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A cross-sectional analysis of the determinants of corporate share repurchases

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A CROSS-SECTIONAL ANALYSIS OF THE

DETERMINANTS OF CORPORATE

SHARE REPURCHASES

by

Kenneth M. Washer, B.B.A., M.B.A.

A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Business Administration

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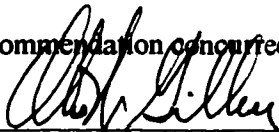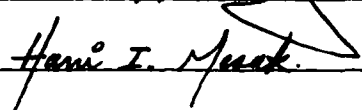
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by _____Kenneth M. Washer_____

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ABSTRACT

The objective of this study is to determine which motives play a significant role in determining the extent of a firm's repurchasing activity. For firms repurchasing through the open market, the motives include taking advantage of perceived undervaluation, increasing financial leverage, distributing cash to shareholders, and reducing agency costs. For firms using a tender offer, the motives include taking advantage of perceived undervaluation and having 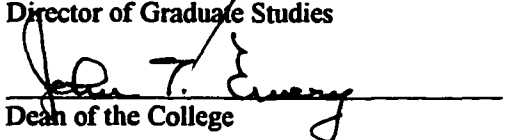the ability to significantly increase financial leverage. Also, the hypothesis that the perceived undervaluation motive is stronger for smaller firms is tested. Three censored regression models are employed, and each model's explanatory variables represent commonly cited motives for repurchasing stock.

Repurchasing activity is measured by the amount of cash distributed to shareholders through share repurchases expressed as a percentage of the firm's average market capitalization. The final sample includes 596 open market repurchasing firms, 11 tender offer repurchasing firms, and 991 non-repurchasing firms. The cross-sectional analysis covers the firm's fiscal year ending between March 31, 1996 and April 1, 1997.

There are three primary conclusions of this study. First, perceived undervaluation, financial leverage, excess cash, and agency costs all play

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important roles in determining the percentage of market capitalization a firm repurchases in the open market. Second, no evidence is found to support the hypothesis that perceived undervaluation and financial leverage impact the percentage of market capitalization a firm repurchases through a tender offer. This is possibly due to the fact that only 11 tender offers were observed during the period studied. The third conclusion is that small firms are more likely to repurchase stock in order to take advantage of perceived undervaluation.

DEDICATION

I would like to dedicate this dissertation to many wonderful people god has placed in my life. To my lovely wife, whose love and support kept me going throughout this difficult process. To my adorable daughter, whose smiles and laughter put everything in perspective. To my parents and step parents, you instilled in me the determination that made this accomplishment possible. To the greatest grandparents and step grandparents, your influence in my life is immeasurable. To my brother and sisters, carefully set your goals and then let nothing stand in your way. To my many aunts and uncles, you have all been excellent role models for me. And finally, to my dissertation committee, you have each impacted my life in a special way. I will forever be indebted to these people.

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CHAPTER 1

INTRODUCTION

Corporations primarily distribute cash to common shareholders through dividends and share repurchases. Dividends have historically been the preferred method, but share repurchases are growing in popularity. Announced dollar repurchases grew at an annual compound rate of 18.4% from 1983 to 1996.[1] Also, in 1995 the dollars distributed through repurchases roughly equaled the dollars paid in dividends.[2] Some firms, like Microsoft, only repurchase stock, while others, like Wal-Mart, pay dividends and buy back stock. According to Securities Data Corporation, there were over 6,250 repurchase announcements from 1990 to 1996.

The primary methods used for repurchasing stock are tender offers and open market repurchases. A company using a tender offer typically agrees to buy a certain percentage of its outstanding shares at a stated price on a specified date from those shareholders that indicate a willingness to sell. Firms generally repurchase about 15% of their equity in a tender offer, and the

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[1] Source: Securities Data Corporation.
[2] Brigham and Gapenski, page 691.

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average premium offered is 22% above the market price prior to the repurchase announcement.[3]

Many motivations for tender offers have been suggested, but the consensus view is that tender offers are typically used by companies to take advantage of perceived undervaluation.[4] For example, Lakonishok and Vermaelen (1990) find that firms announcing a tender offer generally earn positive risk-adjusted returns during the two-year period following the repurchase announcement. They conclude that the market generally underestimated the information value of a tender offer announcement during the 1980 to 1990 period. Their findings support the perceived undervaluation (information signaling) motive.

An open market repurchase is more flexible than a tender offer and often takes place over several years. Open market repurchase plans are generally announced, and the announcement usually states the amount and duration of the planned repurchases. For example, General Motors announced in early 1998 that it will buy an additional $4 billion of its stock over the subsequent twelve months in order to return capital to its shareholders.[5] An open market repurchasing company buys its shares through one broker, and sellers are

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[3] See Dann (1981); Vermaelen (1981); and Lakonishok and Vermaelen (1990).
[4] See Vermaelen (1981); Dann (1981); Asquith and Mullins (1986); Ofer and Thakor (1987); Constantinides and Grundy (1989); and Hausch and Seward (1993).
[5] Wall Street Journal, February 10, 1998.

unaware they are selling to the company.[6] The average announcement period abnormal return is 3.5%.[7] According to Securities Data Corporation, about 90% of all announced repurchases in the 1986 to 1995 period were to be carried out through the open market.

Unlike tender offers, there is a lack of consensus as to the general motivation(s) for open market repurchases. Some researchers suggest that companies repurchase stock in the open market in order to take advantage of perceived undervaluation. However, as Ikenberry and Vermaelen (1996) point out, it is doubtful that perceived undervaluation is the only motivation for an open market repurchase because of the fact that 25% of S&P 500 firms announced a repurchase program in 1994. It is unlikely that so many of the most scrutinized firms believed their stock was undervalued at the same time.

Another motivation that has been offered is that firms use open market repurchases to optimally adjust their capital structure. Repurchasing stock increases financial leverage, holding other factors constant. Masulis (1980) analyzes 199 firms that used a tender offer and finds some support for the financial leverage motive.

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[6] Rule 10B-18 under the Securities Exchange Act places four restrictions on a company repurchasing shares in the open market. First, the company can only operate through one broker. Second, the company cannot lead the market. Third, the company cannot buy at the opening price or buy in the last half-hour of trading. Fourth, the company's daily repurchase limit is equal to 25% of the previous four-week daily volume average.
[7] See Vermaelen (1981) and Ikenberry and Vermaelen (1996).

Others suggest that companies employ open market repurchases in order to distribute excess cash to shareholders. In fact, Bierman and West (1966) argue that the sole benefit of a repurchase program stems from tax advantages over dividends. Investors are believed to prefer repurchases to dividends because repurchases are taxed at potentially lower capital gains rates.[8]

Ikenberry and Vermaelen (1996) argue that open market repurchase plans are initiated by companies in order to create a repurchase option. This option allows management to repurchase stock whenever they believe it is undervalued, thus benefiting long-term shareholders. Ikenberry and Vermaelen find that much of the variability in the announcement period return is explained by three determinants of option value.

Repurchase motives cited less frequently include the reissue motive and the management entrenchment motive. The reissue motive hypothesizes that a firm repurchases stock simply to diminish the dilution of earnings per share caused by conversions, mergers, and/or exercised options. The management entrenchment motive hypothesizes that management initiates a share repurchase program in order to reduce or eliminate the probability of a takeover.

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[8] Under the U.S. tax code, repurchases only receive capital gains treatment if the distribution is not in essence replacing a dividend. Also, during the period studied here, the highest marginal tax rate for dividends (ordinary income) was 39.6% and for capital gains was 28%.

The literature generally contains three types of empirical studies that relate to repurchases. The first type examines the announcement period returns for firms initiating a repurchase program.[9] For example, Ikenberry and Vermaelen (1996) first calculate the cumulative abnormal return (CAR) for 892 firms announcing an open market repurchase plan. Next, they regress CAR on the fraction of shares authorized for repurchase, the standard deviation of the firm's total returns, and the firm's R-squared from the market model. They find that these three variables explain much of the variability in the announcement period return among firms, and they conclude that creating a repurchase option is an important motivation for open market repurchase plans.

The second type of empirical study analyzes the subsequent performance of firms announcing repurchase programs.[10] For example, Ikenberry, Lakonishok, and Vermaelen (1995) find that firms announcing an open market repurchase plan that had high book-to-market value ratios had a four year buy-and-hold abnormal return of about 45%. They conclude that the market inefficiently processed information related to open market repurchase announcements during the 1980 to 1990 period. Their research suggests that, at least for small firms, an important motivation for announcing an open market repurchase plan is undervaluation.

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[9] See Masulis (1980); Vermaelen (1981); Dann (1981); Netter and Mitchell (1989); Comment and Jarrell (1991); Howe, He, and Kao (1992); and Ikenberry and Vermaelen (1996).
[10] See Vermaelen (1981); Lakonishok and Vermaelen (1990); Dann, Masulis, and Mayers (1991); Bartov (1991); and Ikenberry, Lakonishok, and Vermaelen (1995).

The third type of empirical study compares repurchasing firms to non-repurchasing firms.[11] For example, Finnerty (1974) compares firms whose number of shares decreased during the year (repurchasing firms) to firms whose number of shares increased during the year (issuing firms). He finds that prior to repurchase, repurchasing firms use less financial leverage and have higher dividend yields than issuing firms.

