have opposite signs to the expectations of tax explanations, but are not significant. The marginal effect of term spread on the possibility of long-term debt issues support Brick and Ravid (1985) and Kim et al. (1995) indicating that borrowers prefer long-term debt when the term structure of interest rates is upward sloping. The marginal effect of interest volatility is significantly negative, which is inconsistent with Brick and Rivid (1991) and Kim et al. (1995) because interest rate uncertainty makes long-term debt increase debt capacity in their model. The marginal effects of interaction terms between term spread and tax rate and between term spread and interest volatility are not significant.

To predict the value of the debt maturity function for more observations, I omit R&D/sales and marginal tax rate measures in Model 2 because the data on research & development expenses, income tax paid, and net operating loss carryforwards are missing for so many observations in *Research Insight*. The marginal effects of each variable used in Model 2 are not much different from those in Model 1. After I calculate the predicted value of long- or short-term debt from the estimation, I combine the results with the complex strategy based on one-year-ahead excess bond returns. In this way, I find that 880 firms are timers.

3.2.4 Timing Strategy Based on Bond Rating Changes

Bond ratings are designed to measure default risk of publicly traded securities. The major bond rating agencies are Standard and Poor's Corporation, Moody's Investors Service, and Fitch Investors Service. Rating agencies argue that they have access to private information when they review ratings. Also, the review process includes analysis of public information and private information provided by management, and discussions with management, who is notified of ratings prior to publication. Managers can then appeal the proposed ratings with the presentation of new or additional data. Through this process, managers can be assumed to have information about upcoming bond ratings prior to their publication.

Whether bond ratings contain pricing-relevant information is well studied. Pinches and Singleton (1978) document that when bond ratings increase (decrease), abnormally high (low) common stock returns occur before the announcement of the bond rating change. They also show that normal returns occur after bond rating change. From these results, they argue that bond-rating agencies reacted to the changing financial and operating conditions of firms after investors had already discounted these changes. However, Holthausen and Leftwich (1986) find different results. They divide their sample based on rating upgrades or downgrades and find that announcements of downgrades are associated with significantly negative stock returns, but announcements of upgrades are associated with insignificant abnormal returns. Their results suggest that rating changes provide information to the capital market. Dichev and Piotroski (2001) analyze the long-run stock returns following bond ratings changes. They find that following bond ratings downgrades, firms experience negative abnormal returns on the magnitude of 10 to 14 percent in the following year, but they find insignificant abnormal returns for stocks with upgrades. Also, they document that bond rating changes predict subsequent earnings changes that are not fully anticipated by the market.

Following Flannery's (1986) theoretical model, I assume that financial managers have inside information about the future changes of their bond ratings and use that information to choose maturity when they issue debt securities. Financial managers discuss the possible changes with rating agencies in the review process, but have incentive not to divulge negative private information. Also, the rating changes are related to financial and operating information of the issuers prior to and following rating changes. Therefore, financial managers can be assumed to have better information than outsiders about their future ratings changes.

I follow Standard and Poor's bond rating changes during three years after short- and long-term debt issues. The data on bond rating changes are obtained from *Research Insight* during the period 1986-1997 and Standard and Poor's *Bond Records* during 1983-1985. If the firm issues long-term bonds expecting downgrades of two or more than two grades (for example, from BB+ to BB-), it is assumed to be a timer. If the firm borrows short term expecting upgrades, it is also assumed to be a timer. Of the 3,686 firms with bond ratings in the sample, 956 firms (25.94 percent) experience downgrades and 610 firms (16.55 percent) experience upgrades within three years after short- or long-term debt issues.

In this chapter, I explain the process of sample selection, and investigate the characteristics of the sample. The full sample for the dissertation consists of 2,289 long-term debt issuers and 3,198 short-term debt issuers over the period 1983-1997. Then, I classify timers and non-timers based on term spreads, excess bond returns, a combination of the predictions of debt maturity function and excess bond returns, and future bond ratings changes. Based on these classifications, I investigate whether timers have higher firm value than non-timers in the following chapters.

CHAPTER 4

IMPACT Of TIMING STRATEGIES ON ANNOUNCEMENT EFFECTS OF STRAIGHT DEBT OFFERING

In this chapter, I test whether timing strategies affect share price response to announcements of straight debt offerings using a sample of the long-term debt offerings during 1983-1997. Previous literature shows that the share price response to the announcements of straight debt offerings is negative but insignificant. If timing strategies are successful and the motivation of timers is revealed to capital markets at the time of debt offerings, then the share price reaction to the announcements for timers can be higher than that for non-timers. I survey the empirical evidence related to straight debt offerings, describe the data and research method, and report the empirical results.

4.1 Previous Evidence and Hypotheses

There is substantial evidence that security offerings are generally related to abnormal stock returns at the announcement of those issues. For instance, Asquith and Mullins (1986) and Masulis and Korwar (1986) find that the announcement of seasoned equity issues leads to about negative three percent abnormal returns on common stock. Mikkelson (1981) documents that announcement of the call of convertible bonds results in a significant negative return to common stock. Mikkelson and Partch (1986) find that a type of securities offered affect a stock price reaction to the announcements of security offerings. They document that there is a significantly negative stock price reaction to the announcements of common stock and convertible debt issues, an insignificantly negative reaction to the announcements of straight debt and preferred stock issues, and a strongly positive reaction to the announcements of credit agreements. Smith (1986) reviews the evidence related to stock price effects associated with security offerings. The survey of evidence shows that the pecking order seems prevalent. Generally, the issue of riskier securities (common stock, convertible preferred stock, and convertible bonds) is associated with a strong negative stock price reaction, and the issue of less risky securities (preferred stock and straight bonds) is associated with an insignificant stock price reaction.

The effect of straight debt offerings on stock returns has been examined theoretically and empirically. The issue of long-term debt is a leverage-increasing event. Traditional capital structure theory assumes that a firm trades off a corporate tax advantage of debt against costs of financial distress, and it maintains target capital structure. Alternatively, Jensen and Meckling's (1976) agency model obtains optimal capital structure by balancing agency costs of debt against agency cost of equity. From these perspectives, the market may consider the announcement of a debt offering as a signal that the firm's capacity to extract tax advantages of debt have increased or that agency costs of debt has decreased. Therefore, the models indicate that the leverage-increasing event leads to a positive stock price response.

Myers and Majluf's (1984) asymmetric information model assumes that managers have superior information relative to investors about future investment opportunities. Because of adverse selection problems, uninformed investors will demand a discount when they buy new securities. Also, equity issues are more subject to adverse selection problems than debt issues because equity is riskier than debt. Therefore, managers will depend on internal financing to finance their investments rather than external financing. This model indicates that external financing might be related to the negative valuation effect, and the financing with riskier securities has more severe effect. Miller and Rock

(1985) signaling model indicates that investors interpret unexpected external financing as a signal that issuers' operating cash flows are lower than expected. In their model, the firm's managers know more than outsiders about the true state of the firm's current earnings. The managers can signal their expectation about the earnings estimates through a dividend announcement or an external financing announcement. Their model predicts that the stock market reaction to security issues is negatively related to external financing and the size of financing. Also, Ross (1977) model shows that leverage increases can signal similar changes in firm earnings prospects to the market.

Unlike equity-related security issuance, the previous evidence shows that straight debt offerings generally do not affect stock prices at the announcement. Dann and Mikkelson (1984) provide evidence on the valuation effects of non-convertible and convertible debt issuance. The announcement of straight debt issue during the years 1970 through 1979 is associated with marginally negative stock price decrease. The average two-day cumulative abnormal return (CAR) around the announcement is –0.37 percent, which is not significant at 10 percent level. In contrast, they find that the average valuation effect on common stock at the announcement of convertible debt is significantly negative. They argue that the results are partially consistent with Myers and Majluf's (1984) pecking order theory. Pecking order theory implies a decrease in stock price at the announcement of external financing, and also posits a less unfavorable response to new debt financing than to equity related financing.

Eckbo (1986) also analyzes the effect of corporate debt offerings on stock prices. His sample consists of 648 issues of straight debt (of which 189 are mortgage bonds) and 75 issues of convertible debt over the sample period 1964-1981. Consistent with Dann and Mikkelson (1984), the announcement of convertible debt issue elicits a significantly negative mean valuation effect, but the announcement of straight debt issue does not produce any significant abnormal stock returns. Regardless of offering method, use of bonds, issue size, tax shield of the issue, bond ratings, and the abnormal change in the issuing firm's earnings in the period immediately following the offering, the effect of straight debt issue on stock price is not significant. He argues that the difference between the market reactions to straight debt vs. convertible debt is consistent with the Myers and Majluf (1984) model. However, the finding that the bond ratings (risk measure) are not related to the abnormal returns is difficult to square with the asymmetric information model.

Mikkelson and Partch (1986) examine the stock price effects of various types of security offerings and investigate the nature of information inferred by investors from offering announcements. They find that changes in stock price at the announcements of security offerings are determined by the type of security, but they are not related to characteristics of offerings such as proceeds, capital structure change, and the rating of debt issues. They document that there is a significant negative stock price reaction to the announcements of common stock and convertible debt issues, and an insignificant negative reaction to the announcements of straight debt and preferred stock issues. They also find that there is a strong positive reaction to the announcements of credit agreements. These results are consistent with Myers and Majluf's (1984) argument that the market infers that a security is overpriced when a common stock or convertible debt is issued.

The papers in the later period analyze stock market reaction to announcements of straight debt offering based on characteristics of debt issues or issuers like debt seniority, bond rating, or dividend payout ratios. Shyam-Sunder (1991) finds that there is no monotonic relation between stock price response around straight debt offering and bond rating, and there is no significant difference across risk classes, using bond ratings as a risk measure. She indicates that even though Eckbo (1986) analyzes the relation between share price response and bond ratings, he includes only 5 debt issues rated Ba and below out of 222 industrial straight debt offerings. Her sample includes 79 non-investment grade or un-rated debt issues out of 297 straight debt issues. Even though she includes a relatively large number of low-grade debt issues in the paper, she does not find any significant difference between stock price responses to the announcements of investment grade and non-investment grade issues.

Tang and Singer (1993) examine the effect of debt seniority on market reaction. They show that for the 77 subordinated debt offerings over the period, 1979-1986, the average two-day cumulative abnormal return is –1.44 percent and is significantly different from zero. For the 178 non-subordinated debt offering, the average two-day cumulative abnormal return is 0.29 percent and is not significant. Also, the mean difference between non-subordinated and subordinated offering is significant with a t – statistic of 4.03. However, they show that other characteristics, the proceeds, tax effect, maturity, and shelf registration or non-shelf registration, are not related to the announcement effect. They argue that the results generally support the Myers and Majluf (1984) information release hypothesis. The different results between non-subordinated and subordinated offering and no significant relationship between the size of offering and stock response are not consistent with Miller and Rock (1985) predictions.

Johnson (1995) examines stock price response to announcements of straight debt issues across low and high dividend payout firms. Jensen (1986) argues that both debt and dividend payments can reduce free cash flow problem, which managers can invest unprofitable projects with redundant cash flows. Also, debt or dividend payments can serve as a signaling mechanism of future earnings or firm quality by committing to cash outflows. The paper shows that the stock price response to debt offering is significantly positive for low growth-low dividend payout firms, and is negatively related to dividend payout cross-sectionally. Yet, stock price response to debt offering is not significant for high dividend payout firms. The results imply that debt-service payments and dividends are substitutes to reduce agency costs or to serve as a signaling mechanism.

In this chapter, I tests whether financial managers' timing strategies based on public information or private information result in any positive stock price responses to the announcements of straight debt issues. I test the following two main hypotheses:

H_0: The average abnormal stock return at the announcement of straight debt offerings is equal to zero.

H_0: The announcement effect of straight debt offering for timers is equal to that for non-timers.

4.2 Data Description and Event Study Methodology

4.2.1 Data Description

To construct the sample for event study, I start with 2,289 straight long-term debt offering over the sample period, 1983 through 1997 in Table 4. To find out announcement dates of each issue, I use three sources, *Lexis-Nexis Business News*, *Wall Street Journal Index (WSJI)*, and a filing date from *SDC*. I primarily use the dates reported about the offering for the first time in *Lexis-Nexis* and *WSJI* as announcement dates. For issues that are not reported in the two sources, I use filing dates from *SDC* as announcement dates.[20] When I check the announcement dates, I also look at whether those issues are made with equity or convertible debt simultaneously. I remove those dual issues of debt and equity from the sample because Masulis and Korwar (1986) and Billingsley, Smith, and Lamy (1994) show that dual issues are accompanied by significantly negative announcement effects, consistent with general findings about equity issues. To confirm whether I still have dual issues and to remove them, I double-check filing dates of common stock, preferred stock, and convertible debt issues from *SDC*. After these screens, I have 1,716 debt issues with announcement dates. I use the announcement date (day 0) and previous trading day (day −1) as event dates.

Then, I match those debt issues with daily stock return data from *Center for Research in Security Prices (CRSP)*. To be included in final sample, the stock for those issuers should be traded on the event dates and estimation period, day +21 through day +170. The final sample in the event study consists of 1,423 straight long-term debt offerings.

Other characteristics related to those issues like bond rating at the time of issue, lead underwriter, the type of security, and proceeds are obtained from *SDC*. Also, the leverage change in the year of issue, firm size, market to book ratio, bond ratings in

[20] I find that SDC record filing dates of straight debt issues sparsely in the 1980s. The announcement dates of those issues in 1980s usually come from *Lexis-Nexis* and *WSJI*.

subsequent years, sales growth, and dividend payout ratio are obtained from *Research Insight*.

4.2.2 Research Method

Since Fama, Fisher, Jensen, and Roll (1969) used event study methodology in their research, the methodology has been a common research tool in finance area. For instance, Henderson (1990) indicates that event studies are used in 40 papers published in *Journal of Finance* and *Journal of Financial Economics* during 1987 and 1988. I primarily use event study methods in this chapter.

The underlying model in a typical event study is that the stock return follows a market model of Sharpe (1964) and Lintner (1965),

$$r_{it} = \alpha_i + \beta_i r_{mt} + \varepsilon_{it},$$

where r_{it} is the return on for firm i on day t, α_i and β_i are market model parameters, r_{mt} is the return on the CRSP value weighted index for day t, and ε_{it} is error term. Ordinary least-squares regression is performed to obtain estimates of a_i and b_i of α_i and β_i, using the return data of a 150-day estimation period, day –170 to day –21 or day +21 to day +171. This estimation method assumes that the joint distribution of returns is stationary through time, and satisfies the ordinary least-squares assumptions. Also, the regression over the estimation period provides an unbiased estimate of residual variance during the estimation period,

$$V_i^2 = \sum_{t=21}^{170} \hat{\varepsilon}_{it}^2 /(150-2),$$

where 150 comes from the number of days in the estimation period.

These estimated parameters are used to calculate prediction errors during the forecast period or event dates (day –1 and day 0). Since the errors are estimated for observations which were not used in the estimation of the parameters, they are not residuals in the strict ordinary least squares regression. The abnormal return for firm i on day t, which is a prediction error, is defined as

$$AR_{it} = r_{it} - (a_i + b_i r_{mt}) .$$

To calculate two-day cumulative abnormal returns for each firm i (CAR_i), I add the abnormal returns on day –1 and day 0. Then, I calculate the average two-day abnormal return (ACAR) for each sample, and test the null hypothesis that ACAR is equal to zero for a given sample. Assuming that the cumulative abnormal returns are cross-sectionally and intertermporally independent, the appropriate test statistic[21] is

$$z = \sum_i CAR_i / \sqrt{\sum_i Var(CAR_i)} ,$$

where

$$Var(CAR_i) = 2V_i^2 \left[1 + 2/150 + \left(\sum_{t=-1}^{0} r_{mt} - 2\bar{r}_m \right)^2 \Big/ 2\sum_{t=21}^{170} (r_{mt} - \bar{r}_m)^2 \right],$$

and where $\bar{r}_m$ is the mean return on CRSP value weighted index over the estimation period. In the formula for variance of cumulative abnormal returns, the term in the bracket reflects the increase in variance due to prediction outside of the estimation period.

[21] See Salinger (1992).

Also, the formula reflects contemporaneous and intertemporal correlation of estimated abnormal returns.

I report the average two-day cumulative abnormal return with z-statistics, as well as the median, minimum, and maximum of two-day cumulative abnormal returns, sample size, and the percentage of positive cumulative abnormal returns for full sample and sub-samples based on timing strategies. Also, I report the results of mean difference test (t-test) and non-parametric median difference test (Kruskal-Wallis test) between two sub-samples.[22] Then, using regression analysis, I test the relationship between cumulative abnormal returns and timing strategies after controlling for other variables that might affect the announcement effects.

4.3 Empirical Results

4.3.1 Event Study Results

Panel A of Table 7 shows the event study results around announcements of straight debt offering for the full sample in which market models are estimated using pre-event estimation period, day –170 through –21. The mean two-day cumulative abnormal return (CAR) is - 0.18 percent with z-statistics of –0.05, which means that the average CAR is not significantly different from zero. The median is –0.22 percent and the percentage of the positive cumulative abnormal returns is about 45 percent. This negative and insignificant announcement effect to straight debt offering is consistent with findings in Dann and Mikkelson (1984) and Eckbo (1986).

[22] Cumulative abnormal returns (CARs) are prediction errors from market model estimation. Therefore, I normalize CARs with their respective inverse of standard errors before calculating t-statistics to test mean difference.

Table 7. Announcement Effects of Long-term Debt Issues
In *Panel A*, the CARs are calculated as prediction errors from a market model regression with an estimation period of t - 21 to t - 170 day. From *Panel B*, the CARs are calculated as prediction errors from a market model regression with an estimation period of t + 21 to t +170 day.

Panel A. Full Sample – Pre-event estimation period

N	Mean	Median	Minimum	Maximum	% of positive CARs
1416	-.18 % (z = -.05)	-.22 %	-29.26 %	12.09 %	45.13 %

Panel B. Full Sample – Post-event estimation period

N	Mean	Median	Minimum	Maximum	% of positive CARs
1423	-.09 % (z = -.02)	-.16 %	-29.28 %	12.97 %	46.42 %

Panel C. Investment grade bonds vs. speculative grade and non-rated bonds

	N	Mean	Median	% of positive CARs	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Investment grade bonds	965	-.09 % (z = -.02)	-.14 %	46.94 %	-.02	.30
Speculative grade and non-rated bonds	458	-.09 % (z = -.01)	-.22 %	45.20 %		

Panel B shows the similar event study results in which market models estimated using post-event estimation period, day 21 to 170. Hamada (1970) show that with a fixed amount of equity, borrowing will increases the risk to the investor and thus beta for the capital asset pricing model. To control for the increase of risk by the leverage-increase event, I use post-event estimation period in Panel B. The results in Panel B are similar to the results in Panel A. Accordingly, I use post-event estimation period for subsequent event studies.

I divide the sample to two sub-samples based on bond ratings, and report the event study results on the two sub-samples in Panel C. The percentage of long-term debt issues with investment-grade ratings is about 67.8 percent, which implies that the firms tend to issue long-term bonds when they have higher ratings. The average CARs of two sub-samples are almost identical with - .09 percent. The corresponding z-statistics show that the mean CARs are not statistically different from zero. The median of CARs for investment grade bonds is almost identical to that for speculative grade bonds and non-rated bonds. The mean difference test (t-test) and non-parametric difference test (Kruskal-Wallis test) show that the means and medians of CARs between two-subsamples are not significantly different from each other. Also, the percentage of positive CARs for two sub-samples are below 50 percent. These results are consistent with the findings in Eckbo (1986), Mikkelson and Partch (1986), and Shyam-Sunder (1991). They find that there is no significant difference in announcement effects of straight debt offerings across risk classes. Yet, the results are not consistent with Myers and Majluf (1984) model that issuance of riskier securities should elicit a less favorable response from stock investors.

Then, I investigate whether various timing strategies have an effect on the announcement effects of straight debt offering, and present the results in Table 8. Panel A shows the result based on naïve strategy which implies that timers choose long-term debt when term spread is low and non-timers choose long-term debt when term spread is high. Based on this classification, 54 percent of long-term debt issuers follow the naïve timing strategy. Timers have marginally less negative effects (the mean of -0.002 percent and median of -0.11 percent) than non-timers (the mean of -0.20 percent and median of -

Table 8. The Impact of Timing Strategies on the Announcement Effects of Long-term Debt Issues

Panel A. Naïve Strategy based on term spread

	N	Mean	Median	% of positive CARs	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	653	-.20 % (z = -.05)	-.21 %	45.79 %	1.23	.60
Timers	770	-.002 % (z = -.0003)	-.11 %	46.95 %		

Panel B. Complex strategy based on actual excess bond returns

	N	Mean	Median	% of positive CARs	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	886	-.18 % (z = -.03)	-.19 %	45.49 %	1.52	.62
Timers	537	.06% (z = .01)	-.09 %	47.86 %		

Panel C. Complex strategy based on one-year-ahead excess bond returns

	N	Mean	Median	% of positive CARs	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	766	-.21 % (z = -.03)	-.17 %	45.95 %	1.55	.25
Timers	657	.05 % (z = .01)	-.11 %	47.03 %		

Panel D. Complex strategy based on three-year-ahead excess bond returns

	N	Mean	Median	% of positive CARs	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	340	-.17 % (z = -.01)	-.22 %	44.12 %	1.11	1.09
Timers	1,083	-.07 % (z = -.01)	-.14 %	47.09 %		

(table 8 continued)

Panel E. Timing strategy based on the combination of debt maturity function and one-year-ahead excess bond returns

	N	Mean	Median	% of positive CARs	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	881	-.18 % (z = -.03)	-.17 %	46.08 %	1.55	.34
Timers	259	.08 % (z = .01)	-.08 %	48.85 %		

Panel F. Timing strategy based on future bond ratings change

	N	Mean	Median	% of positive CARs	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	1,029	-.04 % (z = -.01)	-.13 %	47.33 %	-1.46	2.16
Timers	172	-.34 % (z = -.01)	-.49 %	40.12 %		

0.21 percent), but the difference between two sub-samples is not statistically significant. Also, the means of CARs for two sub-samples are not significantly different from zero, and the percentage of positive CARs is below 50 percent.

I use actual excess bond returns to divide timers and non-timers (i.e., the complex strategy), and present the result in Panel B. Timers choose long-term debt when excess bond returns are negative and non-timers choose long-term debt when excess bond returns are positive. Following this strategy, 37.74 percent of long-term debt issuers are classified timers. Timers have 0.06 percent abnormal returns and non-timers have -0.18 percent abnormal returns on average at the announcement of the debt offerings. However, the difference between timers and non-timers is not statistically different.

In Panel C, timers and non-timers are classified based on one-year-ahead excess bond returns. Timers choose long-term debt when the predicted excess bond returns are relatively low and non-timers choose long-term debt when the predicted excess bond returns are relatively high. The mean difference and median difference is 0.26 percent and 0.60 percent, respectively, but the difference is not statistically significant.

In Panel D, I assume that timers choose long-term debt when three-year-ahead excess bond returns are low and non-timers choose long-term debt when three-year-ahead excess bond returns are high. There are relatively high portion of timers because three-year-ahead excess bond returns are relatively low in 1990s as seen in Panel C of Figure 2. Therefore, long-term debt issuers in 1990s are classified as timers. The results are not qualitatively different from those using the other two previous complex strategies.

In Panel E, I assume that timers issue long-term debt to follow complex timing strategy even though debt maturity function predicts short-term debt issuance. Non-timers issue long-term debt following the prediction of debt maturity function. Of 1,140 long-term debt issuers with predictions available from debt maturity function, 22.72 percent of the issuers are timers. The timers have 0.08 percent abnormal return and non-timers have -0.18 percent abnormal returns on average, but the difference is not significant. Also, the median difference is not significant.

In Panel F, timers are assumed to issue long-term debt expecting subsequent ratings downgrades within three years after the issuance, and non-timers experience no change or upgrades in bond ratings after the issuance. The timers experience slightly more negative effects than timers, but the mean and median difference is not significantly different. Also, the proportion of positive abnormal returns is about 40 percent for timers, which is relatively low compared to other sub-samples.

In summary, the event study results show that straight debt offering is associated with abnormal stock returns around announcements of long-term debt offerings that are not statistically different from zero, which is consistent with the findings in the previous literature. I also test whether various timing strategies using market interest rates or private information about future bond ratings changes have an effect on stock returns, and find that implementing any type of timing strategy does not have a significant effect on stock returns at the announcements of the long-term debt offering.

4.3.2 Multivariate Regression Results

I use weighted least squares regressions to investigate whether various timing strategies are associated with the abnormal stock returns at the announcements of straight debt offerings after controlling for explanatory variables used in the previous literature. The results are in Table 9. The dependent variable is the two-day cumulative abnormal returns (CARs), and each observation is weighted by the respective inverse of the standard prediction errors of CARs to adjust for heteroskedasticity. Model 1 includes relative issue size (proceeds divided by market value of equity), dummy variable for investment grade bonds, dummy variable for non-rated bonds, a natural log of three-year average dividend payout ratio, and a natural log of Carter-Manaster's (C-M) underwriter ranks as explanatory variables.

With reference to Miller and Rock's (1985) model in which the unanticipated amount of new financing signals the manager's private information about their future cash flows, relative size is used as a proxy. Consistent with Eckbo (1986), Mikkelson

Table 9. Weighted Least Square Regression Results
Dependent variable is the two-day cumulative abnormal returns (CARs). T-statistics are in parentheses. Observations are weighted by the respective inverse of the standard prediction errors of CARs to adjust for heteroskedasticity.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	.0088 (.54)	.0002 (.14)	.0001 (.08)	.0001 (.04)	-.0001 (-.04)	.0017 (.83)
Relative issue size	-.0003 (-.81)	-.0002 (-.58)	-.0002 (-.55)	-.0002 (-.55)	-.0002 (-.29)	-.0003 (-.33)
Dummy for investment grade bonds	-.0013 (-.54)	-.0029 (-1.57)	-.0027 (-1.44)	-.0026 (-1.39)	-.0019 (-.92)	-.0024 (-1.12)
Dummy for non-rated bonds	-.0189** (-2.29)	-.0029** (-2.33)	-.0168** (-2.28)	-.0170** (-2.30)	-.0167** (-2.09)	-.0109 (-.54)
Log of dividend payout ratio	-.0005 (-.90)					
Log of C-M underwriter ranks	-.0034 (-.44)					
Dummy for naïve timing strategy		.0023 (1.42)				
Dummy for complex strategy based on one-year ahead excess bond returns			.0025 (1.58)	.0060 (.99)		
Dummy for complex strategy* Dummy for highly ranked underwriters				-.0037 (-.59)		
Dummy for combination of debt maturity function and complex strategy					.0032 (1.55)	
Dummy for timing strategy based on future bond ratings change						-.0026 (-1.06)
N	1,059	1,145	1,145	1,145	1,141	1,060
F-statistic	1.59	2.28*	2.40**	1.99*	2.14*	.63
R^2	.0075	.0079	.0084	.0087	.0075	.0024

*Indicates significant difference at 10 percent level.
**Indicates significant difference at 5 percent level.

and Partch (1986), and Johnson (1995), I find a statistically insignificant relation between the relative size and the abnormal returns. These results do not support Miller and Rock's (1985) theoretical model. Two dummy variables to represent investment grade bonds and non-rated bonds, which measure the risk of securities, are included. Myers and Majluf (1984) model shows that investors might react less favorably to the issuance of riskier securities. Consistent with Eckbo (1986), Mikkelson and Partch (1986), Shyam-Sunder (1991), and Johnson (1995), I find no significant relation between bond ratings and the stock return response to straight debt offering. Yet, the coefficient on dummy variable for non-rated bonds is negatively significant at five percent level, which is consistent with Myers and Majluf (1984) model.