The present study fits into the third type of empirical work dealing with share repurchases. The objective is to determine the motivating factors that influence some firms to repurchase large amounts of stock in the open market or through a tender offer and other firms to repurchase little or no stock. Three censored regression models are employed, and each model's explanatory variables represent commonly cited motives for repurchasing stock. For firms repurchasing through the open market, the motives include taking advantage of management perceived undervaluation, increasing financial leverage, distributing cash to shareholders, and reducing agency costs.[12] For firms using a tender offer, the motives include taking advantage of perceived undervaluation and having the capacity to significantly increase financial

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[11] See Young (1969); Norgaard and Norgaard (1974); and Finnerty (1975).
[12] The tax savings motive, reissue motive, and management entrenchment motive are not included in the models for various reasons. The logical approach for testing the tax savings motive is a time series study. Bagwell and Shoven (1989) take this approach and find that buyback activity fails to decrease following the Tax Reform Act of 1986. It is very unlikely that the reissue motive and the management entrenchment motive explain the rapid growth rate of repurchasing activity in the 1980s and 1990s. There is no doubt that these motives play significant roles in some repurchasing programs, but in general they are not believed to significantly affect repurchasing behavior.

leverage. Also, the hypothesis that the perceived undervaluation motive is stronger for smaller firms is tested. The goal of this study is to determine which motive(s) play a significant role in determining the magnitude of a firm's repurchasing activity.[13]

This study differs from previous studies in several ways. First, this study employs three censored regression models. No other study dealing with repurchases uses a censored regression model. Second, the time frame used for the cross-sectional analysis is a firm's fiscal year ending between March 31, 1996 and April 1, 1997. Repurchasing activity has increased significantly throughout the 1990s, and this increase may be due to changing motivations that are not captured in earlier studies. Third, no other study considers the impact agency costs have on share repurchases.

Statement of Problem

Why do firms repurchase stock? The most general answer, and the one that shareholders hope to be true, is that firms repurchase stock in order to increase shareholder wealth. Several approaches have been taken to determine the specific motivations for repurchasing stock. One approach is to simply survey managers concerning their motivation(s) for a repurchase program. A problem with this approach is that managers may not give truthful

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[13] Ikenberry and Vermaelen (1996) state that "repurchase programs will be appealing to firms with excess debt capacity, excess cash, few growth opportunities, and as the exchange model suggests, the potential for mispricing." In essence, this research tests their statement.

answers. A second approach is to infer motivations by studying firms that announce repurchase programs. A limitation of this approach is that many firms fail to repurchase as many shares as they announce. A third approach, and one that has been used infrequently, is to analyze firms that actually repurchase stock in order to deduce repurchase motivations. This study focuses on the amount of cash that firms distribute to shareholders through share repurchases and the factors that explain the variability of this cash distribution among firms.

Purpose of the Study

The purpose of this study is to determine the motivating factors that influence some firms to repurchase large amounts of stock and other firms to repurchase little or no stock. It is believed that the motivations for repurchasing stock differ based on whether a firm uses a tender offer or the open market. Three censored regression models are employed and the explanatory variables in each model represent commonly cited motives for repurchasing stock. The determinants of open market repurchasing activity to be developed and tested are perceived undervaluation, financial leverage, excess cash, and agency costs. The determinants of tender offer repurchasing activity to be developed and tested are perceived undervaluation and financial leverage. This study also tests whether or not the perceived undervaluation motive is stronger for smaller firms.

Propositions

This study tests the following eight propositions.

Proposition 1:

Firms that appear undervalued relative to industry peers are motivated to repurchase a greater percentage of their market capitalization in the open market in order to benefit long-term shareholders.

Proposition 2:

Firms that use little financial leverage relative to industry peers are motivated to repurchase a greater percentage of their market capitalization in the open market in order to move the firm closer to its optimal capital structure.

Proposition 3:

Firms that have high cash inflows relative to industry peers are motivated to repurchase a greater percentage of their market capitalization in the open market. The larger a firm's cash inflows, the greater the need to distribute cash to shareholders, holding other factors constant.

Proposition 4:

Firms that have lower investment cash outflows are motivated to repurchase a larger percentage of their market capitalization in the open market. The smaller the firm's investment cash outflows, the greater the need to distribute cash to shareholders, holding other factors constant.

Proposition 5:

Firms that have more diverse ownership structures will repurchase a larger percentage of their market capitalization in the open market in order to reduce agency costs. Distributing cash through repurchases lowers agency costs by forcing the company to rely more heavily on external funds.

Proposition 6:

Firms that appear undervalued relative to industry peers are motivated to repurchase a greater percentage of their market capitalization through a tender offer. A tender offer allows a firm to quickly repurchase a large percentage of its stock, thus sending a powerful undervaluation signal to investors.

Proposition 7:

Firms that use little financial leverage relative to industry peers are able to repurchase a greater percentage of their market capitalization through a tender offer in order to take advantage of perceived undervaluation.

Proposition 8:

The perceived undervaluation motive to repurchase stock is stronger for smaller firms because they are typically followed by fewer analysts, and management is therefore more likely to believe the firm is undervalued.

Limitations of the Study

This study excludes:

1. Foreign firms.

2. Firms in industries subject to significant regulation such as banking, thrift, insurance, other financial services, and utilities.

3. Firms in industries that have fewer than five observations.

4. Firms that are not included on Value Line Investment Survey's September 1997, compact disc or that have important missing information.

5. Firms that are not included on Global Researcher's November 1997, compact disc or that have important missing information.

6. Firms that are not on the Edgar website[14] or that have important missing information.

Plan of Study

Chapter 2 reviews the important historical research related to share repurchases and is divided into five sections. Section 1 reviews theories justifying share repurchases. Section 2 discusses the work related to share price behavior surrounding repurchase announcements. Section 3 summarizes the work comparing repurchasing firms to non-repurchasing firms. Other

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[14] http://www.freeedgar.com/companies/index.htm.

research related to repurchasing activity is reviewed in Section 4, and conclusions are contained in Section 5.

Chapter 3 is divided into four sections. In Section 1, propositions related to open market repurchases are developed. Likewise, Section 2 develops the tender offer repurchasing propositions. In Section 3, Proposition 8 argues that the perceived undervaluation motive is stronger for smaller firms. Three censored regression models used to validate Propositions 1 through 8 are presented in Section 4.

Chapter 4 has three sections. Section 1 details the procedures followed in constructing the sample of 1,598 firms. In Section 2, descriptive statistics and the correlation matrix of important variables are presented and discussed. Section 3 examines the regression results for the three models.

Chapter 5 is divided into two sections. Section 1 reviews the eight propositions and summarizes the evidence related to each proposition. Section 2 points out limitations of this study and provides suggestions for future research.

CHAPTER 2

LITERATURE REVIEW

This chapter reviews the existing body of literature related to share repurchases. The focus of this chapter is to relate the existing literature to the proposed factors that determine a company's repurchasing behavior.

The chapter contains five sections. Section 1 reviews theoretical justifications for share repurchases. Section 2 examines share price behavior surrounding repurchase announcements. Section 3 summarizes the work comparing repurchasing firms to non-repurchasing firms. Section 4 covers other research related to repurchases, and Section 5 contains conclusions.

Section 1: Theoretical Justification for Share Repurchases

A brief listing and summary of the relevant research justifying share repurchases is found in Exhibit 2-1 in the appendix.

Bierman and West (1966) examine the effects of share repurchases and cash dividends on the value of the firm. They argue that the sole benefit of distributing cash through a stock repurchase is a reduction of taxes for shareholders. The assumptions of their model are that investors have homogeneous tax rates and tax bases, that investors know the breakdown

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between cash dividends and share repurchases, and that net income available to common equity holders is a perpetuity. Bierman and West demonstrate that if capital gains tax rates are lower than ordinary tax rates, the value of the firm is maximized by distributing cash to shareholders solely through repurchases.

Elton and Gruber (1968) extend the work of Bierman and West (1966) by first considering transaction costs in the model. The researchers point out that the tax benefits of a repurchase can be offset by an increase in transaction costs. The implication is that some companies will find a cash dividend strategy optimal, while others will find a stock repurchase strategy optimal. Elton and Gruber also relax the assumption of homogeneous shareholders and develop three implications. First, some shareholders will prefer cash dividends and others will prefer repurchases due to differences in the cost basis of the stock and marginal tax rates. Second, total transaction costs associated with the repurchase will decrease because only shareholders selling stock will incur brokerage commissions. Third, corporations do not have to force a blanket cash flow policy on shareholders under a repurchase plan. Shareholders can choose their personal cash flow pattern.

Vermaelen (1984) analyzes tender offers in a signaling framework. He determines that management's primary incentives for signaling the market are to prevent takeovers and to increase the value of their stock options. The three information factors that he derives and tests are the tender premium, the target

fraction repurchased, and the amount of insider ownership. He finds that these three factors are positively related to the firm's announcement period return.

Ofer and Thakor (1987) develop a signaling model that applies to relatively small firms whose management's compensation varies directly with the company's stock price. The authors consider both share repurchases and dividend increases as signaling devices available to management. They argue that the market should respond more favorably to repurchase announcements than dividend increases because false signals sent via repurchase announcements are shown to be more costly to management than false signals sent through dividend increases. Their model also supports the notion of a post-repurchase price decline. Stock prices are shown to decrease at the expiration of a tender offer because the firm is indirectly assessed exiting shareholders' transaction costs.