Following Johnson (1995), I include the natural log of the three-year average dividend payout ratio as a control variable. The dividend payout ratio is cash dividends paid on common stock divided by earnings before extraordinary items and discontinued operations less preferred dividend requirements.[23] He finds that share price response is significantly positive for low growth-low dividend payout firms, and argues that debt service payments can be served as an effective substitute for dividends. However, the coefficient on log of dividend payout ratio is insignificantly negative, which is not consistent with Johnson's findings. I include the natural log of Carter-Manaster's underwriter ranks to investigate whether reputation of underwriters can mitigate the negative stock price response to straight debt offerings. The coefficient on the variable is insignificantly negative. In unreported regressions, I also use market shares of

[23] Johnson (1995) measures a dividend payout ratio as cash dividends paid on common stock divided by net income. Yet, since I use dividend payout ratios to proxy for future cash outflow commitments, it would be better to use earnings before extraordinary items and discontinued operations as a denominator to calculate dividend payout ratios.

underwriters as reputation measures for underwriters instead of Carter-Manaster's underwriter ranks and find results qualitatively similar to those reported in Model 1.

From Model 2 to Model 5, I include dummy variables representing various timing strategies based on market interest rates to investigate whether timing strategies are cross-sectionally associated with the stock price response to straight debt offerings. In Model 2, 3, and 5, the coefficients on dummy variables for naïve strategy, complex strategy, and combination of debt maturity function and complex strategy are insignificantly positive. In Model 4, I include an interaction term between dummy variable for complex strategy and dummy variable for highly ranked underwriters, which have the highest and the second highest ranks in Carter and Manaster's tombstone rankings. The coefficient on the interaction term is insignificantly negative, which implies that the timing strategies do not affect the stock price response to the announcements of straight debt offerings regardless of whether those offerings are underwritten by prestigious underwriters. In Model 6, I include a dummy variable for timing strategy based on future rating changes. The coefficient on the dummy variable is insignificantly negative. Overall, regardless of how I classify timers and non-timers, the multivariate regression results show that attempting to time debt markets does not increase the abnormal stock returns around the announcement effects of straight debt offering after controlling for other determinants. The results are consistent with those from the event study.

In this chapter, I show that timing strategies are not associated with stock price changes at the time of long-term debt issuance. There are two limitations of the study in this chapter. First, I have only investigated the impact of timing strategies on stock price response. Following the timing strategies to change a portfolio of debt securities with different maturities spectrum, financial managers can increase firm value without affecting stock prices if capital markets are segmented. Second, if investors are able to discern financial managers' motivation to follow timing strategies and their abilities, they could have already reflected the effect of timing strategies in stock prices or bond prices. These concerns might be a reason that I do not find any significant result in this chapter. In following two chapters, I address these two problems and complement the research with a different data set and a different approach.

CHAPTER 5

IMPACT OF TIMING STRATEGIES ON FIRM VALUE

The main objective of this research is to test whether timing debt markets reduces the overall cost of capital and increases firm value. In the previous chapter, I find no evidence that timing strategies increase stock returns at the announcements of straight debt offering. In this chapter, I try to complement the results of event study in two ways. If timing strategies can reduce overall cost of capital in a firm and if investors have already realized the motivation of timing strategies and the abilities of timers, then timers should have higher firm value than non-timers even before timers implement their strategies through a new debt issue. Thus, I first test whether timers have higher firm value than non-timers by analyzing Tobin's q across timers and non-timers. I use q as a measure of firm value. Second, I investigate *changes in q* (from before to after the debt issues) across timers and non-timers to test whether the motivation of timing strategies is revealed to the capital markets after those strategies are implemented.

5.1 Tobin's q

Theoretically, q is defined as the ratio of the market value of the firm to the replacement cost of its assets. If q is greater than one, it means that a firm is assumed to use its assets better by capital markets than its next best alternative, its replacement costs. q has been widely used in the finance literature to measure firm value. For example, McConnell and Servaes (1990) and Morck, Shleifer, and Vishny (1988) examine whether q is related to ownership structure. Lang and Litzenberger (1989) use q to measure over-investment when they examine the impact of dividend announcements on stock prices. Lang and Stulz (1994) and Berger and Ofek (1995) use q to investigate the relation between corporate diversification and firm performance. Also, Lang, Stulz, and Walkling (1989), Yermack (1996), and Park and Song (1995) use q to examine the relationship between managerial performance and tender offer gains, the relationship between board size and firm performance, and the relationship among firm performance, employee stock ownership plans, and monitoring by outside blockholders, respectively.

Even though q is commonly used in many empirical papers in corporate finance, it is hard to calculate accurate q values due to unavailability of data, especially market value of debt and replacement costs of firm assets. Many papers have followed the methodology developed by Lindenberg and Ross (1981) to estimate the replacement of costs of inventory and fixed assets. To calculate the replacement costs they select an initiation date on which the replacement cost of the assets is assumed to be equal to their book values. Then, they use an algorithm to estimate the replacement costs for subsequent years by considering increase in book assets, depreciation expense, and inflation rate. This procedure is computationally complex and requires substantial historical data that may not be available. The Manufacturing Sector Master File compiled at the National Bureau Economic Research (NBER) uses similar approach to calculate the replacement costs, but the database is not available after 1987. These approaches have a problem that the initiation date is ad hoc, and replacement costs depend on the starting date. In addition, the NBER approach does not use actual market value of long-term debt, but is based on the assumption that all long-term debt has an original maturity of 20 years, estimates market value using a matrix of bond prices in year t for bonds due in year s from the Moody's corporate BAA bond price series. This approach to estimate market value of long-term debt is specifically not reasonable for this research because changes in interest rates following timing strategies can affect the market value of debt securities.

Chung and Pruitt (1994) show that their "approximate q" (hereafter C-P q) is highly correlated to Lindenberg and Ross's (1981) more theoretically correct model. They show that at least 96.6 percent of the variability of Lindenberg and Ross q is explained by their q. In this chapter, since the data necessary to perform the more exhaustive Lindenberg and Ross' q calculations are not available for many observations, I use the C-P q, defined as follows:

$$\text{C-P } q = (MVE + PS + DEBT)/TA,$$

where MVE is market value of equity, PS is the liquidating value of the firm's outstanding preferred stock, DEBT is the value of the firm's short-term liabilities net of its short-term assets plus the book value of the firm's long-term debt, and TA is the book value of the total assets of the firm. The advantage of using C-P q is that I can simply use accounting data available from *Research Insight* to calculate q.

5.2 Empirical Results on *C-P q*

5.2.1 Characteristics of Timers and Non-timers

Before investigating impact of timing strategies on firm value, I first compare characteristics of timers vs. non-timers and report the results in Table 10. I classify timers as firms following complex strategy based on one-year-ahead excess bond returns. Timers are assumed to issue short-term debt (long-term debt) when the predicted excess bond returns are high (low), and non-timers are assumed to issue long-term debt (short-

Table 10. Characteristics of Timers and Non-timers

The table reports the number of timers and non-timers based on complex strategy using one-year ahead excess bond returns as well as the mean and median of each variable and mean and median difference test results (t-test and non-parametric Kruskal-Wallis test) across two sub-samples. C-P q is market value of equity plus liquidation value of preferred stock plus book value of debt divided by book value of total assets. Total assets are presented in million dollars. Long-term leverage ratio is long-term debt divided by total assets. Dividend payout ratio indicates three-year average of cash dividends paid to common stock holders divided by earnings before extraordinary and discontinued items. Market to book ratio of equity is the ratio of market value of equity to book value of equity. R&D to sales ratio is research & development expenditure divided by net sales. Insider ownership is the ratio of shares owned by executives and directors to the number of shares of common stock outstanding.

Variable	Timer or non-timers	N	Mean	Median	Mean difference test (t-test)	Kruskal-Wallis test (χ^2)
C-P q	Non-timer	2,385	1.18	1.02		
	Timer	2,162	1.17	1.02	.67	.12
Total assets ($ in millions)	Non-timer	2,796	5,727.3	1,292.8		
	Timer	2,497	5,294.8	1376.3	.92	.95
Long-term leverage ratio	Non-timer	2,591	.38	.37		
	Timer	2,327	.38	.37	-.41	.07
Dividend payout ratio	Non-timer	2,362	.45	.35		
	Timer	2,109	.47	.36	-1.34	1.54
Market to book ratio of equity	Non-timer	2,362	2.53	1.84		
	Timer	2,109	2.50	1.82	.24	.27
R&D to sales ratio	Non-timer	1,450	.024	.015		
	Timer	1,287	.026	.016	-1.25	1.64
Inside ownership (%)	Non-timer	1,977	15.11	2.74		
	Timer	1,469	10.56	2.16	1.10	3.75*

*Indicates significant difference at 10 percent level.

term debt) when excess bond returns are low (high). Based on this classification, 2,574 firms (47 percent) are timers out of the full sample of 5,487 firms.

Following Chung and Pruitt (1994), I calculate q in the year when timers and non-timers issue long-term debt or short-term debt. The mean of C-P q for timers (1.17), which measures firm value, is slightly lower than that for non-timers (1.18), but the mean difference test (t-test) shows no significant difference. Also, the medians of q for the two sub-samples are identical based on the median difference test (Kruskal-Wallis test). To compare the average firm size, I examine total assets of the firms. The mean and median total assets of firms for non-timers are about \$5.7 billon and \$1.3 billion, which compares respectively to about \$5.3 billion and \$1.4 billion for non-timers. Mean and median difference tests show no significant differences between the two sub-samples. The mean and median long-term leverage ratios (0.38 and 0.37) for timers are the same as those for non-timers. The mean and median dividend payout ratios for timers (0.47 and 0.36) are slightly higher than those for non-timers (0.45 and 0.35), but the mean and median difference tests indicate no significant differences. To compare growth opportunities between two sub-samples, I examine market-to-book ratio of equity and ratio of research & development expenditure to sales. The mean (median) market-to-book ratio of equity for timers, 2.50 (1.82), is slightly lower than that for non-timers, 2.53 (1.84), but the difference tests are not statistically significant. The ratios of research & development expenditure to sales are similar between two sub-samples. The mean (median) inside ownership for timers, 10.56 (2.16) percent, is lower than that for non-timers, 15.11 (2.74) percent. The mean difference test shows no significant difference, but the median difference test shows statistically significant difference at 10 percent level. In summary, timers have similar characteristics in terms of firm value (C-P q), firm size, leverage, dividend policy, growth opportunities (market-to-book and R&D to sales), and inside ownership, compared to non-timers.

5.2.2 Univariate Test Results on C-P q

Panel A of Table 11 compares C-P q for timers with that for non-timers. The classification between market-timers and non market-timers is based on the naïve timing strategy. I assume that firms are timers when they issue long-term debt (short-term debt) when term spread is lower (higher) than the median term spread (2.40 percent), and firms are non-timers when they issue long-term debt (short-term debt) when term spread is higher (lower) than the median. The mean and median C-P q for non-timers are almost equal to those for timers. The mean difference test (t-test) and nonparametric median difference test (Kruskal-Wallis test) show that C-P q is not significantly different between timers and non-timers.

Panels B, C, and D report the univariate test results on C-P q between two sub-samples based on the complex timing strategy. In Panel B, I assume that timers issue long-term debt (short-term debt) when actual excess bond returns are negative (positive) and vice versa. In Panel C and D, I use the median values of one-year-ahead excess bond returns and three-year-ahead excess bond returns to classify timers and non-timers, respectively, and assume that timers issue long-term debt (short-term debt) when the excess bond returns are lower (higher) than the median value and vice versa. The results in the Panel B, C, and D show that timers have slightly lower q than non-timers, but the mean and median difference tests show that there exists only marginal difference between two sub-samples.

Table 11. Impact of Timing Strategies on Firm Value (Univariate Test Results on C-P q)
The table reports the number of timers and non-timers based on various classification methods as well as the mean and median of q (C-P q), and the mean and median difference test results (t-test and non-parametric Kruskal-Wallis test) across two sub-samples. C-P q is market value of equity plus liquidation value of preferred stock plus book value of debt divided by book value of total assets.

Panel A. Naïve Strategy based on term spread

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	2,377	1.18	1.01	.18	.71
Timers	2,170	1.17	1.03		

Panel B. Complex strategy based on actual excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	1,907	1.20	1.02	1.70*	.58
Timers	2,640	1.16	1.02		

Panel C. Complex strategy based on one-year-ahead excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	2,385	1.18	1.02	.67	.12
Timers	2,162	1.17	1.02		

Panel D. Complex strategy based on three-year-ahead excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	2,169	1.20	1.03	1.61	3.51*
Timers	2,378	1.16	1.01		

(table 11 continued)

Panel E. Timing strategy based on the combination of debt maturity function and one-year-ahead excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	3,694	1.17	1.01	-1.22	2.34
Timers	781	1.21	1.04		

Panel F. Timing strategy based on future bond ratings change

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	2,830	1.23	1.06	4.97***	11.72***
Timers	283	1.05	.92		

Panel G. Timing strategy based on future bond ratings change W/O timers with improved ratings

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	2,405	1.23	1.07	5.91***	9.73***
Timers	216	1.01	.92		

* and *** Indicates significant difference at 10 percent and 1 percent level, respectively.