Bagnoli, Gordon, and Lipman (1989) develop a model in which management uses share repurchases as a takeover defense. In their model, management is concerned with both job security and maintaining the market value of the firm. The repurchase announcement conveys the message that management believes the share price is too low. If management signals falsely, the firm will overpay for repurchased shares and the value of the firm will decrease.

Talmor and Titman (1990) argue that cash distributions made through a share repurchase program are preferred to dividend distributions, even if capital gains are taxed at ordinary rates. The main advantage of the repurchase program is that participating shareholders are able to use the stock's basis to shelter some or all of the cash distribution from taxes. If the firm instead distributed cash to shareholders through dividends, the entire distribution would be taxed. However, the authors argue that if tax rates are expected to increase, the stock's basis deduction is more valuable in the future and shareholders will prefer dividends to share repurchases in the current period.

Hausch and Seward (1993) conclude that high-quality firms will distinguish themselves from low-quality firms by repurchasing shares. False signaling is discouraged by higher costs associated with the decision to repurchase.

Persons (1994) develops a model of repurchasing shares through a tender offer in which the firm chooses between either the Dutch auction method or the fixed price method. The author concludes that the Dutch auction method is a better takeover deterrent and that the fixed price method provides a more powerful undervaluation signal.

Ikenberry and Vermaelen (1996) argue that an open market share repurchase plan creates an option for the company. The plan gives management the option to enter the market whenever management believes

the firm's stock is undervalued. This theory relies on market inefficiency and the ability of management to determine the "true" stock price. Ikenberry and Vermaelen find that announcement period returns are positively related to the volatility of the company's stock price and the number of shares authorized for repurchase, and negatively related to the correlation coefficient between the company's stock return and the market's return.[15] The authors encourage companies to initiate open market share repurchase plans in order to capitalize on any possible future mispricing.

Persons (1997) develops a signaling model for tender offers that incorporates heterogeneous shareholder reservation values. He argues that firms must overpay on occasion for their shares because they face an upward sloping supply curve, not a perfectly elastic one. He also concludes that tender offers are used to signal large information asymmetries and dividends are used to signal small ones.

In summary, distributing cash through repurchases would not affect the value of the firm if markets were perfect and taxes were non-existent. Bierman and West (1966) relax the no tax assumption and theorize that the only benefit of repurchases over dividends is that repurchases are taxed at lower capital gains rates. Vermaelen (1981 and 1984) and Dann (1981) conclude that

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[15] The correlation coefficient is a proxy for the relationship between the "true" value and market value of the company's stock. Intuitively, if R-squared were one, the market return would fully explain the firm's return and inside information would be useless. In this case, the option would be worthless.

repurchase announcements are generally used by firms as an undervaluation signal. Ofer and Thakor (1987), Hausch and Seward (1993), and Persons (1994 and 1997) all rely on the existence of asymmetric information in justifying repurchasing activity. Ikenberry and Vermaelen (1996) argue that signaling the market is not the primary reason for many open market share repurchase plans. They believe that management benefits long-term shareholders by purchasing shares in the market when the shares are undervalued.

Section 2: Repurchase Announcement Effects on Share Prices

Section 2 is divided into two subsections. Subsection 2.1 reviews the literature on the effects tender offer and open market repurchase announcements have on share prices. Subsection 2.2 reviews the literature on the effects targeted share repurchases (TSRs) have on share prices.

Subsection 2.1: Tender Offer and Open Market Repurchases

The empirical research related to share price effects of repurchase announcements is extensive. A brief listing and summary of the relevant articles is contained in Exhibit 2-2.1 in the appendix.

Stewart (1976) measures repurchasing activity by examining changes in shares outstanding from one year to the next. Any company that repurchased more than .25% of its stock is categorized as a repurchasing firm. He compares the indexed annual returns of repurchasing and non-repurchasing

firms using the Wilcoxon Matched-Pairs Signed-Rank Test. He finds repurchasing firms have discernibly higher rates of return over both the three- and four-year periods following the repurchase. Stewart's research supports the contention that management is able to determine when the company's stock is undervalued and will repurchase it to increase shareholder returns. The results imply that the market inefficiently factors repurchase information into stock prices.

Masulis (1980) finds that stock prices of firms announcing a cash tender offer increase an average of 16.35% over the two-day announcement period. He attributes his findings in part to

1) a reduction in shareholders' personal taxes by converting dividends into capital gains,

2) a beneficial increase in financial leverage,

3) an expropriation of wealth from bondholders to shareholders, and

4) a wealth transfer from non-tendering to tendering shareholders due to non-tendering shareholders' relatively higher costs associated with tendering.[16]

He also finds that on average only oversubscribed issues that are purchased pro rata decline in price at the expiration date of the tender offer.

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[16] If the tender price is greater than the true price, wealth will be transferred from non-tendering to tendering shareholders. Shareholders with high tendering cost (reinvestment transaction costs, high marginal tax rates, etc.) and significant tendering constraints will not claim their share of this tender premium.

An oversubscribed issue indicates that investors believe the offer is too generous, and the expiration price typically drops if management announces a pro rata repurchase. A positive signal is sent to the market if management decides to repurchase all tendered shares, and the stock price typically does not decline.

Dann (1981) investigates the expropriation hypothesis that says wealth is transferred from senior security holders to shareholders through repurchases. He calculates the average rates of return for common stock as well as for convertible and non-convertible preferred stocks and bonds. His findings suggest that during the announcement period, non-tendering common shareholder wealth increases by about 15%, and convertible security holder wealth increases by about 3%. Non-convertible security holder wealth is insignificantly affected by the tender offer announcement. Dann concludes that repurchases do not transfer wealth from bondholders to shareholders.

Vermaelen (1981) examines the share price behavior of firms that repurchase their shares in the open market or via a tender offer. He uses event study methodology and finds that the average abnormal return for an open market repurchase announcement is 3.62%. He also finds that tender offer announcements deliver an average abnormal return of 13.9% during the announcement period. Vermaelen's specific findings that support the information-signaling hypothesis are as follows:

1) He finds that 60% of the tender offer abnormal return variance is explained by the size of the tender offer premium, level of insider ownership, and the fraction repurchased. These three factors are all positively related to the abnormal return and send positive signals to the market.

2) Most of the firms repurchasing shares during the period 1962-1977 were small firms, which are typically followed by fewer analysts. These firms are more likely than larger firms to have undervalued shares and thus would have a greater need to use a tender offer.

3) If management uses repurchases to signal investors, then cash flow per share would be expected to increase in subsequent years. Earnings per share are used as a proxy for cash flow per share and are found to be abnormally high for the years following a tender offer.

Barclay and Smith (1988) theorize that specialists increase a stock's bid-ask spread when management enters the market on behalf of the firm. The increase in the spread decreases the liquidity of the stock and lowers its price. The researchers use an event study design to test their theory and conclude that spreads increase discernibly following open market repurchase announcements.

Contrary to Barclay and Smith (1988), Singh, Zaman, and Krishnamurti (1994); Wiggins (1994); and Miller and McConnell (1995) all report no change in bid-ask spreads subsequent to repurchase announcements. They use daily

data, unlike Barclay and Smith who use annual data, and they find that the percent spread (ratio of spread to stock price) increases in the pre-announcement period but not in the post-announcement period. The pre-announcement increase is attributable to a decline in the share price. They find consistent results using both univariate and multivariate tests.

Netter and Mitchell (1989) analyze stock repurchase announcements in the two weeks following the October 1987 stock market crash. They find that firms that announced an open market repurchase plan earned an average abnormal return of 3.45% during the announcement period. They also compare the post-announcement returns of firms that actually repurchased shares to those firms that failed to repurchase shares. They find no evidence that the market punishes firms that announce a repurchase and then fail to actually repurchase shares. Their study supports the theory that repurchase announcements convey management's message that the company's stock is undervalued.

Pugh and Jahera (1990) find a positive relationship between the tender offer announcement period abnormal return and the change in the debt asset ratio, holding other factors constant. This supports the leverage hypothesis that says that tender offers move the firm toward their optimal capital structure. The authors argue that tender offers transfer wealth from the government to shareholders through tax reductions.

Lakonishok and Vermaelen (1990) examine 221 tender offers that took place in the 1962-1986 period. They employ a trading rule of purchasing a tender firm's stock if it is less than or equal to 97% of the tender price, tendering it, and selling any excess shares in the open market after expiration. The results indicate an average risk-adjusted return of about 9% during an investment period of less than thirty days. A possible reason for this anomaly is that "repurchase tender offers are relatively rare events," according to the authors. They also calculate risk-adjusted returns for firms over the twenty-two months following the tender offer. During this period, small firms earn an average excess return of 24%. This result is consistent with the hypothesis that the market underestimates the information released in tender offers. Therefore, they conclude that firm's employing a tender offer generally buy undervalued shares.

Comment and Jarrell (1991) find that a Dutch auction tender offer is a weaker signaling device than a fixed-price tender offer, and that large firms use the Dutch auction method more frequently. The authors argue that large firms are followed by more analysts and have a smaller chance of being undervalued. The researchers find that if insiders' wealth is at risk, higher announcement period excess returns are generally earned.

Dann, Masulis, and Mayers (1991) test the hypothesis that management uses tender offers to signal the market of forthcoming positive information. Using two methods for predicting earnings, the researchers find that following

tender offers, earnings are typically above predictions. There is also a positive correlation between the announcement period abnormal return and the prediction error of earnings. They also discover that market risk generally decreases for firms announcing tender offers. This change in risk is negatively correlated with the announcement period abnormal return.

Bartov's (1991) study is similar to Dann, Masulis, and Mayer's (1991) study except that he analyzes earnings and risk changes of firms announcing an open market repurchase instead of a tender offer repurchase. He finds that earnings per share are generally higher than expected in the announcement year and risk generally decreases following the announcement. Also, regression analysis indicates that announcement returns are positively correlated with unexpected earnings and negatively correlated with risk changes. Comparing the findings of Dann, Masulis, and Mayers to the findings of Bartov, tender offers provide stronger evidence of earnings changes and a larger reduction in systematic risk than open market repurchase announcements. Both studies support the information-signaling hypothesis.

Brown & Ryngaert (1992) find that tendering rates are significantly higher for inter-firm tender offers relative to self-tender offers. They argue that accepting stock from another company is more costly than paying the capital gains tax for many shareholders.

Howe, He, and Kao (1992) find no evidence that Jensen's free cash flow theory explains the market reaction to announced tender offers or specially designated dividends. Low-Q (over-investing) firms are expected to have higher announcement period returns than high-Q (under-investing) firms. They are puzzled that the free cash flow theory was found by Lang and Litzenberger (1989) to play an important role in dividend increases, but not in their study.

Ikenberry, Lakonishok, and Vermaelen (1995) perform a study similar to Stewart (1976). They analyze 1,239 firms announcing an open market share repurchase plan from 1980-1990. They find that these firms earn an average abnormal return of 12.1% over the four-year period following the announcement. They also break the sample into five quintiles according to the book-to-market ratio and find that firms in the highest quintile (value stocks) averaged a 45.3% abnormal return over the four-year period following the announcement. No positive drift in prices is apparent for non-value stocks. The researchers draw two main conclusions from their results:

1. Companies with high book-to-market value ratios are more likely to repurchase stock due to undervaluation, and

2. The market inappropriately factors open market share repurchase announcements into stock prices.

Ratner, Szewczyk, and Tsetsekos (1996) argue that institutional investors are better informed than individual investors are, and as a company's institutional ownership increases, its stock price more accurately reflects all

publicly and privately available information. The researchers find that a larger tender offer announcement period abnormal return is associated with lower levels of institutional ownership.

Chhachhi and Davidson (1997) find that companies announcing tender offers typically have larger abnormal returns than companies announcing specially designated dividends. One explanation for this is that shareholders place a higher value on repurchases due to lower capital gains tax rates. The researchers do find that the difference in the abnormal returns narrows following the Tax Reform Act of 1986.

In summary, there is a strong body of empirical research that supports the information-signaling motive for stock repurchases. Vermaelen (1981) and Dann (1981) find that tender offer announcements send stronger undervaluation signals than open market repurchase announcements. According to Vermaelen (1981), firms announcing tender offers earn an average abnormal return of 13.9% during the announcement period. Firms announcing an open market repurchase are typically characterized by negative abnormal returns prior to the announcement and positive announcement period abnormal returns that average 3.6%. Dann, Masulis, and Mayers (1991) and Bartov (1991) find that firms announcing either type of repurchase program have positive earnings surprises in subsequent years. Stewart (1976) and Ikenberry, Lakonishok, and Vermaelen (1995) find that the market tends to underestimate the value of an open market repurchase announcement. They

find that firms announcing open market repurchases earn positive abnormal returns over the subsequent five-year period. These results indicate that tender offer and open market share repurchases increase shareholder wealth.

Subsection 2.2: Targeted Share Repurchases (TSRs)

A listing of the relevant articles and their major findings is found in Exhibit 2-2.2 in the appendix.

Bradley and Wakeman (1983) find that TSRs from insiders and small investors typically benefit shareholders. The authors hypothesize that TSRs involving insiders send positive signals to the market if insiders are perceived as simply rebalancing their portfolio and if the company is perceived as demonstrating confidence in the stock by buying it. The main benefit of TSRs from small investors comes from a decrease in the total cost of mailing dividend checks, quarterly reports, and other items to shareholders. The authors also analyze block repurchases from single shareholders (often called "greenmail") and find that from event day -1 to 30, the cumulative abnormal return (CAR) is -3.8%. Block repurchases that are associated with the end of a takeover attempt elicit a drop of 12.5% in the share price. This finding suggests that management is not acting in shareholders' best interest by repurchasing large blocks of shares. Management appears to be eliminating competition for the control of the firm's assets by "buying out" large shareholders that have both the power and incentive to discipline management.

Dann and DeAngelo (1983) investigate the effects that standstill agreements and TSRs have on non-participating shareholders. During the announcement period, they calculate that the mean share price reduction is 4.52% for companies with standstill agreements and 1.76% for companies with TSRs. These results cast doubt on whether management is acting in shareholder's best interest by negotiating standstill agreements and block repurchases.

Holderness and Sheehan (1985) investigate target companies' returns around large block purchases by six so-called "raiders" (Carl Icahn, Irwin Jacobs, Carl Lindner, David Murdock, Victor Posner and Charles Bluhdorn). A subset of their sample includes TSRs of the raider's shares. The authors calculate the average abnormal return for target companies during the purchase-to-repurchase period by summing the average abnormal return on three significant event dates; the announcement day of the original block purchase, the day that the raider demands repurchase, and the repurchase announcement day. The purchase-to-repurchase abnormal return is 3.2%. Holderness and Sheehan conclude that shareholders benefit from the initial investment by the raider.

Klein and Rosenfeld (1988) analyze the share price behavior of target firms during the purchase-to-repurchase period. Their study is similar to the Holderness and Sheehan (1985) study except they use a larger sample (77 verses 12). Klein and Rosenfeld calculate a 6.45% abnormal return by

summing the original purchase announcement period abnormal return and the repurchase announcement period abnormal return. However, a -3.27% abnormal return occurs during the two-day repurchase announcement period. Klein and Rosenfeld conclude that while the positive abnormal return during the purchase-to-repurchase period supports the shareholder interest hypothesis, the negative abnormal return during the repurchase announcement period does not support it.

Klein and Rosenfeld (1988) study the turnover rates of companies engaged in TSRs and find that these firms have above average management turnover rates in the year following the repurchase. They argue that if the repurchase were in shareholders' best interest, management turnover rates would be insignificantly different from average turnover rates. They also find that firms paying greenmail typically earn positive abnormal returns prior to a change in management. This finding eliminates poor share price performance as a motive for dismissal and places more emphasis on the greenmail payment.

In summary, TSRs generally increase shareholder wealth during the announcement period if the repurchase is from insiders or small shareholders.[17] Controversy exists over whether TSRs from large shareholders is in a remaining shareholder's best interest. During the announcement period,

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[17] Bradley and Wakeman (1983).

shareholder wealth decreases abnormally, however abnormal returns are positive when calculated from the purchase-to-repurchase period.[16] Klein and Rosenfeld (1988) argue that since management turnover rates are higher than normal following TSRs, shareholders must believe that TSRs do not maximize shareholder wealth.

Section 3: Operating and Financial Characteristics of Share Repurchasing Firms

Research on the important characteristics that differentiate repurchasing firms from non-repurchasing firms is limited to four studies. A listing and summary of the four studies is found in Exhibit 2-3 in the appendix.

Young (1969) compares financial, operating, and security market conditions of 227 firms that repurchased 1% or more common stock to a group of similar firms that repurchased no common stock during any year between 1960-1967. He finds no distinct liquidity differences between the two groups, but he does find that repurchasing firms typically use less financial leverage and have greater debt service ability prior to the repurchase. Young also discovers that repurchasing firms have relatively lower total asset growth rates. This finding suggests that they have relatively fewer investments, and therefore, repurchase stock with their excess cash. Another distinct difference between the two groups is in sales growth rates and operating income growth

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[16] Holderness and Sheehan (1985) and Klein and Rosenfeld (1988).

rates prior to and during the year of repurchase. Repurchasing firms have lower growth rates in sales and operating income, and Young suggests that they are masking difficulties by repurchasing stock in hopes of maintaining earnings per share. Alternatively, management may determine that the stock price is low due to the poor operating results and may view this as an opportunity to repurchase stock at a reduced price. Young also finds that repurchasing firms have lower price/earnings ratios both before and after the repurchase, reinforcing his idea that the firm is repurchasing stock at reduced prices.

Norgaard and Norgaard (1974) define a repurchasing firm as holding 8% or more of its outstanding stock in the treasury, and a non-repurchasing firm as holding no treasury stock. Their sample includes sixty repurchasing firms and sixty non-repurchasing firms. They first compare the means of various operating and financial ratios of repurchasing firms to non-repurchasing firms. Repurchasing firms have lower price/earnings ratios, higher book-to-market ratios, and higher dividend yields. Repurchasing firms also hold less cash but have higher inventory and/or receivables balances. Unlike Young (1969), Norgaard and Norgaard find that repurchasing firms use more debt than non-repurchasing firms. They conclude that repurchasing companies are inferior to non-repurchasing companies and advise "financial managers to reexamine their actions or contemplated actions in repurchasing in light of both theory and

practice." Norgaard and Norgaard also use discriminant function analysis and find that the companies can be divided into two distinct groups.