In Panel E, I assume that timers issue debt at a different maturity spectrum than predicted by the debt maturity function in order to follow a complex strategy based on one-year-ahead excess bond returns. Timers have slightly higher q with a mean of 1.21 (a median of 1.04) than non-timers with a mean of 1.17 (a median of 1.01), but the mean and median difference test results indicate no statistical difference between two sub-samples.

In summary, the results show that although managers try to time debt markets based on market interest rates, term spread or excess bond returns, they do not succeed in increasing firm value. Because investors might figure out whether firms are timers or not even before they implement timing strategies, I estimate q one year before they issue debt securities and compare qs across timers and non-timers. The unreported results show that timers do not have significant different firm values compared to non-timers, consistent with the results in the year when timers (or non-timers) issue long- or short-term debt.

In Panel F, I assume that timers have private information about their future bond rating changes following Flannery (1986). Timers are assumed to issue short-term debt when they expect their bond ratings to improve at least two grades within three years after debt security issuance. Timers are also assumed to issue long-term debt when they expect their bond ratings to deteriorate within the period. Interestingly, timers have lower q with the mean of 1.05 (the median of 0.92) than non-timers with the mean of 1.23 (the median of 1.06). Both the mean and median differences are statistically significant at 1 percent level. To investigate the results further, I divide the timers based on upgrades or downgrades. Of the 283 timers, 216 firms issue long-term debt expecting their bond ratings to fall (at least two grades) within three years after the issuance. I compare the average q of those 216 timers with the average q of non-timers whose bond ratings do not improve, and report the results in Panel G. The mean and median differences are larger than those in Panel F, and are statistically significant at 1 percent level. However, in unreported tests, I find that if I compare the average q of timers who issue short-term debt expecting bond ratings upgrades with that of non-timers, the mean and median differences are not significant. Also, I compare the average q between timers and non-timers one year before debt issuance, and find that the results are similar. In summary, investors might have already predicted bond ratings changes, and reflected timers' motivation to issue long-term debt based on future rating downgrades in firm value. This explains the findings that timers have lower firm value than non-timers when I classify timers based on future bond rating changes.

In general, univariate test results show that even though firm managers try to time the debt market based on market interest rates, firm value for timers is not statistically different from that for non-timers. If financial managers try to time the debt market based on their future bond rating changes, firm value for timers is significantly lower than that for non-timers. The results indicate that firm managers do not time the debt market successfully.

5.2.3 Multivariate Regression Results on C-P q

Previous literature shows that firm value is related to financing, dividend, compensation policies, ownership structure, growth opportunities, and the magnitude of diversification of firms. Therefore, these variables need to be controlled for when testing whether timing strategies affect q.

First, we control for leverage effects. Because the sample firms for this research issue long-term debt or short-term debt, their leverage ratios will increase in the year when they issue the debt securities. Myers (1977) argues that if the firm has risky debt outstanding, it may have to pass up positive NPV projects because the created value from the potential projects will go to bondholders instead of shareholders. This argument suggests that for firms with high growth opportunities, leverage will be negatively related to firm value. Yet, Miller and Rock (1985) and Jensen (1986) argue that high levels of debt can be thought of as a bonding mechanism to force a firm to pay out excess cash. Therefore, an increase in leverage ratio will reduce free cash flow and agency costs, and will increase firm value. In other words, the leverage ratio could be positively or negatively related to firm value, as measured by q. Thus, I include the change in leverage ratio from previous year as a control variable.

Second, I control for dividend effects. Rozeff (1982) argues that external capital markets reduce agency costs by providing effective monitoring. The firms paying higher dividends have lower free cash flow and tend to go to external markets to raise capital more frequently. Miller and Rock (1985) show that dividends serve to signal future earnings. Also, Jensen (1986) implies that firms with more positive NPV investment opportunities have less free cash flow and pay lower dividends. Smith and Watts (1992) find that firms with more growth options have lower leverage, lower dividend yields, and higher executive compensation. These papers predict that dividend payout ratios are positively related to q. I include the three-year average dividend payout ratio in the regression analysis to control for dividend effects.

Third, I control for insider ownership. Once the manager sells a fraction of his common shares to outside investors, he does not bear full costs associated with a perk he consumes.[24] Therefore, as ownership gets more diffuse, agency costs will increase causing firm value to decrease. The competing argument is that as insider ownership increases, managers entrench themselves in a firm and increase agency costs. This management entrenchment hypothesis predicts a negative relation between insider ownership and firm value. Empirically, Demsetz and Lehn (1985) find that large firms have highly diffuse ownership structures. Yet, they find no linear relation between

[24] See the theoretical models of Jensen and Meckling (1976) and Leland and Pyle (1977).

ownership concentration and the accounting profit rate. McConnell and Servaes (1990) find a curvilinear relation between q and insider ownership. They document that the curve slope is positive until insider ownership reaches 40-50 percent and turns negative after the point. Morck, Shleifer, and Vishny (1988) find a significant non-monotonic relation between management ownership and market valuation of the firm as measured by Tobin's q. Their results suggest "a positive relation between ownership and q in the zero percent to five percent board ownership range, a negative and less pronounced relation in the five percent to 25 percent, and perhaps a further positive relation beyond 25 percent." These results are consistent with both the convergence of interest and entrenchment effects. I include the percentage of shares owned by executives and directors in the regression to explain q.

Fourth, q can be related to the magnitude of diversification of sample firms. Lang and Stulz (1994) and Berger and Ofek (1995) argue that diversification can lead to loss in firm value. They argue that conglomerates are not even average firms in terms of Tobin's q. To control for the magnitude of diversification of sample firms, I include the number of segments of the firms. The number of segments is not available in *Research Insight* for many observations in the sample, which limits the use of this variable in the analyses.

Finally, I control for bond ratings to explain the variation in q. Pinches and Singleton (1978) find abnormal high or low returns before changes in the rating, and argue that the improved (deteriorated) financial and operating conditions of the firms are realized by the capital markets long before the rating changes occur. Holthausen and Leftwich (1986) find that firms experience negative abnormal returns at the announcement of bond rating downgrades, but they do not experience abnormal returns at the announcement of bond rating upgrades. They also find that the difference between the one-year pre-announcement returns for upgrades and downgrades are about 20 to 30 percent. Dichev and Piotroski (2001) investigate long-run stock returns following bond ratings changes, and find abnormal returns following downgrades and no abnormal returns following upgrades. They also find that bond ratings changes predict earnings changes. This evidence indicates that bond rating and bond ratings changes should be associated with firm value. I include a dummy variable equal to one if the bond is investment grade and zero otherwise.

Univariate test results show that timers do not have higher value than non-timers. I estimate multivariate regression equations to examine whether timers have higher firm values than non-timers even after controlling for other determinants mentioned in the above, and report the results in Table 12. Model 1 includes only control variables. C-P q is significantly positively related to firm size (log of assets), which measured as a natural log of assets. Long-term leverage ratio is measured as the ratio of book value of long-term debt to total assets. Changes in long-term leverage from previous year are negatively related to q, which is marginally significant. Leverage can increase the present value of bankruptcy costs, but reduce the agency costs in Jensen (1986). The result is not consistent with the agency theory argument. Miller and Rock (1985), and Rozeff (1982) and Jensen (1986) argue that dividends can be served to signal the future earnings and to reduce agency costs. These models predict a positive relation between dividend payout ratio and firm value. Dividend payout ratio in the model indicates three-year average of common stock paid divided by earnings before extraordinary items and

Table 12. Multivariate Regression Results on C-P q

The dependent variable is C-P q. LT leverage change from previous year is change in long-term debt divided by assets from previous year. Dividend payout ratio indicates three-year average of dividends paid on common stockholders divided by earnings before extraordinary and discontinued operations. Dummy for timing strategy is a qualitative variable taking 1 for market timers and 0 for non-market timers, which are classified based on term spread (naïve strategy), EBR 0 (actual excess bond returns), EBR 1 (one-year ahead excess bond returns), combination of debt maturity function and EBR 1, and ratings change within three years after the issuance.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Intercept	.92*** (10.96)	.92*** (10.96)	.89*** (10.05)	.91*** (11.08)	.89 (11.62)	.76*** (6.58)
Log of assets	.07*** (5.45)	.07*** (5.41)	.07*** (5.49)	.07*** (5.39)	.07*** (6.32)	.08*** (5.59)
LT leverage change from previous year	-.24* (-1.89)	-.24* (-1.90)	-.23* (-1.79)	-.25* (-1.92)	-.23* (-1.91)	-.04 (-.31)
Dividend payout ratio	-.0001 (-.76)	-.0001 (-.76)	-.0002 (-.94)	-.0001 (-.74)	-.0002 (-.89)	-.0001 (-.48)
Dummy for investment grade bonds	.09*** (2.74)	.09*** (2.71)	.09*** (2.87)	.09*** (2.74)	.08** (2.54)	.14*** (3.18)
Inside ownership	.19** (2.05)	.19** (2.05)	.19** (2.08)	.19** (2.05)	.21** (2.31)	.27 (.97)
Square of inside ownership	-.002** (-2.06)	-.002** (-2.06)	-.002** (-2.09)	-.002** (-2.07)	-.003** (-2.33)	-.13 (-.31)
Dummy for timing strategy - Naïve strategy		.002 (.07)				
- Complex strategy based on EBR 0			.04 (1.28)			
- Complex strategy based on EBR 1				.03 (.83)		
- Combination of debt maturity function and EBR 1					.02 (.50)	
- Future ratings change						-.20*** (-4.31)
N	2,848	2,848	2,848	2,848	2,846	2,041
Adjusted R^2	.03	.03	.03	.03	.03	.03

The numbers in parentheses are t-statistics, which are calculated based on White heteroscedasticity consistent estimator.

*, **, and *** Indicates statistical significance at 10, 5, and 1 percent level, respectively.

discontinued operations. The result shows a negative but insignificant relation between dividend payout ratio and q, which is inconsistent with the predictions. Bond ratings measure the default risk of bonds, and are expected to be positively associated with firm value. The coefficient on dummy variable for investment grade bonds is significantly positive, which is consistent with the prediction. Then, I include inside ownership and the square term of insider ownership following Morck et al. (1988) and McConnell and Servaes (1990). Consistent with the results in those papers, firm value and inside ownership show a curvilinear relation. The coefficient on inside ownership is significantly positive, and the coefficient on the square term of inside ownership is significantly negative.

From Model 2 to Model 5, I include dummy variables representing timers that are classified based on market interest rates. In Model 2, timers follow a naïve strategy based on term spread. The results show that timers do not have significantly higher q than non-timers. In Models 3 and 4 timers follow a complex strategy based on actual excess bond returns and one-year-ahead excess bond returns; the results show that timers do not have significantly higher q than non-timers. In Model 5 I assume that timers issue debt securities at different maturity spectrum from predictions of debt maturity function to follow a complex strategy. The result still shows that timers are not significantly different from non-timers in terms of q. Timers might have higher value than non-timers if capital markets already know the motivation of timing strategies even before they implement those strategies. I measure q one year before they issue short-term or long-term debt following timing strategies. Unreported results are not qualitatively different from the results reported in Table 11 and 12. Overall, the results show that even though managers try to time debt markets using market interest rates, they do not have higher q (or firm value) than non-timers.

In Model 6, I test whether following a timing strategy based on future rating changes affects q. Consistent with univariate test results reported in Table 11, the coefficient on a zero-one dummy variable, which takes a value of 1 if firms are timers, is significantly negative at the 1 percent level, which implies that future bond rating changes might be predicted. This result is consistent with the findings in Pinches and Singleton (1978), and Holthausen and Leftwich (1986). They show that bond rating changes follow financial and operational abnormal performance. This explains why timers have lower value than non-timers even though they implement timing strategies based on future credit rating changes.

To test whether firms that issue long-term bonds before bond ratings downgrade lose value during the year when they issue long-term debt, I investigate the *change in q* during the one-year period and report the results in Table 13 and 14. For this test, I remove short-term debt issuers from the sample, and calculate change in q for 1,490 long-term debt issuers with available bond ratings during 1984-1997. The mean change in q is 0.02, which is significantly different from zero with t-statistics of 1.91 at 10 percent level. This implies that long-term bond issuers marginally increase firm value on average during the year when they issue long-term bonds. Then, I divide the sample to two sub-samples based on bond rating changes during three years after the issuance, and report the mean and median difference tests in changes in q across two sub-samples. Of 1,397 issuers with available bond ratings, 422 issuers (30 percent) experience downgrades within three years after the issuance. Long-term debt issuers with future ratings upgrades

Table 13. Univariate Test Results on *Change in q* during the Year when Firms Issue Long-term Debt

The table reports sample size as well as the mean and median of *change in q*, and the mean and median difference test results (t-test and non-parametric Kruskal-Wallis test) across two sub-samples, which is divided by bond rating changes during three years after long-term debt issuance. Change in q indicates change in C-P q during the year when firms issue long-term debt.

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
LT debt issuers with future ratings upgrades or no change	975	.04	.04	4.39***	20.48***
LT debt issuers with future ratings downgrades	422	-.03	-.01		

*** Indicates statistical significance at 1 percent level.

or no change experience increases in q by 0.04 while long-term debt issuers with future ratings downgrades experience decreases in q by 0.03. The mean and median test results show that the difference of changes in q between two sub-samples is statistically significant at 1 percent level. This evidence implies that capital markets significantly decrease value of timers during the year when they issue long-term bonds expecting credit deterioration. In chapter 4, I do not find any impact of timing strategy based on credit deterioration on announcement effects of straight debt offering. Combined with the result in chapter 4, the loss of firm value for the timers in terms of change in q does not seem to be related to the timing strategy based on bond ratings changes because the implementation of the strategy have no effect on share price. The loss of firm value for the timers could be related to other events like financial or operational abnormal performance, which occurs before bond ratings changes.