Finnerty (1975) identifies the primary characteristics that distinguish equity repurchasing companies from equity issuing companies. He uses both univariate and multivariate models and has a final sample size of 715 firms that issued or repurchased equity in 1972. He concludes that firms issuing equity generally have more financial leverage and lower dividends than firms repurchasing stock. These results suggest that repurchasing firms have relatively fewer investments. Finnerty also uses factor analysis and concludes that the firms come from distinct groups.

Medury, Bowyer, and Srinivasan (1992) use both univariate and multivariate models to compare repurchasing firms, non-repurchasing firms, open market repurchasing firms, and tender offer repurchasing firms. Repurchasing firms are classified as announcing a repurchase program between 1983-1986. The researchers find that repurchasing firms use relatively less financial leverage, have less liquidity, have higher dividend yields, and have higher profitability ratios. Firms that announce a tender offer, relative to firms announcing an open market repurchase, are smaller in terms of sales, number of shares outstanding, and total assets. The researchers use a multiple discriminant model that indicates that the firms can be accurately classified.

In summary, there is general agreement that repurchasing and non-repurchasing firms have significantly different financial and operating characteristics. The studies generally characterize repurchasing firms as using less financial leverage[19] and having lower stock prices[20] than non-repurchasing firms.

Section 4: Other Research

A listing and summary of other research related to share repurchases is found in Exhibit 2-4 in the appendix.

Austin (1969) looks at the repurchasing activity over the 1961-1967 period. He finds that

1) the number of times a repurchasing company entered the market to repurchase shares ranged from 1 to 68 times,

2) the percentage of total shares that were repurchased varied from 1% to 85%, and

3) the main reasons for repurchase were to provide shares for stock option programs and to avoid takeovers.

Baker, Gallagher, and Morgan (1981) survey chief financial officers (CFOs) and find that the two most common reasons for repurchasing stock are for investment purposes and to acquire shares for employee bonuses and/or

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[19] Young (1969); Finnerty (1975); and Medury, Bowyer, and Srinivasan (1992).
[20] Young (1969); Norgaard and Norgaard (1974); and Medury, Bowyer, and Srinivasan (1992).

stock options. Many of the CFOs view share repurchases as detrimental to the firm's capital structure and do not view them as substitutes for dividends.

Wansley, Lane, and Sarkar's (1989) survey results indicate that management's primary reason for repurchasing stock is undervaluation. Managers also believe premiums increase 1) as management's confidence in future earnings increase, 2) as the fraction of shares repurchased increase, 3) when debt is used to repurchase the shares, and 4) when the repurchase is in response to a takeover attempt.

Gay, Kale, and Noe (1989) show that repurchasing shares by issuing transferable put rights (TPRs) ensures that shareholders with the lowest reservation prices tender their shares first. This leads to maximum tax efficiency and decreases the probability of a takeover by eliminating shareholders with the lowest reservation prices.

Gay, Kale, and Noe (1991) use a Monte Carlo simulation to compare two relatively new stock repurchase methods (Dutch auction and TPRs) to the traditional fixed-price tender offer, assuming heterogeneous shareholders. They find that Dutch auctions and TPRs are more efficient than fixed-price tender offers. An efficient repurchase is defined as one where all remaining shareholders place a higher value on the firm than the tendering shareholders. Dutch auctions and TPRs do a better job of maximizing the value of the firm than fixed-price tender offers. The researchers also show that Dutch auctions are the best repurchasing method to deter takeovers.

Gay, Kale and Noe (1996) develop and test two models dealing with heterogeneous shareholders involved in a Dutch auction repurchase. They predict and find evidence indicating that tender offer premiums are negatively related to the level of bidding competition and that tender offer premiums increase as the number of shares sought increases.

Bagwell and Shoven (1989) highlight the tax advantage of share repurchases and acquisitions over cash dividend disbursements. They accumulate the total amount of dollars spent on acquisitions, dividends, and share repurchases from 1977-1987. The real growth rates for the entire ten-year period in dollars distributed through acquisitions, share repurchases, and dividends were 900%, 824%, and 61.3%, respectively. There was a sharp decrease in repurchases during the first quarter of 1987 that is possibly attributable to the narrowing of the gap between capital gains tax rates and ordinary tax rates resulting from the Tax Reform Act of 1986. Also, Casey, Anderson, Mesak, and Dickens (1997) find evidence that companies in certain industries changed their dividend payout ratios as a result of the Tax Reform Act of 1986.

Denis (1990) investigates target firms that pay out cash to shareholders through a special dividend or a share repurchase as a means of defense. The announcement of a share repurchase is associated with a negative abnormal return, and the announcement of a special dividend is associated with a positive abnormal return. Firms remaining independent, generally have

positive CARs during the contest period regardless of the defensive payout method used. Firms that maintain their independence undergo major changes in capital, asset, and ownership structures in the year following the takeover contest.

Cole, Helwege, and Laster (1996) adjust the dividend yield for share repurchases and find that it is currently low by historical standards. They note that low dividend yields have historically been associated with lackluster returns in the stock market, and they predict lackluster stock returns based on this measure.

Section 5: Conclusions

Share repurchasing can be used for many reasons such as altering a firm's capital structure or signaling the market of undervaluation. The consensus view in the literature is that tender offers are used as a signaling device. Management signals the market in order to increase shareholder wealth.

Unlike tender offers, there is a lack of consensus as to the primary reason(s) for open market repurchases. Ikenberry, Lakonishok, and Vermaelen (1995) suggest that large firms use an open market repurchase plan to restructure and that small firms use it as a signaling device. Ikenberry and Vermaelen (1996) argue that open market repurchase plans are instituted

in order to give companies the option to repurchase stock whenever management believes it is undervalued.

Some of the important characteristics of repurchasing firms relative to non-repurchasing firms differ depending on either the time period analyzed and/or the definitions used for repurchasing and non-repurchasing firms. For instance, Norgaard and Norgaard (1974) find that repurchasing firms are relatively less profitable, while Medury, Bowyer, and Srinivasan (1992) find that repurchasing firms are relatively more profitable.

Much of the empirical work in the 1980s supports the information-signaling hypothesis, especially for tender offers. However, Ikenberry and Vermaelen (1996) argue that signaling the market is not the primary motivation for open market repurchases. The present study identifies and empirically tests the important factors that influence a firm's repurchasing activity.

CHAPTER 3

METHODOLOGY OF PROPOSITIONS'
VALIDATION

Share repurchase activity varies widely among firms. In this study, a firm's repurchase activity is measured by the amount of cash distributed to shareholders through share repurchases expressed as a percentage of the firm's average market capitalization (RCAP). Market capitalization equals the number of shares outstanding multiplied by the firm's share price. Section 1 of this chapter discusses factors that motivate firms to repurchase shares through the open market.

In Section 2 of this chapter, two motivations for repurchasing stock through a tender offer are discussed. Prior research indicates that the primary motivation for repurchasing shares through a tender offer is perceived undervaluation, however, this study proposes that financial leverage plays an important role in determining the size of the tender offer. For example, a firm that perceives substantial undervaluation will not be able to use a tender offer unless it has excess debt capacity.

Prior research indicates that the perceived undervaluation motive is stronger for smaller firms, and in Section 3 this motivation is discussed in

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detail. Three censored regression models are presented in Section 4 for the purpose of validating the developed propositions.

Section 1: Propositions Related to Open Market Repurchases

The basic elements of the Open Market Repurchase Model are perceived undervaluation, financial leverage, cash inflows, investment cash outflows, and the dispersion of ownership. The Open Market Repurchase Model (Equations 1-a and 1-b on page 50) is presented in Section 4 of this chapter and is used to test Propositions 1 through 5.

Proposition 1:

Firms that appear undervalued relative to industry peers are motivated to repurchase a greater percentage of their market capitalization in the open market in order to benefit long-term shareholders.

In a survey by Wansley, Lane, and Sarkar (1989), management indicates that undervaluation is an important motivation for repurchasing shares. If management believes the company's stock is undervalued, repurchasing it makes sense. If management is correct, the repurchase will benefit long-term shareholders.

The price-to-book value ratio is used as a proxy for undervaluation and is measured at the beginning of each firm's fiscal year. A repurchase often sends a positive signal to investors, who typically respond by increasing the

firm's price and therefore cause the price-to-book value ratio to increase. The repurchase reduces or eliminates any undervaluation. Measuring the price-to-book value ratio at the beginning of the year eliminates the positive feedback effect that repurchases have on the price-to-book value ratio.

Industry characteristics influence a firm's price-to-book value ratio. For example, firms in the computer software service industry typically have significantly higher price-to-book value ratios than firms in the auto manufacturing industry. Much of this difference is due to software service firms having substantially more human assets than the auto manufacturers, and these human assets do not increase a firm's book value. If industry effects are not controlled, auto manufacturers will typically look undervalued relative to software service firms. In order to control for industry effects, each firm's price-to-book value ratio is normalized by subtracting the industry's estimated mean and dividing by the industry's estimated standard deviation. Controlling for industry effects allows a firm to appear undervalued or overvalued relative to industry peers. The normalized price-to-book value ratio (PBN) included in the Open Market Repurchase Model is expected to negatively impact RCAP.

Proposition 2:

Firms that use little financial leverage relative to industry peers are motivated to repurchase a greater percentage of their market capitalization in the open market in order to move the firm closer to its optimal capital structure.

The trade-off model suggests that as debt is added to the capital structure, the value of the firm increases up to a point and then decreases beyond that point.[21] As the model suggests, the main advantage of debt is its tax deductibility, and the main disadvantages of debt are agency and financial distress costs. In theory, a firm's optimal capital structure is the one that balances the marginal benefit of debt with the marginal cost of debt. Firms with low debt-to-asset ratios are expected to benefit from more debt and/or less equity in their capital structures. One way for a firm to increase the relative amount of debt is to repurchase stock.

The proxy for the financial leverage motive is a firm's debt-to-asset ratio measured at the beginning of each firm's fiscal year. Measuring this ratio at the beginning of the year is necessary because stock repurchases have an impact on financial leverage. A firm repurchasing stock in order to increase its financial leverage will not appear as under-leveraged after the repurchase. Therefore, measuring the debt-to-asset ratio at the beginning of the year eliminates the feedback effect the repurchase has on the debt-to-asset ratio.

Industry characteristics influence the amount of financial leverage a firm can employ. For example, firms in industries that have a large amount of operating risk (durable goods manufacturers) will generally use less debt than firms in industries that have little operating risk (utility companies). In order to

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[21] See Brigham and Gapenski (pp. 636-640) for a more complete discussion of the trade-off model.

account for industry effects, a firm's debt-to-asset ratio is normalized by subtracting the industry's estimated mean and dividing by the industry's estimated standard deviation. The normalized debt-to-asset ratio (DN) included in the Open Market Repurchase Model is expected to negatively impact RCAP.

Proposition 3:

Firms that have high cash inflows relative to industry peers are motivated to repurchase a greater percentage of their market capitalization in the open market. The larger a firm's cash inflows, the greater the need to distribute cash to shareholders, holding other factors constant.

One of the benefits of distributing cash to shareholders through a repurchase is that only shareholders desiring current income receive cash and pay taxes. Alternatively, a dividend forces cash, taxes, and transaction costs on shareholders that do not desire a cash distribution. Furthermore, dividends are taxed at ordinary rates, and repurchases are taxed at potentially lower capital gains rates. Therefore, companies with higher cash inflows are expected to distribute more cash to shareholders through open market repurchases.

The cash flow-to-total asset ratio is used as a proxy for a firm's relative cash inflows. Cash flows are defined as net income plus non-cash expenses. This variable is normalized by subtracting the industry's estimated mean and

dividing by the industry's estimated standard deviation. The normalization process controls for industry effects. The normalized cash flow-to-total asset ratio (CFN) included in the Open Market Repurchase Model is expected to positively impact RCAP.

Proposition 4:

Firms that have lower investment cash outflows are motivated to repurchase a larger percentage of their market capitalization in the open market. The smaller the firm's investment cash outflows, the greater the need to distribute cash to shareholders, holding other factors constant.

Higher growth firms need cash to finance asset acquisitions, and internally generated cash is a cheaper source of financing than externally generated cash due to floatation costs. Donaldson's (1961) survey of corporations suggests that internally generated cash is the preferred means for financing new projects. The firm's compound annual growth rate in sales calculated over the preceding five-year period is employed to measure a firm's historical and future investment cash outflows. High historical growth rates indicate less cash was available for repurchasing stock and if past growth rates are good predictors of future growth rates, imply cash will be retained in order to finance future growth. The compound annual growth rate in sales (G) included in the Open Market Repurchase Model is expected to negatively impact RCAP.

Proposition 5:

Firms that have more diverse ownership structures will repurchase a larger percentage of their market capitalization in the open market in order to reduce agency costs. Distributing cash through repurchases lowers agency costs by forcing the company to rely more heavily on external financing.

Proposition 5 addresses the agency conflict between shareholders and management. The proxy for the diversity of ownership is a firm's book value of total assets measured at the end of each firm's fiscal year. Larger firms typically have more owners and thus higher agency costs. Distributing cash to shareholders through repurchases forces firms to go to capital markets more frequently, and thus undergo the scrutiny of investment bankers and prospective investors. Rozeff (1982) finds that the number of shareholders positively impacts the dividend payout ratio.[22] The natural log of total assets (LTA) included in the Open Market Repurchase Model is expected to positively impact RCAP.

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[22] Rozeff uses the total number of shareholders to proxy for the dispersion of ownership in his study. Total assets is used here instead of the total number of shareholders because of fewer missing data points. The two variables are highly correlated though (.71).

Section 2: Propositions Related to Tender Offer Repurchases

Eleven of the 1,598 firms in the sample used a tender offer to repurchase shares during the fiscal year. One alternative for dealing with the limited number of tender offer observations is to include a slope dummy variable and intercept dummy variables representing tender offer firms in the Open Market Repurchase Model. However, in order to do this, one has to assume that the error variances for tender offer repurchasing firms and open market repurchasing firms are equal. This assumption is not reasonable. The dependent variable in the Open Market Repurchase Model, RCAP, has a standard deviation for tender offer repurchasing firms that is over eleven times greater than the standard deviation of RCAP for open market repurchasing firms. Therefore, a separate censored regression model is set up for tender offer firms. The Tender Offer Repurchase Model (Equations 2-a and 2-b on page 50) is presented in Section 4 and is used to test Propositions 6 and 7.

Proposition 6:

Firms that appear undervalued relative to industry peers are motivated to repurchase a greater percentage of their market capitalization through a tender offer. A tender offer allows a firm to quickly repurchase a large percentage of its stock, thus sending a powerful undervaluation signal to investors.

Firms will likely prefer a tender offer to an open market repurchase if the firm's stock is perceived by management to be substantially undervalued because a tender offer allows the company to rapidly repurchase a large quantity of stock. Ikenberry (1980) finds that tender offer announcements send a much stronger undervaluation signal to investors than open market repurchase announcements. Firms repurchasing through a tender offer pay an average premium of 22% and thus are thought to be undervalued by at least the amount of the premium. The price-to-book value ratio normalized by industry (PBN) is included in the Tender Offer Repurchase Model and is expected to negatively impact RCAP.

Proposition 7:

Firms that use little financial leverage relative to industry peers are able to repurchase a greater percentage of their market capitalization through a tender offer in order to take advantage of perceived undervaluation.

Firms repurchasing through a tender offer typically buy back about 15% of their equity. This large equity repurchase substantially changes the firm's capital structure. Managers believing that the firm has too little debt can rapidly increase financial leverage by using a tender offer repurchase. However, it is doubtful that the benefit of more financial leverage will offset the large tender offer premium. Therefore, it is likely that perceived undervaluation is the primary motivation for a tender offer and that excess debt capacity

impacts the size of repurchase. The debt-to-asset ratio normalized by industry (DN) is included in the Tender Offer Repurchase Model and is expected to negatively impact RCAP.[23]

Section 3: Small Firms and the Undervaluation Motive

The basic elements of the Small Firm Undervaluation Model are perceived undervaluation, financial leverage, cash inflows, investment cash outflows, and the dispersion of ownership. This model differs from the Open Market Repurchase Model in that an interaction term between firm size and perceived undervaluation is included. The Small Firm Undervaluation Model (Equations 3-a on page 50 and 3-b on page 51) is presented in Section 4 of this chapter and is used to test Propositions 8.

Proposition 8:

The undervaluation motive to repurchase stock is stronger for smaller firms because they are typically followed by fewer analysts and management is therefore more likely to believe the firm is undervalued.

Ikenberry, Lakonishok, and Vermaelen's (1995) findings suggest that smaller firms are motivated to repurchase stock due to undervaluation. Specifically, they find that small firms had significantly higher abnormal returns

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[23] The cash inflow, investment cash outflow, and agency cost motives are not expected to motivate firms to distribute cash to shareholders through a tender offer because a dividend distribution is more efficient. The large tender offer premium is expected to outweigh any benefits derived from these three motivations.

than large firms over a four-year period following an open market repurchase announcement. They conclude that a strong motivation for announcing a repurchase program for small firms is undervaluation.

In order to account for the possibility that smaller firms are more inclined than larger firms to repurchase stock due to perceived undervaluation, interaction terms between a firm's PBN and its total asset quartile are included as explanatory variables in the Small Firm Undervaluation Model presented in Section 4. Size quartiles are constructed by sorting firms according to total assets and then placing them in one of four total asset quartiles. TA2 is a dummy variable coded one if the firm is in the second total asset quartile and zero otherwise. TA3 (TA4) is a dummy variable coded one if the firm is in the third (fourth) total asset quartile and zero otherwise. In equation 3-b shown on page 51, β_4 represents the expected change in RCAP resulting from a one standard deviation change in PBN for firms in total asset quartile one. β_5 represents the difference in the marginal impact of PBN between firms in total asset quartiles one and two. β_6 (β_7) represents the difference in the marginal impact of PBN between firms in total asset quartiles one and three (one and four). If smaller firms have a greater tendency to repurchase stock due to perceived undervaluation, $\beta_7 > \beta_6 > \beta_5 > 0$.