Table 14. Multivariate Regression Results on *Change in q* during the Year when Firms Issue Long-term Debt

The dependent variable is *change in q* during the year when firms issue long-term debt. Log of assets are measured at the end of one year before they issue long-term debt. LT leverage is long-term debt divided by assets. Dividend payout ratio indicates three-year average of dividends paid on common stockholders divided by earnings before extraordinary and discontinued operations. Log of C-M underwriter ranks is a natural log of Carter-Manaster's tombstone ranks. Dummy for timing strategy is a qualitative variable taking 1 for market timers and 0 for non-market timers, which are classified based on ratings change within three years after the issuance.

Variables	Model 1	Model 2	Model 3
Intercept	-.13** (-2.22)	-.12** (-2.09)	-.24 (-.94)
Log of assets	.02** (2.46)	.02** (2.50)	.02** (2.45)
LT leverage change from previous year	-.06 (-.50)	-.04 (-.36)	-.04 (-.37)
Dividend payout ratio	.0001 (.85)	.0001 (.69)	.0001 (.68)
Dummy for investment grade bonds	.01 (.52)	.02 (.74)	.02 (.67)
Log of C-M underwriter ranks			.06 (.49)
Dummy for timing strategy based on future ratings change (two grades or more)	-.05** (-2.18)		
Dummy for timing strategy based on future ratings change (one grade or more)		-.07*** (-3.98)	-.07*** (-3.99)
N	1,391	1,391	1,391
Adjusted R^2	.02	.03	.03

The numbers in parentheses are t-statistics, which are calculated based on White's heteroscedasticity consistent estimator.
*, **, and *** Indicates statistical significance at 10, 5, and 1 percent level, respectively.

I next estimate multivariate regression equations on change in q after including other determinants of q and report the results in Table 14. Log of assets is measured one year before firms issue long-term debt; the coefficients on the variable are significantly positive, which means that larger firms tend to increase firm value during the year they issue long-term bonds. I include the change in the long-term leverage ratio from the previous year to test whether the change in q is related to the magnitude of long-term financing. The coefficient on the variable is not significant, which means that the relative size of financing is not related to change in firm value. The coefficients on dividend payout ratio and dummy variable for investment grade bonds are also not significant. Consistent with univariate test results in Table 13, the coefficient on the dummy variable for the timing strategy based on future ratings change (two grades or more) is significantly negative.

In Model 2, I re-classify long-term debt issuers as timers if they experience one-grade downgrades or more. The coefficient on dummy variable for timing strategy is more strongly negative. In Model 3, I include the natural log of Carter-Manaster's tombstone ranks (Log of C-M underwriter ranks) to test whether reputation of underwriters is related to change in q during the year of long-term debt issuance.[25] The coefficient is positive but insignificant, which means that underwriters' reputation does not affect firm value when firms issue long-term bonds.

In summary, the evidence reported in Tables 13 and 14 shows that when firms issue long-term bonds expecting their bond ratings to be downgraded, they experience declines in firm value during the year of debt issuance. This implies that capital markets have already figured out the motivation of timers using future credit rating changes. The results also imply that firms experience financial and operating problems even long before bond ratings downgrades, which are reflected in firm value. This result is

[25] In unreported regression, I use market shares of underwriters as reputation measures instead of Carter-Manaster's tombstone ranks. The result still shows that underwriters' reputation does not increase firm value during the year of long-term debt issuance.

consistent with the findings in Pinches and Singleton (1978), and Holthausen and Leftwich (1986) that bond rating changes follow financial and operational abnormal performance.

5.3 Empirical Results on *Change in C-P q* (from year –1 to year +3)

5.3.1 Univariate Test Results on *Change in C-P q*

The above results show that timers classified based on market interest rates do not have higher firm values than non-timers one year before or in the year when they implement timing strategy. Now, I investigate the change in q from year -1 to year +3 to complement the event study in the previous chapter and to test whether timing strategies increase firm value in the long run. Year zero indicates the year in which sample firms issue long-term debt or short-term debt following various timing strategies.

Table 15 reports the univariate test results based on the change in q. Panel A reports the number of timers following a naïve strategy and the number of non-timers, the mean and median changes in q, and results of the mean and median difference test. The mean q for timers increases by 0.05 (the median increase is 0.05) while the mean q for non-timers increases by 0.09 (the median increase is 0.06). The mean and non-parametric median difference tests indicate no statistical difference between two sub-samples. In Panel B, timers and non-timers are classified based on actual excess bond returns. The mean and median changes in q for timers are slightly higher than those for non-timers, but the difference is not statistically significant. In Panel C, timers and non-timers are classified based on one-year-ahead excess bond returns. There is no significant difference in the mean changes in q between the two sub-samples, but the

Table 15. Impact of Timing Strategies on *Change in q* (from year –1 to year +3)

The table reports the number of timers and non-timers based on various classification methods as well as the mean and median of *change in q* (from year –1 to year +3), and the mean and median difference test results (t-test and non-parametric Kruskal-Wallis test) across two sub-samples. Year 0 is the year when timers or non-timers issue short-term or long-term debt following timing strategies. C-P q is market value of equity plus liquidation value of preferred stock plus book value of debt divided by book value of total assets.

Panel A. Naïve Strategy based on term spread

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	2,141	.09	.06	1.59	.70
Timers	1,971	.05	.05		

Panel B. Complex strategy based on actual excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	1,727	.06	.05	-.26	1.97
Timers	2,385	.07	.06		

Panel C. Complex strategy based on one-year-ahead excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	2,140	.08	.04	.46	3.18*
Timers	1,972	.06	.06		

(table 15 continued)

Panel D. Complex strategy based on three-year-ahead excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	1,995	.06	.04	-.74	3.39*
Timers	2,117	.08	.06		

Panel E. Timing strategy based on the combination of debt maturity function and one-year-ahead excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	3,406	.06	.06	-.94	1.04
Timers	681	.07	.05		

* Indicates significant difference at 10 percent level.

median change in q is marginally higher than that for non-timers. In Panel D, timers and non-timers are classified based on three-year-ahead excess bond returns. The mean difference test shows that there is no significant difference in changes in q between the two sub-samples, but the non-parametric median difference test shows that timers have a marginally higher change in q than non-timers. In Panel E, timers and non-timers are classified based on combination of debt maturity function and one-year-ahead excess bond returns. The test results show that there is no statistical difference between the two sub-samples.

In general, the evidence from univariate tests show that timing strategies based on market interest rates do not increase firm value over the time period from year –1 to year zero. In unreported tests, I implement the same test using different time periods like from year 0 to year 3 or from year –1 to year 5. The results are qualitatively similar to those reported in Table 15. Because the change in q is highly correlated to bond rating improvement or deterioration, I do not test the mean and median difference between timers and non-timers, which are classified based on future bond rating changes.

5.3.2 Multivariate Test Results on *Change in C-P q*

In the previous section, I do not find any evidence that timing strategies increase firm value in the long run, from year –1 to year 3. To complement the univariate tests, I estimate multivariate regressions on change in q after controlling for other determinants of q, and report the results in Table 16.

Dependent variable in the regressions is the change in q from year –1 to year 3. Model 1 includes a natural log of assets at year –1 (a measure of firm size), change in long-term leverage ratio from year –1 to year 3, three-year average of dividend payout ratio, dummy variable for investment grade bonds at year –1, and change in bond ratings from year –1 to year 3 as independent variables. Firm size is significantly positively related to change in q. The evidence is not consistent with the idea that small firms grow faster while large firms are relatively stable and mature. The coefficient on the change in long-term leverage ratio is negative but insignificant in Model 1. Long-term leverage ratio is measured as a ratio of book value of long-term debt plus current portion of long-term debt to total assets. Jensen (1986) predicts that an increase in leverage ratio will reduce agency costs. Leverage will also increase present value of bankruptcy costs. The result is not consistent with Jensen's prediction. The coefficient on the three-year average of dividend payout ratio is not significant in the model, which is not consistent

Table 16. Multivariate Regression Results on *Change in q* (from year-1 to year 3)
The dependent variable is change in q (C-P q). Log of assets indicates a natural log of assets. LT leverage (long-term leverage) is measured as long-term debt divided by assets. Dividend payout ratio indicates three-year average of dividends paid on common stockholders divided by earnings before extraordinary and discontinued operations. Rating changes are an assigned number to each bond rating at year -1 minus an assigned number at year 3. S&P AAA bond is assigned 2, AA bond is assigned 3, A bond is assigned 4, and so on. Dummy for timing strategy is a qualitative variable taking 1 for market timers and 0 for non-market timers, which are classified based on term spread (naïve strategy), EBR 0 (actual excess bond returns), EBR 1 (one-year ahead excess bond returns), combination of debt maturity function and EBR 1, and ratings change within three years after the issuance.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	-.54*** (-7.67)	-.54*** (-7.47)	-.52*** (-7.35)	-.54*** (-7.57)	-.55*** (-7.73)
Log of assets at year –1	.08*** (8.58)	.08*** (8.61)	.08*** (8.51)	.08*** (8.57)	.08*** (8.49)
LT leverage change from year –1 to year 3	-.21 (-1.54)	-.20 (-1.50)	-.22* (-1.70)	-.21 (-1.53)	-.21 (-1.52)
Dividend payout ratio	.00004 (.39)	.00005 (.48)	.00006 (.49)	.00004 (.42)	.00003 (.34)
Dummy for investment grade bonds at year –1	.04 (1.34)	.04 (1.37)	.02 (.75)	.04 (1.34)	.04 (1.34)
Rating changes from year –1 to year 3	.04*** (3.71)	.04*** (3.72)	.03*** (3.31)	.04*** (3.71)	.04*** (3.68)
Dummy for timing strategy					
- Naïve strategy		-.02 (-.99)			
- Complex strategy based on EBR 0			.04 (1.63)		
- Complex strategy based on EBR 1				-.01 (-.35)	
- Combination of debt maturity function and EBR 1					.05 (1.41)
N	2,741	2,741	2,741	2,741	2,733
Adjusted R^2	.04	.04	.05	.04	.04

The numbers in parentheses are t-statistics, which are calculated based on White's heteroscedasticity consistent estimator.
*, **, and *** Indicates statistical significance at 10, 5, and 1 percent level, respectively.

with a prediction of Rozeff (1982) and Jensen (1986) that higher dividends decrease free cash flow of a firm, and increase firm value. The coefficient on a dummy variable for investment grade bonds at year –1 is not significant, which implies that bond ratings are not related to the growth of firm value. Finally, Model 1 includes the change in bond ratings from year –1 to year 3. *Research Insight* assigns a value of two to an S&P AAA bonds, three to AA bonds, and four to A bonds, and so on. I measure change in bond ratings as the number assigned to the rating at year –1 minus the number assigned to at year 3. A positive number for the variable indicates credit improvement while a negative number indicates a decline of credit worthiness of the firms. The change in bond ratings is significantly positively related to change in q as expected, which means that rating upgrades increases firm value while rating down grades decreases firm value. This result is consistent with the findings in Pinches and Singleton (1978), Holthausen and Leftwich (1986), and Dichev and Piotroski (2001). Due to this relation between change in bond ratings and firm value, I do not test the impact of timing strategies based on change in bond ratings on firm value because I cannot separate the impact of timing strategies from the impact of bond rating changes on firm value. The results across Models 1 to 5 are consistent. Also, I use a zero-one variable equal to one to represent firms of which ratings change from investment grades to speculative grades. The decline of bond ratings from investment grade to speculative grade decreases firm value significantly as expected.

From Model 2 to Model 5, I add dummy variables for timing strategies based on market interest rates to test whether those strategies increase firm value. There is no evidence that timing positively impacts firm value. In this chapter, I do not find any evidence that timing strategies based on market interest rates increase firm value. Regardless of how I classify timers and non-timers, timers do not have higher firm values than non-timers during the year of issuance or one year before they issue short-term or long-term debt following those strategies. To test whether timing strategies increase firm value in the long run, I examine the change in q from year –1 to year 3. The results show that the change in firm value during the period is not related to timing strategies.

One interesting result comes from a timing strategy based on future rating changes. When firms choose maturity based on their expectation about their future rating changes, those timers have lower firm values than non-timers. To investigate the result further, I divide the timers into firms with upgrades and firms with downgrades. The result shows that timers issuing short-term debt expecting upgrades do not have significantly different firm value than non-timers. Yet, timers issuing long-term debt expecting downgrades have significantly lower value than non-timers in the year or one year before they issue long-term debt. These asymmetric results are consistent with a couple of explanations. First, The rating agencies might be more concerned about the firms that perform bad. Consequently, upgrades may not be as timely as downgrades. Second, managers' incentives to release information may not be symmetric such that they report good news early and bad news late. In addition, timers issuing long-term debt expecting downgrades lose firm value significantly more than non-timers during the year when they implement the timing strategy. Other events like financial and operational abnormal performance accounts for the loss of firm value for the timers. These results strongly suggest that timers fail to reduce the overall cost of capital even though they use seemingly private information.

Interpretation of these results is limited because I measure q using the market value of stock and the book value of debt to calculate firm value and using total assets to proxy for replacement costs. Firms using timing strategies might be able to increase market value of debt without changing share price if capital markets are not integrated. To address this problem, I collect market prices of bonds for the sample and re-measure q in the next chapter. After re-measuring q (New q), I do the same analyses as done in this chapter.

CHAPTER 6

NEW Q AND IMPACT OF TIMING STRATEGIES ON FIRM VALUE

In the previous chapter, I use C-P q as a measure of firm value following Chung and Pruitt (1994). I use the market value of common stock and the book value of long-term debt to calculate C-P q, and do not find any evidence that timing strategies decrease the overall cost of capital of the firms. Timers can decrease the overall cost of capital without changing the cost of equity by implementing timing strategies if debt markets and equity markets are segmented. Thus, I need to examine how debt market timing affects the costs of debt securities. To complement the results in the previous chapter, I re-calculate q using the market value of debt instead of the book value of debt. After re-calculating q, I repeat the same analyses from the previous chapter.

6.1 New q

Theoretically, q is defined as the ratio of the market value of the firm to the replacement costs of its assets. I modify q in Lindenberg and Ross' (1981) and Chung and Pruitt's (1994) papers to measure "New q":

$$\text{New } q = (MVE + PS + BVSTD + MVLTD) / TA,$$

where MVE is the market value of equity, PS is the liquidating value of the firm's preferred stock, BVSTD is the book value of the firm's short-term liabilities net of its short-term assets, MVLTD is the market value of the firm's long-term debt, and TA is the book value of the total assets of the firm. I use total assets to proxy for the replacement costs of the firm. The New q should be closer to theoretical q than C-P q because I use the market value of long-term debt.

It is challenging to collect the market value of debt for individual firms because large firms tend to have various kinds of bonds. I obtain a weighted price of bonds, and then I calculate the market value of long-term debt for each firm. I collect market prices of bonds from two sources for the sample during the ten-year period 1988-1997. I mainly use *Bloomberg* to collect yearly prices and the amount of bonds outstanding for each firm. I also use *Mergent Bond Record* to complement the data from *Bloomberg*. Then, I calculate a weighted average price of bonds for each firm each year using the amount of bonds outstanding as weights and obtain the market value of long-term debt by multiplying the book value of long-term debt from *Research Insight* by the weighted average price of bonds. I assume here that the price is expressed as a percentage of par value. For example, if book value of long-term debt for a firm is $1 million and the weighted market price of bonds for the firm is 1.02 (102 percent of par value), then the market value of long-term debt would be $1.02 million.

For this chapter, I limit the sample to firms with available bond prices from *Bloomberg* or *Mergent Bond Record* during the sub-period 1988-1997. Of 3,944 firms (2,308 short-term debt issuers and 1,636 long-term debt issuers) during the 10-year period, 1,943 firms have available bond prices, and these firms are used in this research. Then, I combine the bond prices with accounting data from *Research Insight* for the sample. As expected, more long-term debt issuers have available bond prices. Of 1,943 firms in the sample, 1,636 firms are long-term debt issuers while 600 firms are short-term debt issuers. Based on the complex strategy with one-year-ahead excess bond returns, 933 firms (48 percent) are classified as timers, which is similar to the proportions of timers (47 percent) in the full sample in the previous chapter.

Table 17. Descriptive Statistics for the Sample with Bond Prices during 1988-1997

The table reports the number of short- and long-term debt issuers, mean and median of each variable, and mean and median difference test results (t-test and non-parametric Kruskal-Wallis test) across two sub-samples. C-P q is the market value of equity plus the liquidation value of preferred stock plus the book value of debt divided by the book value of total assets. New q is the market value of equity plus the liquidation value of preferred stock plus the market value of debt divided by the book value of total assets. Total assets are presented in million dollars. Long-term leverage ratio is long-term debt divided by total assets. Dividend payout ratio indicates three-year average of cash dividends paid to common stock holders divided by earnings before extraordinary and discontinued items. Market to book ratio of equity is the ratio of market value of equity to book value of equity. R&D to sales ratio is research & development expenditure divided by net sales. Insider ownership is the ratio of shares owned by executives and directors to the number of shares of common stock outstanding.

Variable	Short- or Long-term debt issuers	N	Mean	Median	Mean difference test (t-test)	Kruskal-Wallis test (χ^2)
Tobin's q (C-P q)	Short-term	369	1.38	1.10	1.81*	.08
	Long-term	938	1.29	1.12		
New q	Short-term	369	1.39	1.12	1.80*	.08
	Long-term	938	1.29	1.14		
Total assets ($ in millions)	Short-term	600	9,608.47	2,413.01	.47	17.30***
	Long-term	1,272	8,988.19	3,435.31		
Long-term leverage ratio	Short-term	542	.35	.34	-14.38***	106.64***
	Long-term	1,129	.49	.46		
Dividend payout ratio	Short-term	530	.54	.41	3.22***	41.03***
	Long-term	942	.44	.30		
Market to book ratio of equity	Short-term	530	3.13	2.23	.02	.19
	Long-term	942	3.13	2.20		
R&D to sales ratio	Short-term	357	.03	.02	1.03	9.82***
	Long-term	607	.03	.01		
Inside ownership (%)	Short-term	528	7.24	1.20	-2.61***	3.39*
	Long-term	1,154	9.34	1.46		

*** Indicates significant difference at 1 percent level.

Because the sample size in this chapter is much smaller than that in the previous chapter, I first investigate the sample characteristics and report the results in Table 17. Comparing to the results in Table 4 for the full sample, firms in the sub-sample have higher q on average in terms of C-P q. Also, the firms tend to be large, have higher long-term leverage ratio, have higher dividend payout ratio, have higher market-to-book ratio of equity, and have less inside ownership. Short-term debt issuers in the sub-sample have higher q than long-term debt issuers while short-term debt issuers in the full sample have lower q.

Then, I examine the relationship between C-P q and New q year by year and report the results in Table 18. The C-P q and New q are measured in the year when the firms issue short- or long-term debt. The Table reports the number of the firms, and the means and medians of C-P q and New q year by year. The results show that New q is very close to C-P q, but New q is slightly higher than C-P q in the 1990s. In total, the mean C-P q is 1.31 (the median C-P q is 1.11) while the mean New q is 1.32 (the median New q is 1.13). The Pearson correlation coefficient between C-P q and New q is 0.99 and the correlation coefficient is not changing year by year. These results suggest that New q is not much different from C-P q although the market value of long-term debt is used to calculate New q.

6.2 Empirical Results on New q

As done in the previous chapter, I investigate whether there is any difference in firm value between timers and non-timers, and report the results in Table 19. I report the numbers of timers and non-timers, the means and medians of q, and the results of the mean and non-parametric median difference tests. In Panel A, I classify timers using the

Table 18. Comparison of C-P q with New q
The table reports the number of firms used in the research and the means and medians of C-P q and New q year by year. C-P q is the market value of equity plus the liquidation value of preferred stock plus the book value of debt divided by the book value of total assets. New q is the market value of equity plus the liquidation value of preferred stock plus the market value of debt divided by the book value of total assets.

Year	N	C-P q		New q	
		Mean	Median	Mean	Median
1988	90	1.02	.91	1.01	.90
1989	113	1.19	1.01	1.18	1.02
1990	81	1.08	.92	1.06	.91
1991	130	1.29	1.04	1.30	1.06
1992	163	1.33	1.10	1.35	1.12
1993	182	1.31	1.13	1.33	1.17
1994	122	1.19	1.06	1.18	1.06
1995	146	1.38	1.21	1.41	1.22
1996	140	1.46	1.20	1.47	1.23
1997	140	1.62	1.40	1.64	1.41
Total	**1,307**	**1.31**	**1.11**	**1.32**	**1.13**

naïve timing strategy based on term spread. Of 1,307 firms for which New q can be calculated, 685 firms (54 percent) are classified as timers. The mean q (the median q) for timers is close to that for non-timers. The mean and median difference tests show no significant differences.

Panels B, C, and D report the univariate test results on q between two sub-samples based on the complex timing strategies. Timers are classified based on actual, one-year-ahead, and three-year-ahead excess bond returns in the Panels, respectively. The results

Table 19. Impact of Timing Strategies on Firm Value (Univariate Test Results on New q)
The table reports the number of timers and non-timers based on various classification methods as well as the mean and median of q (New q), and the mean and median difference test results (t-test and non-parametric Kruskal-Wallis test) across two sub-samples. New q is the market value of equity plus liquidation value of preferred stock plus the market value of debt divided by book value of total assets.

Panel A. Naïve Strategy based on term spread

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	622	1.32	1.11	.13	.74
Timers	685	1.32	1.14		

Panel B. Complex strategy based on actual excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	726	1.33	1.13	.66	.01
Timers	581	1.31	1.13		

Panel C. Complex strategy based on one-year-ahead excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	673	1.35	1.12	1.23	.06
Timers	634	1.29	1.14		

Panel D. Complex strategy based on three-year-ahead excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	403	1.34	1.10	.67	1.85
Timers	904	1.31	1.14		

(table 19 continued)

Panel E. Timing strategy based on the combination of debt maturity function and one-year-ahead excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	955	1.30	1.12	-1.13	.59
Timers	350	1.36	1.14		

Panel F. Timing strategy based on future bond ratings change

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	1,140	1.35	1.15	5.50***	9.60***
Timers	125	1.07	.97		

Panel G. Timing strategy based on future bond ratings change W/O timers with improved ratings

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	944	1.38	1.15	5.86***	7.95***
Timers	110	1.05	.97		

* and ***Indicates significant difference at 10 and 1 percent level, respectively.

show that the mean and median qs for timers are not significantly different from those for non-timers regardless of how I classify timers.

Panel E reports the comparison of qs between timers and non-timers, which are classified based on the combination of the debt maturity function and the complex timing strategy. As explained in the previous chapters, I use the predictions of the debt maturity function and one-year-ahead excess bond returns to obtain a better classification. Of

1,305 firms, 350 firms (27 percent) are classified as timers and the proportion of timers are much lower compared to the naïve and complex timing strategies. Consistent with the results in the previous Panels, the mean and median q for timers are higher but not statistically different from those for non-timers.

In Panel F, I assume that timers have private information about their future bond rating changes, and use the information to choose maturity. Of 1,265 firms, only 125 firms (10 percent) are classified as timers. The mean q of 1.07 for timers (the median q of 0.97) is significantly lower than the mean q of 1.35 for non-timers (the median q of 1.15) at a 1 percent level. To investigate the differences of firm value between timers and non-timers further, I divide the sample firms into the firms with improved ratings and the firms with deteriorated ratings. Panel G compares the mean q between timers who issue long-term debt expecting their bond ratings to fall and non-timers. The mean and median differences are larger than those in Panel F, and are statistically significant at a 1 percent level. Also, I find that the mean and median differences of q between timers that issue short-term debt expecting their ratings to rise and non-timers are not significant. The evidence shows that when timers are classified using the future bond rating changes, they have lower firm value than non-timers. The results stem from lower firm value of timers, which issue long-term debt expecting their grades to deteriorate. The evidence is consistent with the argument that bond ratings changes follow abnormal operational and financial performance, which is observable in the market. Thus, investors are able to predict bond ratings changes, and reflect their expectation in firm value.

Overall, the univariate test results are consistent with those in the previous chapter although I use New q instead of C-P q as a measure of firm value. Even though firm managers try to time debt markets based on term spread or excess bond returns, firm value for timers is not statistically different from that for non-timers. Also, if financial managers try to time debt markets based on their expectation about bond ratings changes, firm value for timers is significantly lower than that for non-timers. The evidence indicates that firm managers fail to increase firm value by implementing timing strategies based on market interest rates or seeming private information about their future ratings changes.

Univariate test results show that timers do not have higher value than non-timers although I use a different measure of q in this chapter. I estimate multivariate regression equations to examine whether timers have higher firm value than non-timers as I do in the previous chapter, and report the results in Table 12. Model 1 tests whether a naïve timing strategy based on term spreads increases q. The coefficient on the dummy variable for a naïve timing strategy is negative but insignificant. I include other determinants of q as control variables. Q is significantly positively related to firm size, which is measured as the natural log of assets. The coefficient on long-term leverage change from the previous year is negative but insignificant.[26] The result is not consistent with the agency theory argument. Jensen (1986) argues that debt service payments can mitigate free cash flow problems, and predicts that firm value and leverage are positively related. I include three-year average dividend payout ratio because Miller and Rock (1985), Rozeff (1982), and Jensen (1986) predict a positive relation between dividend payout ratio and firm value. The coefficient on the dividend payout ratio is positive but insignificant, which is inconsistent with the predictions of those models. Pinches and

[26] The coefficient on long-term leverage change from the previous year is negative and significant at 10 percent level in Model 3.

Table 20. Multivariate Regression Results on New q

The dependent variable is New q, which is measured as the market value of equity plus the market value of long-term debt plus the adjustment of short-term debt divided by total assets. LT leverage change from previous year is the change in long-term debt divided by assets in the end of previous year. Dividend payout ratio indicates three-year average of dividends paid on common stockholders divided by earnings before extraordinary and discontinued operations. Dummy for timing strategy is a qualitative variable taking 1 for market timers and 0 for non-market timers, which are classified based on term spread (naïve strategy), EBR 1 (one-year ahead excess bond returns), the combination of debt maturity function and EBR 1, and ratings change within three years after the issuance.

Variables	Model 1	Model 2	Model 3	Model 4
Intercept	.41*** (2.88)	.43*** (3.12)	.34** (2.17)	.37** (2.46)
Log of assets	.10*** (5.40)	.10*** (5.48)	.10*** (5.53)	.11*** (5.65)
LT leverage change from previous year	-.42 (-1.56)	-.44 (-1.61)	-.45* (-1.67)	-.12 (-.45)
Dividend payout ratio	.0002 (.12)	.002 (.99)	.001 (.72)	.002 (1.27)
Dummy for investment grade bonds	.10** (2.05)	.10** (1.98)	.12** (2.31)	.11** (2.19)
Inside ownership	.24* (1.82)	.24* (1.84)	.25* (1.90)	.22* (1.70)
Dummy for timing strategy - Naïve strategy	-.05 (-.95)			
- Complex strategy based on EBR 1		-.06 (-1.34)		
- Combination of debt maturity function and EBR 1			.12* (1.88)	
- Future ratings change				-.26*** (-4.48)
N	1,171	1,171	1,171	1,149
Adjusted R^2	.03	.03	.04	.04

The numbers in parentheses are t-statistics, which are calculated based on White's heteroscedasticity consistent estimator.