Section 4: The Repurchase Models

RCAP is a censored variable because the repurchase expenditure cannot fall below zero and thus does not adequately measure a non-repurchasing firm's aversion to repurchasing shares. It may be argued that firms show their aversion to repurchases by issuing equity, however this will not always be the case. For example, suppose a non-repurchasing firm has excess liquidity and a relatively high debt-to-asset ratio. This firm is unlikely to show its aversion to repurchases by issuing equity because this would increase the firm's liquidity. This firm is more likely to distribute cash to debtors and thus hide its level of aversion to share repurchases.

Share repurchasing activity is measured by the amount of cash distributed to shareholders through share repurchases expressed as a percentage of the firm's average annual market capitalization (RCAP). Simply regressing RCAP on a set of explanatory variables is inappropriate because the coefficient estimates would be biased and inconsistent due to bias in the error term. Heckman (1979) proposes a simple two-stage estimation process that generates consistent coefficient estimates. In the first stage, a probit model is utilized in order to estimate a hazard rate, λ_i, for each firm. [24] In the second stage, λ_i is added to the regression model as an explanatory variable in

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[24] λ_i is a measure of the likelihood that firm i repurchases stock. Specifically, $\lambda_i = f(\alpha+\beta X_i)/F(\alpha+\beta X_i)$.

order to normalize the mean of the error to zero, thus generating consistent estimates of the coefficient parameters. Three censored regression models are presented below.

Open Market Repurchase Model

Stage 1 Probit Model

$$P_i = F(Z_i) = F(\alpha_0 + \alpha_1 PBN_i + \alpha_2 DN_i + \alpha_3 CFN_i + \alpha_4 G_i + \alpha_5 LTA_i) \qquad (1\text{-}a)$$

Stage 2 Regression Model

$$RCAP_i = \beta0 + \beta1 PBNi + \beta2 DNi + \beta3 CFNi + \beta4 Gi + \beta5 LTAi + \beta6 \hat{\lambda} i + u_i \qquad (1\text{-}b)$$

Tender Offer Repurchase Model

Stage 1 Probit Model

$$P_i = F(Z_i) = F(\alpha_0 + \alpha_1 PBN_i + \alpha_2 DN_i) \qquad (2\text{-}a)$$

Stage 2 Regression Model

$$RCAP_i = \beta_0 + \beta_1 PBN_i + \beta_2 DN_i + \beta_3 \hat{\lambda}_i + u_i \qquad (2\text{-}b)$$

Small Firm Undervaluation Model

Stage 1 Probit Model

$$P_i = F(Z_i) = F(\alpha_0 + \alpha_1 TA2_i + \alpha_2 TA3_i + \alpha_3 TA4_i + \alpha_4 PBN_i +$$

$$\alpha_5(PBN_i{}^* TA2_i) + \alpha_6(PBN_i{}^* TA3_i) + \alpha_7(PBN_i{}^* TA4_i) + \alpha_8 DN_i +$$

$$\alpha_9 CFN_i + \alpha_{10} G_i) \qquad (3\text{-}a)$$

Stage 2 Regression Model

$$RCAP_i = \beta_0 + \beta_1 TA2_i + \beta_2 TA3_i + \beta_3 TA4_i + \beta_4 PBN_i + \beta_5(PBN_i{}^*TA2_i) +$$

$$\beta_6(PBN_i{}^*TA3_i) + \beta_7(PBN_i{}^*TA4_i) + \beta_8 DN_i + \beta_9 CFN_i + \beta_{10}G_i +$$

$$\beta_{11}\hat{\lambda}_i + u_i \qquad\qquad\qquad (3\text{-}b)$$

where,

P_i = Estimate of the conditional probability that firm i will repurchase stock given PBN, DN, CFN, G, and LTA (Open Market Repurchase Model); PBN and DN (Tender Offer Repurchase Model); and TA2, TA3, TA4, PBN, PBN*TA2, PBN*TA3, PBN*TA4, DN, CFN, and G (Small Firm Undervaluation Model).

F = Cumulative normal probability function.

Z_i = A continuous index number determined from firm i's PBN, DN, CFN, G, and LTA (Open Market Repurchase Model); PBN and DN (Tender Offer Repurchase Model); and TA2, TA3, TA4, PBN, PBN*TA2, PBN*TA3, PBN*TA4, DN, CFN, and G (Small Firm Undervaluation Model).

PBN_i = Firm i's beginning of the year price-to-book value ratio normalized by subtracting the industry's estimated mean and dividing by the industry's estimated standard deviation.

DN_i = Firm i's beginning of the year total debt-to-asset ratio normalized by subtracting the industry's estimated mean and dividing by the industry's estimated standard deviation.

CFN_i = Firm i's cash flow-to-total asset ratio normalized by subtracting the industry's estimated mean and dividing by the industry's estimated standard deviation.

G_i = Firm i's compound annual growth rate in sales calculated over the preceding five-year period using the average to average method.[25]

LTA_i = The natural log of firm i's book value of total assets measured at the end of the fiscal year.

$RCAP_i$ = The amount of cash distributed to shareholders through share repurchases expressed as a percentage of the firm's average annual market capitalization.

PBN_i*TA2_i = An interaction term between PBN and TA2. TA2 is a dummy variable coded one if the firm is in the second total asset quartile and zero otherwise. Total assets are measured at the end of the year.

PBN_i*TA3_i = An interaction term between PBN and TA3. TA3 is a dummy variable coded one if the firm is in the third total asset quartile and zero otherwise. Total assets are measured at the end of the year.

PBN_i*TA4_i = An interaction term between PBN and TA4. TA4 is a dummy variable coded one if the firm is in the highest total asset quartile and zero otherwise. Total assets are measured at the end of the year.

$\hat{\lambda}_i$ = Firm i's hazard rate, estimated from the Stage 1 Probit Model. This variable normalizes the mean of u_i to zero.

u_i = The error term distributed as N $(0, \sigma^2)$.

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[25] The compound annual rates of change are calculated using three-year base periods. Base periods used for the 1996 sales growth rate calculation are 1989-1991 and 1994-1996. Value Line Investment Survey calculates and reports this growth rate.

The Stage 1 Probit Model assumes that there is a theoretical continuous variable Z, which is a linear function of the explanatory variables. Observations on Z are not available, but high Z-values are associated with repurchasing firms, and low Z-values are associated with non-repurchasing firms. Z_i represents the strength of appeal of a repurchase for firm i. Maximum likelihood estimation is used to estimate the coefficients of the explanatory variables, and the probability that firm i repurchases stock through the open market is directly related to Z_i. Specifically, the probability is measured by the area under the standard normal curve from $-\infty$ to Z_i.

The Stage 1 probit model and the Stage 2 regression model can be estimated independently or jointly. Joint estimation is accomplished by using the "Sampsel" command in TSP International Version 4.4. The method used is the maximization of the likelihood function. Joint estimation using the maximum likelihood function yields more efficient estimates. Joint estimation is used for the Open Market Repurchase Model and the Small Firm Undervaluation Model. The Tender Offer Repurchase Model equations are estimated independently because of a limited number of tender offer repurchasing firms.

CHAPTER 4

DATA AND EMIPIRCAL FINDINGS

Chapter 4 is divided into three sections. Section 1 details the procedures followed in constructing the sample of 1,598 firms. In Section 2, descriptive statistics and the correlation matrix for important variables are presented and discussed. Section 3 presents the regression results for the three models and examines the resulting implications.

Section 1: Data

The final sample includes 1,598 firms and spans 62 industries as classified by Value Line Investment Survey. Table 4-1 lists the industries represented, the number of firms within each industry, the number of firms within each industry that repurchased stock, and the percentage of firms within each industry that repurchased stock. The largest industry represented in the sample is the medical supply industry, and it accounts for 5.4% of the total sample.

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Table 4-1: Industries Represented in the Sample

The industries included in the final sample of 1,598 firms are listed in descending order according to the number of firms within each industry. For example, 87 firms in the medical supply industry are included in the sample and 32 of them (36.78%) repurchased stock during their fiscal year ending between 3-31-96 and 4-1-97.

Industry	Number of Firms	Number of Repurchasing Firms	Percent of Industry that Repurchased
Medical Supplies	87	32	36.78%
Software	71	28	39.44%
Retail (Special Lines)	69	23	33.33%
Electronics	67	19	28.36%
Machinery	66	25	37.88%
Drug	63	15	23.81%
Computers	57	14	24.56%
Chemical (Specialty)	52	32	61.54%
Diversified	51	29	56.86%
Industrial Services	48	18	37.50%
Instrument	42	15	35.71%
Medical Services	42	4	9.52%
Petroleum (Producing)	36	12	33.33%
Food Processors	34	13	38.24%
Environment	33	6	18.18%
Electrical Equipment	32	14	43.75%
Telecommunications Equipment	32	4	12.50%
Restaurant	31	9	29.03%
Natural Gas (Distributors)	30	7	23.33%
Recreation	30	9	30.00%
Telecommunications Services	30	10	33.33%
Semiconductor	27	11	40.74%
Oilfield	26	7	26.92%
Homebuilding	25	7	28.00%
Natural Gas (Diversified)	24	8	33.33%
Paper & Forest Products	24	13	54.17%
Metal Fabrication	21	7	33.33%
Apparel	20	9	45.00%

Petroleum (Integrated)	20	11	55.00%
Retail Store	20	6	30.00%
Trucking	20	9	45.00%
Publishing	19	13	68.42%
Steel	19	7	36.84%
Aerospace/Defense	17	5	29.41%
Entertainment	16	11	68.75%
Gold/Silver Mining	16	0	0.00%
Office Equipment & Supplies	16	6	37.50%
Building Materials	15	7	46.67%
Hotel/Gaming	15	6	40.00%
Packaging & Container	15	6	40.00%
Textile	15	7	46.67%
Chemical (Diversified)	14	11	78.57%
Grocery	14	10	71.43%
Newspaper	14	11	78.57%
Auto Parts (Replacement)	13	3	23.08%
Furniture	13	12	92.31%
Manufactured Housing / Recreational Vehicles	13	6	46.15%
Cement	12	5	41.67%
Air Transport	11	3	27.27%
Household Products	11	7	63.64%
Auto Parts (OEM)	10	4	40.00%
Chemical (Basic)	10	3	30.00%
Shoe	10	5	50.00%
Cosmetics	9	6	66.67%
Maritime	9	4	44.44%
Appliance	7	3	42.86%
Building Supplies	7	3	42.86%
Beverage (Soft Drink)	6	4	66.67%
Mining	6	2	33.33%
Semiconductor Equipment	6	4	66.67%
Advertising	5	4	80.00%
Auto & Truck	5	3	60.00%
Average	25.77	9.79	42.56%

A three-step process was followed in order to arrive at the final sample of 1,598 firms.