*, **, and *** Indicates statistical significance at 10, 5, and 1 percent level, respectively.

Singleton (1978), Holthausen and Leftwich (1986), and Dichev and Piotroski (2001) predict that bond ratings are positively related to firm value. The coefficient on the dummy variable for investment grade bonds is positive and significant at 5 percent level, which is consistent with the predictions. Following Morck, Shleifer, and Vishny (1988) and McConnell and Servaes (1990), I also include inside ownership as a control variable. Consistent with the previous results, q is positively related to inside ownership.[27]

In Model 2, I include a dummy variable for a complex timing strategy based on one-year-ahead excess bond returns instead of the naïve timing strategy. The coefficient on the variable is negative but insignificant. Model 3 includes a dummy variable for timers, which are classified based on the combination of debt maturity function and one-year-ahead excess bond returns. Timers are assumed to choose maturity different from the predictions of debt maturity function to follow complex timing strategy. The coefficient on the variable is positive and significant at 10 percent level, which means that timers have marginally higher firm value than non-timers. In Model 4, timers are assumed to have inside information about their future ratings changes. Timers issue short-term debt expecting upgrades and issue long-term debt expecting downgrades. The coefficient on the dummy variable for timing strategy based on future ratings changes is significantly negative at 1 percent level. Again, this result comes from the fact that long-term debt issuers for whom credit quality deteriorates subsequently, have significantly lower firm value than other debt issuers.

In general, the multivariate regression results are consistent with the univariate test results and the results in the previous chapter. Timers that implement timing

[27] In an unreported regression, I also include the square term of inside ownership to test a curvilinear relation between inside ownership and q. In contrast to the results in the previous chapter, the coefficient on the variable is not significant.

strategies based on term spread or excess bond returns do not have higher firm value than non-timers. Also, timers that issue long-term debt expecting the downgrades of their credit quality have less firm value than non-timers. The result indicates that although timers use seemingly private information like future bond ratings changes, they are not successful in increasing firm value.

6.3 Empirical Results on *Change in New q*

In the previous section, I find that timers do not have higher firm value than non-timers. If timing strategies based on their superior information about future interest rate changes are successful, those strategies allow the timers to lock in lower interest rates in the future. If capital markets are segmented and do not discern which firms are timers at the time of implementing those strategies, bond prices of timers will increase more than those of non-timers. To test this possibility, I investigate the *change in New q* from year zero to year three across timers and non-timers. Year zero indicates the year when timers implement timing strategies based on term spreads or excess bond returns. Comparing the change in New q to the change in C-P q for the sub-sample, the mean change (0.04) in New q and in C-P q is identical. The median change in New q (0.03) is slightly higher than the median change in C-P q (0.02), but the median difference tests shows no significant differences between them.

Table 21 reports the univariate test results based on the change in New q. Panel A reports the number of timers following a naïve timing strategy based on term spreads and the number of non-timers, the mean and median changes in q, and the results of the mean and median difference test. The mean q for timers increases by 0.04, and the mean q for non-timers also increases by 0.04. The median q for timers increases by 0.04 while the

Table 21. Impact of Timing Strategies on *Change in New q* (from year 0 to year +3)

The table reports the number of timers and non-timers based on various classification methods as well as the mean and median of *change in New q* (from year –1 to year +3), and the mean and median difference test results (t-test and non-parametric Kruskal-Wallis test) across two sub-samples. Year 0 is the year when timers or non-timers issue short-term or long-term debt following timing strategies. New q is the market value of equity plus the liquidation value of preferred stock plus the market value of debt divided by book value of total assets.

Panel A. Naïve Strategy based on term spread

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	609	.04	.04	-.02	1.14
Timers	663	.04	.02		

Panel B. Complex strategy based on one-year-ahead excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	663	.04	.03	-.41	.15
Timers	609	.04	.03		

Panel C. Timing strategy based on the combination of debt maturity function and one-year-ahead excess bond returns

	N	Mean	Median	Mean difference test (t)	Kruskal-Wallis test (χ^2)
Non-timers	989	.04	.02	.27	2.91
Timers	277	.04	.04		

*Indicates significant difference at 10 percent level.

median q for non-timers increases by 0.02. The mean and non-parametric median difference tests indicate no statistical difference between two sub-samples. In Panel B, timers and non-timers are classified based on one-year-ahead excess bond returns. The mean and median q for timers and non-timers increases almost identically.[28] In Panel C, timers choose a different maturity from the predictions of the debt maturity function to follow a complex timing strategy. The mean change in q for timers is similar to that for non-timers. The median q for timers increases by 0.04 while the median q for non-timers increases by 0.02. The non-parametric median difference test result shows that the changes in q for two sub-samples are not statistically different. Because the change in q is highly correlated to bond rating changes, it is impossible to separate the effects of bond rating changes from the effect of a timing strategy based on future bond rating changes on q. Thus, I do not test the mean and median differences between timers and non-timers based on future bond rating changes.

In general, the univariate test results show that implementing timing strategies based on term spread or excess bond returns does not increase firm value in the long run. The evidence indicates that firms are not able to lock in lower interest rates and reduce the overall cost of capital in the future by implementing timing strategies.

I find no evidence that timing strategies increase firm value from year zero to year three in the univariate tests. To complement the univariate tests, I estimate multivariate regression equations on change in New q after controlling for other determinants of q

[28] In unreported tests, timers are classified based on actual excess bond returns or three-year-ahead excess bond returns. Consistent with the results from a complex timing strategy based on one-year-ahead excess bond returns, the mean and median changes in New Q are not statistically different between timers and non-timers although actual excess bond returns or three-year-ahead excess bond returns are used to classify timers.

Table 22. Multivariate Regression Results on *Change in New q* (from year 0 to year 3)
The dependent variable is change in New q. Log of assets indicates a natural log of assets. LT leverage (long-term leverage) is measured as long-term debt divided by assets. Dividend payout ratio indicates three-year average of dividends paid on common stockholders divided by earnings before extraordinary and discontinued operations. Rating changes are an assigned number to each bond rating at year 0 minus an assigned number at year 3. S&P AAA bond is assigned 2, AA bond is assigned 3, A bond is assigned 4, and so on. Dummy for timing strategy is a qualitative variable taking 1 for market timers and 0 for non-market timers, which are classified based on term spread (naïve strategy), EBR 1 (one-year ahead excess bond returns), and the combination of debt maturity function and EBR 1.

Variables	Model 1	Model 2	Model 3
Intercept	-.23*** (-3.09)	-.23*** (-3.13)	-.28*** (-3.66)
Log of assets at year 0	.03*** (3.66)	.03*** (3.67)	.04*** (3.82)
LT leverage change from year 0 to year 3	.05 (.16)	.04 (.16)	.12 (.55)
Dividend payout ratio	-.0004 (-.53)	-.0005 (-.60)	-.0007 (-0.86)
Dummy for investment grade bonds at year 0	-.002 (-.06)	-.003 (-.08)	.02 (.62)
Rating changes from year 0 to year 3	.03*** (3.56)	.03*** (3.55)	.03*** (4.26)
Dummy for timing strategy			
- Naïve strategy	-.01 (-.39)		
- Complex strategy based on EBR 1		.004 (.20)	
- Combination of debt maturity function and EBR 1			.005 (.23)
N	1,241	1,241	1,235
Adjusted R^2	.02	.02	.02

The numbers in parentheses are t-statistics, which are calculated based on White heteroscedasticity consistent estimator.
*, **, and *** Indicates statistical significance at 10, 5, and 1 percent level, respectively.

and report the results in Table 21. Model 1 includes the natural log of assets at year zero (a measure of firm size), change in long-term leverage ratio from year zero to year three, three-year average of dividend payout ratio, a dummy variable for investment grade bonds at year zero, and the change in bond ratings from year zero to year three as control variables. Firm size is significantly positively related to the change in q, which is not consistent with the idea that small firms grow faster, but consistent with the results in the previous chapter. The coefficients on long-term leverage change and dividend payout ratio are not significant, which is inconsistent with Jensen (1986) agency costs theory that debt service payments or dividends mitigate free cash flow problems. The coefficient on a dummy variable for investment grade bonds at year zero is not significant, which implies that bond ratings are not related to the growth of firm value. Then, I control for bond rating changes from year zero to year three, which is measured by number assigned to the ratings by *Research Insight* at year zero minus the number assigned to the ratings at year three. A positive number for the variable indicates credit improvement and a negative number indicates credit deterioration. As expected, the rating changes are strongly related to the change in q, which means that firms gain value or lose value following bond rating changes. This result is consistent with Pinches and Singleton (1978), Holthausen and Leftwich (1986), and Dichev and Piotroski (2001). From Model 1 to Model 3 respectively, I include dummy variable for timers based on term spread, based on one-year-ahead excess bond returns, or based on the combination of the debt maturity function and one-year-ahead excess bond returns. The results show that timing strategies are not related to the change in q during the period, which implies that firm managers fail to increase firm value by implementing timing strategies based on market interest rates.

In this chapter, I re-measure q (New q) using market value of long-term debt. If capital markets are segmented, firm managers would be able to lock in lower interest rates by implementing timing strategies and decrease the overall cost of capital. Thus, if timing strategies are successful, timers should have higher firm value than non-timers. The evidence shows that timers do not have higher firm value than non-timers, and do not increase firm value more than non-timers after they issue debt securities, regardless of how I classify timers. The results suggest that debt markets are well integrated with equity markets.

CHAPTER 7

SUMMARY AND CONCLUSION

Previous literature finds that firm managers tend to choose maturity based on term spreads or excess bond returns. That is, they tend to issue long-term debt (short-term debt) when term spreads or excess bond returns are low (high). Even though the literature indicates that firm managers try to time debt markets to reduce overall cost of capital of the firm, they do not directly tell us whether timing debt markets increases firm value via the reduced cost of capital. This dissertation tests whether timing debt markets increases firm value.

I classify short- and long-term debt issuers into timers and non-timer based on term spreads (a naïve timing strategy) and excess bond returns (a complex timing strategy), which are publicly available information. Then, I combine one-year-ahead excess bond returns and a debt maturity function to obtain a better classification of timers.

Following Flannery (1986), I classify timers based on future bond ratings changes, where timers are assumed to have private information about their rating changes within three years after the issuance of debt securities and use the information to choose maturity when they issue the debt securities.

Based on those classifications of timers, I first examine the effect of timing strategies on share price responses to the announcements of straight debt offering using a standard event study method to test whether the motivation of timers is revealed to the markets after firms implement timing strategies. Using a sample of 1,423 straight long-term debt offerings with available announcement dates during 1983-1997, I find that the share price response for timers is not significantly different from that for non-timers regardless of how I classify timers. That is, timing strategies based on market interest rates or future bond ratings change do not affect the mean stock price response to the announcements of straight debt offerings.

Second, I test whether timers have higher firm value than non-timers. I use q as a measure of firm value. I use two different measures of q. Following Chung and Pruitt (1994), I use the market value of equity, the book value of long-term debt, and the book value of assets (a proxy for the replacement costs of its assets) to calculate q (C-P q) and use the market value of long-term debt instead of the book value of long-term debt for the firms with available bond prices to re-calculate q (New q). Using a sample of 5,487 short- or long-term debt issuers over the period 1983-1997, I find no significant differences across timers and non-timers in firm value, regardless of whether I assume they follow a naïve timing strategy or a complex timing strategy, and regardless of whether I use C-P q or New q as a measure of firm value.

Third, I examine whether any increase in firm value would show up after the issuance of debt securities by comparing changes in q between timers and non-timers. If timers can lock in lower interest rates by implementing timing strategies, they should increase firm value more than non-timers in the long run. I find no significant differences in the changes in q between timers and non-timers.

I do find one interesting result when I classify timers based on private information (future rating changes). I find that timers have lower firm values than non-timers in the year of or one year before they issue the debt securities. To investigate this result further, I divide the timers into firms with upgrades and firms with downgrades. The result shows that timers issuing short-term debt expecting upgrades do not have significantly different firm value than non-timers. In contrast, timers issuing long-term debt expecting downgrades have significantly lower value than non-timers. In addition, timers issuing long-term debt expecting downgrades lose firm value significantly more than non-timers during the year when they implement the timing strategy. This result is consistent with previous findings that financial and operational abnormal performance precedes bond ratings changes, and thus investors are able to predict bond ratings changes. These results also imply that timers fail to reduce the overall cost of capital although they try to time debt market using seemingly private information.

Overall, the results indicate that timers do not have higher firm value than non-timers regardless of how I classify timers based on public information (term spreads or excess bond returns) or seemingly private information (future bond ratings changes), and that timing strategies do not affect the share price response to the announcements of straight debt offerings, and do not increase firm value in the long run.

In conclusion, the results enable me to answer the problem in Baker et al. (2003) and Titman (2002) about whether managers successfully time debt market or managers try in vain to time an efficient debt markets. Even though firm managers try to time debt markets using market interest rates or future bond ratings changes, they are not successful in decreasing the overall cost of capital. The results also suggest that corporate debt markets are efficient and well integrated with equity markets.

REFERENCES

Akerlof, G. 1970. The Market for 'Lemons': Quality Uncertainty and the Market Mechanism. *The Quarterly Journal of Economics* 84: 488-500.

Asquith, P.A., and D. Mullins, 1986, Equity issues and offering dilution, *Journal of Financial Economics* 15, 61-89.

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

Baker, M. and J. Wurgler, 2000, The equity share in new issues and aggregate stock returns, *Journal of Finance* 55, 2219-2257.

Baker, M., R. Greenwood, and J. Wurgler, 2003, The maturity of debt issues and predictable variation in bond returns, *Journal of Financial Economics*, *Forthcoming*.

Barclay, M.J. and C.W. Smith, Jr., 1995, The maturity structure of corporate debt, *Journal of Finance* 50, 609-631.

Barclay, M.J. and C.W. Smith, Jr., 1996, On financial architecture: leverage, maturity, and priority, *Journal of Applied Corporate Finance* 8, 4-17.

Barnea, A., R.A. Haugen, and L.W. Senbet, 1980, A rationale for debt maturity structure and call provisions in the agency theoretic framework, *Journal of Finance* 35, 1223-1234.

Beatty, R. P. 1989. Auditor Reputation and the Pricing of Initial Public Offerings. *The Accounting Review* 64: 693-709.

Berger, P. and E. Ofek, 1995, Diversification's effect on firm value, *Journal of Financial Economics* 37, 39-65.

Billingsley R. S., D. M. Smith, and R. E. Lamy, 1994, Simultaneous debt and equity issues and capital structure targets, *Journal of Financial Research* 17, 495-516.

Black, F. and M. Scholes, 1973, The pricing of options and corporate liabilities, *Journal of Political Economy* 81, 637-654,

Bodie, Z. and R. Taggart, 1978, Future investment opportunities and the value of the call provision on a bond, *Journal of Finance* 33, 1187-1200.

Boyce, W.M. and A.J. Kalotay, 1979, Tax differentials and callable bonds, *Journal of Finance* 34, 825-838.

Brennan, M.J. and E.S. Schwartz, 1978, Corporate income taxes, valuation, and the problem of optimal capital structure, *Journal of Business* 51, 103-114.

Brick, I. E. and S. A. Ravid, 1985, On the relevance of the debt maturity structure, *Journal of Finance* 40, 1423-1437.

Brick, I. E. and S. A. Ravid, 1991, Interest rate uncertainty and the optimal debt maturity structure, *Journal of Financial and Quantitative Analysis* 26, 63-81.

Carter, R., F. Dark, and A. Singh. 1998. Underwriter Reputation, Initial Returns and the Long-Run Performance of IPO Stocks. *Journal of Finance* 53: 285-311.

Carter, R., and S. Manaster. 1990. Initial Public Offerings and Underwriter Reputation. *Journal of Finance* 45, no. 4: 1045-67.

Chung, K. H. and S. W. Pruitt, 1994, A simple approximation of Tobin's Q, *Financial Management* 23, 70-74.

Choe, H., R. W. Masulis, and V. Nanda, 1993, Common stock offerings across the business cycle: Theory and evidence, *Journal of Empirical Finance* 1, 3-31.

Dann, L. Y. and W. H. Mikkelson, 1984, Convertible debt issuance, capital structure changes and financing-related information: some new evidence, *Journal of Financial Economics* 13, 157-86.

DeAngelo, L., 1981, Auditor Size and Audit Quality. *Journal of Accounting and Economics* 3, 183-99.

Demirguc-Kunt, A. and V. Maksimovic, 1999, Institutions, financial markets, and firm debt maturity, *Journal of Financial Economics* 54, 295-336.

Demsetz, H. and K. Lehn, 1985, The structure of corporate ownership: causes and consequences, *Journal of Political Economy* 93, 1155-1177.

Denis, D.J. and V.T. Mihov, 2003, The choice among bank debt, non-bank private debt and public debt: evidence from new corporate borrowings, *Journal of Financial Economics*, Forthcoming.

Diamond, D.W., 1991, Debt maturity structure and liquidity risk, *Quarterly Journal of Economics* 106, 710-737.

Diamond, D.W., 1993, Seniority and maturity of debt contracts, *Journal of Financial Economics* 33, 341-368.

Dichev, I.D. and J.D. Piotroski, 2001, The long-run stock returns following bond ratings changes, *Journal of Finance* 56, 173-203.

Eckbo, B. E., 1986, Valuation effects of corporate debt offerings, *Journal of Financial Economics* 15, 119-51.

Fama, E., L. Fisher, M. Jensen, and R. Roll, 1969, The adjustment of stock prices to new information, *International Economic Review* 10, 1-21.

Flannery, M.J., 1986, Asymmetric information and risky debt maturity choice, *Journal of Finance* 41, 19-37.

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

Guedes, J. and T. Opler, 1996, The determinants of the maturity of corporate debt issues, *Journal of Finance* 51, 1809-1833.

Hamada, R., 1972, The effects of the firm's capital structure on systematic risk of common stocks, *Journal of Finance* 37, 1141-1150.

Henderson, G., 1990, Problems and solutions in conducting event studies, *Journal of Risk and Insurance* 57, 282-306.

Holtahusen R.W. and R.W. Leftwich, 1986, The effect of bond rating changes on common stock prices, *Journal of Financial Economics* 17, 57-89.

Jensen, M. C., 1986, Agency cost of free cash flow, corporate finance, and takeovers, *American Economic Review* 76, 323-329.

Jensen, M. C. and W. Meckling, 1976, Theory of the firm: managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 306-360.

Johnson, S.A., 1995, Dividend payout and the valuation effects of bond announcements, *Journal of Financial and Quantitative Analysis* 30, 407-423.

Johnson, S.A., 1997, An empirical analysis of the determinants of debt ownership structure, *Journal of Financial and Quantitative Analysis* 32, 47-69.

Johnson, S.A., 2003, Debt maturity and the effects of growth opportunities and liquidity risk on leverage, *Review of Financial Studies* 16, 209-236.

Jung, K., Y. Kim, and R. Stulz, 1996, Timing, investment opportunities, managerial discretion, and the security design issue, *Journal of Financial Economics* 42, 159-186.

Kale, J.R. and T.H. Noe, 1990, Risky debt maturity choice in a sequential game equilibrium, *Journal of Financial Research* 13, 155-165.

Kim, C., D.C. Mauer, and M.H. Stohs, 1995, Corporate debt maturity policy and investor tax-timing options: Theory and Evidence, *Financial Management* 24, 33-45.

Kim, E.H., 1978, A mean-variance theory of optimal capital structure and corporate debt capacity, *Journal of Finance* 33, 45-64.

Klein, B., and K. B. Leffler. 1981. The Role of Market Forces in Assuring Contractual Performance. *Journal of Political Economy* 89, 615-41.

Korajczyk, R. A., D. J. Lucas, and R. L. McDonald, 1991, The effect of information releases on the pricing and timing of equity issues, *Review of Financial Studies* 4, 685-708.

Korajczyk, R. A., D. J. Lucas, and R. L. McDonald, 1992, Equity issues with time varying asymmetric information, *Journal of Financial and Quantitative Analysis* 27, 397-417.

Lang L. and R. Ritzenberger, 1989, Dividend announcements: cash flow signaling vs. free cash flow hypothesis, *Journal of Financial Economics* 24, 181-191.

Lang, L. and R. Stulz, 1994, Tobin'q, corporate diversification, and firm performance, *Journal of Political Economy* 102, 1248-1280.

Lang, L., R. Stulz, and R. Walkling, 1989, Managerial performance, Tobin's q, and the gains from successful tender offers, *Journal of Financial Economics* 24, 137-154.

Leland, H. and D. Pyle, 1977, Information asymmetries, financial structure and financial intermediation, *Journal of Finance* 32, 371-387.

Lindenberg, E. and S. Ross, 1981, Tobin's q ratio and industrial organization, *Journal of Business* 54, 1-32.

Lintner, J., 1965, The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets, *Review of Economics and Statistics* 47, 13-37.

Livingston, M. and R.E. Miller, 2000, Investment bank reputation and the underwriting of nonconvertible debt, *Financial Management* 29, 21-34.

Loughran, T. and J.R. Ritter, 1995, The new issues puzzle, *Journal of Finance* 50, 23-51.

Logue, D.E. and R.J. Rogalski, 1979, Does it pay to shop around for a bond underwriter? *Harvard Business Review* 57, 111-117.

Lucas, D. J. and R. L. McDonald, 1990, Equity issues and stock price dynamics, *Journal of Finance* 45, 1019-1043.

Maksimovic, V., and S. Titman. 1991. Financial policy and reputation for product quality, *Review of Financial Studies* 4, no. 4: 175-200.

Masulis, R. W. and A. Kowar, 1986, Seasoned equity offerings: an empirical investigation, *Journal of Financial Economics* 15, 91-118.

McConnell, J.J. and H. Sevaes, 1990, Additional evidence on equity ownership and corporate value, *Journal of Financial Economics* 27, 595-612.

Mikkelson, W., 1981, Convertible calls and security returns, *Journal of Financial Economics* 9, 237-265.

Mikkelson, W. and M. M. Partch, 1986, Vaulation effects of security offerings and the issuance process, *Journal of Financial Economics* 15, 31-60.

Miller, M. H. and K. Rock, 1985, Dividend policy under asymmetric information, *Journal of Finance* 40, 1031-1052.

Megginson, W. L. and K. A. Weiss. 1991. Venture Capitalist Certification in Initial Public Offerings. *Journal of Finance* 46, no. 3: 879-904.

Merton, R.C., 1973, The theory of rational option valuation, *Bell Journal of Economics and Management Science* 4, 141-183.

Myers, S.C., 1977, Determinants of corporate borrowing, *Journal of Financial Economics* 5, 147-176.

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

Myers, S.C. and N.S. Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics* 13, 187-221.

Miller, M.H., 1977, Debt and Taxes, *Journal of Finance* 32, 261-275.

Modigliani, F. and M.H. Miller, 1958, The cost of capital, corporation finance, and the theory of investment, *American Economic Review* 48, 655-669.

Modigliani, F. and M.H. Miller, 1963, Corporate income taxes and the cost of capital: a correction, *American Economic Review* 53, 433-443.

Morck, R., A. Shleifer, and R.W. Vishny, 1988, Management ownership and market valuation: An empirical analysis, *Journal of Financial Economics* 20, 293-315.

Park, S. and M. Song, 1995, Employee stock ownership plans, firm performance, and monitoring by outside blockholders, *Financial Management* 24, 52-85.

Patell, J., 1976, Corporate forecasts of earnings per share and stock price behavior: empirical tests, *Journal of Accounting Research* 14, 246-276.

Pinches G.E. and J.C. Singleton, 1978, The adjustment of stock prices to bond rating changes, *Journal of Finance* 33, 29-44.

Puri, M., 1999, Commercial banks as underwriters: Implications for the going public process, *Journal of Financial Economics* 54, 133-163.

Rajan, R.G. and L. Zingales, 1995, What do we know about capital structure? Some evidence from international data, *Journal of Finance* 50, 1421-1460.

Robbins E.H. and J.D. Schatzberg, 1986, Callable bonds: A risk-reducing signaling mechanism, *Journal of Finance* 41, 935-949.

Ross, S.A., 1977, The determination of financial structure: the incentive-signaling approach, *Bell Journal of Economics* 8, 23-40.

Rozeff, M. C., 1982, Growth, beta and agency costs as determinants of dividend payout ratios, *Journal of Financial Research* 5, 249-259.

Salinger, M., 1992, Standard errors in event studies, *Journal of Financial and Quantitative Analysis* 27, 39-53.

Scott, J., 1976, A theory of optimal capital structure, *Bell Journal of Economics* 7, 33-54.

Shapiro, C. 1983. Premiums for High Quality Products as Returns to Reputation. *The Quarterly Journal of Economics* 98: 659-79.

Sharpe, W., 1964, Capital asset prices: a theory of market equilibrium under conditions of risk, *Journal of Finance* 19, 425-442.

Sharpe, S.A., 1991, Credit rationing, concessionary lending, and debt maturity, *Journal of Banking and Finance* 15, 581-604.

Smith, C., 1986, Investment banking and the capital acquisition process, *Journal of Financial Economics* 15, 3-29.

Smith, C.W. and R.L. Watts, 1992, The investment opportunity set and corporate financing, dividend, and compensation policies, *Journal of Financial Economics* 32, 263-292.

Spiess, D. K. and J. Affleck-Graves, 1995, Underperformance in long-run stock returns following seasoned equity offerings, *Journal of Financial Economics* 38, 243-267.

Stohs, M.H. and D.C. Mauer, 1996, The determinants of corporate debt maturity structure, *Journal of Business* 69, 279-312.

Shyam-Sunder, L., 1991, The stock price effect of risky versus safe debt, *Journal of Financial and Quantitative Analysis* 26, 549-58.

Stiglitz, J.E., 1974, A Re-examination of the Modigliani-Miller theorem, *American Economic Review* 59, 784-793.

Stiglitz, J.E. and A. Weiss, 1981, Credit rationing in markets with incomplete information, *American Economic Review* 71, 393-410.

Tang, A. P. and R. F. Singer, 1993, Valuation effect of issuing nonsubordinated versus subordinated debt, *Journal of Financial Research* 16, 11-21.

Titman, S. and B.Trueman. 1986. Information Quality and the Valuation of New Issues, *Journal of Accounting and Economics* 8, 159-172.

Titman, S., 1992, Interest rate swaps and corporate financing choices, *Journal of Finance* 47, 1503-1516.

Titman, S., 2002, The Modigliani and Miller theorem and the integration of financial markets, *Financial Management* 31, 101-115.

Yermack, D., 1996, Higher market valuation of companies with a small board of directors, *Journal of Financial Economics* 39, 185-211.

VITA

Kyojik Song received his bachelor of arts degree in sociology at Yonsei University, Seoul, Korea, in 1993. After he received his undergraduate degree, he worked for a newspaper company, Kwangjuilbo, as a reporter for about three years.

Then, he came to the United States of America to continue his graduate studies in 1997. He received his master of business administration degree at Iowa State University in 1999. After that, he went to Louisiana State University to pursue a doctoral degree in business administration (finance). While he was pursuing his doctoral degree, he taught introductory finance classes for undergraduate students and worked as a research assistant to Dr. William Lane, Dr. Jimmy Hilliard, and Dr. Harley Ryan Jr. He will be awarded the doctoral degree in December 2003.