Step 1: The filter presented in Table 4-2 was applied to Value Line Investment Survey's September 1997, compact disc. There were 624 foreign firms that were eliminated because foreign firms are often prohibited from repurchasing shares. Seven hundred and forty-one firms in industries that face regulatory constraints on equity were also eliminated. Two hundred and five firms were eliminated because their fiscal year end did not fall in the period between March 31, 1996 and April 1, 1997. There were 1,416 firms that did not have five-year sales growth rates. Lastly, 144 firms with negative equity were discarded because the price-to-book value ratio is meaningless when a firm has negative equity.

Step 2: Global Researcher's November 1997, compact disc was used to obtain the prior year's debt-to-asset ratio and price-to-book value ratio for the remaining firms. Two hundred and nine firms were eliminated due to missing data or unmatched ticker symbols.

Step 3: The 10-Ks of the 1,844 remaining firms were examined on the FreeEdgar website in order to obtain the amount of cash distributed through stock repurchases. Two hundred and forty-six firms were eliminated for various reasons such as an unmatched ticker symbol,

Table 4-2: Value Line Filter

The following filter was applied to Value Line Investment Survey's September 1997, compact disc. There are 5,183 observations on the disc, and 2,053 passed the filter.

Field Name	Logic	Value	# Passed
US domicile code	Include	US	4,559
Industry	Exclude	Bank	4,334
Industry	Exclude	Brokers	4,306
Industry	Exclude	Insurance - Divers.	4,256
Industry	Exclude	Insurance – Life	4,222
Industry	Exclude	Insurance – Property	4,157
Industry	Exclude	Fund USA	4,142
Industry	Exclude	Fund FGN	4,121
Industry	Exclude	Fund Income	4,109
Industry	Exclude	R.E.I.T.	4,013
Industry	Exclude	Thrift	3,917
Industry	Exclude	Utility Central	3,876
Industry	Exclude	Utility East	3,836
Industry	Exclude	Utility West	3,818
FY End	>=	1996-04-01	3,779
FY End	<=	1997-03-31	3,613
5-Year Sales Growth	>	-999 (in percent)	2,197
Price-to-Book Value	>	0	2,053

a missing statement of cash flows, or a net amount reported for the issue (repurchase) of equity.

Eleven of the 607 repurchasing firms used a tender offer. These firms were identified by searching the Edgar website for SC 13E-4 filings. The Securities and Exchange Commission requires that all firms pursuing a tender offer submit this form. The form gives specifics on the tender offer.

Section 2: Descriptive Statistics

Panel A of Table 4-3 presents descriptive statistics for several variables of interest. The average firm distributed 1.20% of its average annual market capitalization in cash to shareholders through stock repurchases.[26] This compares to 1.02% of market capitalization distributed to shareholders through dividends. Also, 37.92% of the firms in the sample repurchased stock versus 46.68% that paid dividends. The 1,598 firms distributed about $52.86 billion through repurchases and about $63.55 billion through dividends during the fiscal period.[27] These findings support the notion that repurchasing stock is an important means of distributing cash to shareholders for many firms.

The volatility of RCAP is 2.69 times greater than the volatility of the dividend-to-market capitalization ratio (DCAP). This suggests that some firms distribute relatively large sums of cash through repurchases while others distribute relatively small sums of cash through repurchases, if any. A possible explanation for this finding is that firms initially pay a fixed dividend and then use any excess liquidity to repurchase stock.

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[26] If the 11 tender offer repurchasing firms are excluded, the mean and standard deviation of RCAP are 1.036 and 2.65.

[27] The fact that the average firm distributes more of its market capitalization through repurchases than through dividends, but that more dollars are distributed through dividends than through repurchases indicates that small firms typically repurchase more of their market capitalization than large firms.

Table 4-3: Descriptive Statistics and Correlation Matrix

The following table provides summary statistics and the correlation matrix for a cross-sectional sample of 1,598 firms spanning 62 industries based on a firm's fiscal year ending between 3-31-96 and 4-1-97. Panel A reports descriptive statistics for the repurchase-to-market capitalization ratio (RCAP), dividend-to-market capitalization ratio (DCAP), price-to-book value ratio (PB), debt-to-asset ratio (D), cash flow-to-total asset ratio (CF), five-year compound annual growth rate in sales (G), and total assets (TA). Panel B reports the correlation matrix for RCAP, DCAP, PBN (price-to-book value ratio normalized by industry), DN (debt-to-asset ratio normalized by industry), CFN (cash flow-to-total asset ratio normalized by industry), G, and LTA (natural log of total assets).

Panel A: Descriptive Statistics on Raw Data

Variable	Mean	Std. Dev.	Minimum	Maximum
RCAP (%)	1.20	4.70	0	146.65[a]
DCAP (%)	1.02	1.75	0	31.75
PB(#)	2.91	3.32	.07	45.30
D (%)	48.01	20.25	1.58	99.22
CF (%)	8.09	12.38	-79.18	61.90
G (%)	7.44	14.20	-48.50	98.50
TA (millions of $)	1,926.71	8,559.60	2.24	262,867.00

Panel B: Correlation Matrix

	RCAP	DCAP	PBN	DN	CFN	G	LTA
RCAP	1						
DCAP	.080	1					
PBN	-.030	-.003	1				
DN	-.036	-.025	.053	1			
CFN	.080	.142	.174	-.105	1		
G	-.027	-.118	.087	-.078	.194	1	
LTA	.043	.269	.052	.286	.187	.102	1

[a] Measuring RCAP using the average annual market capitalization makes it possible for a firm to repurchase over 100% of its market capitalization. Nitches accomplished this by repurchasing $9.928 million of stock through a tender offer in the second week of its fiscal year. Its average annual market capitalization was $6.77 million. The second highest RCAP was 47.6%.

Panel B of Table 4-3 presents the correlation matrix for several variables of interest. RCAP and DCAP have a correlation of .08. This positive correlation supports the idea that repurchases are not substitutes for dividends and vice versa.

The negative relationship between RCAP and PBN is stronger than the negative relationship between DCAP and PBN (-.030 versus -.003). One interpretation of this finding is that PBN is more responsive to changes in RCAP than to changes in DCAP, suggesting that repurchases send stronger undervaluation signals than dividends.

RCAP and DCAP are each negatively related to DN and positively related to CFN. These correlations imply that low financial leverage and high cash inflows are conducive to firms distributing cash to shareholders.

The negative relationship between DCAP and G is much stronger than the negative relationship between RCAP and G (-.118 versus -.027). This suggests that investment policy has a stronger impact on dividend policy than on repurchase policy. This result is plausible if sales growth and asset growth are related non-linearly. For example, assume that a high-growth firm made a large asset investment last year and that its asset base will support sales growth for the next few years. Also, assume that in a few years the firm expects to make another big investment in assets in order to support its rapid growth. If this firm currently has excess cash that needs to be distributed to shareholders, it will likely choose a stock repurchase over a dividend

distribution because repurchases can be discontinued without upsetting investors. Therefore, high-growth firms that expect to finance their asset expansion in waves will probably be unwilling to commit to a perpetual cash distribution policy such as a dividend and will be more likely to distribute cash sporadically to investors through repurchases.

Each cash distribution variable (RCAP and DCAP) has a positive relationship with LTA. One explanation for the positive relationships is agency costs. If firm size is a proxy for the diversity of ownership, larger firms will benefit more than smaller firms from cash distributions to shareholders because of a greater reduction in agency costs.

The positive relationship between DCAP and LTA is much stronger than the positive relationship between RCAP and LTA (.269 versus .043). This finding suggests that larger firms distribute relatively more cash through dividends than through repurchases. Management in large firms may seldom perceive that the firm's stock is undervalued because many analysts follow the company. Therefore, managers of large companies may decide simply to distribute cash through an established dividend policy.

Section 3: Estimation of the
Regression Equations

The results of estimating the Open Market Repurchase Model's regression equation over the sample of 1,587 firms are shown in Table 4-4.[26] The motivations for repurchasing stock are assumed to be different for open market repurchasing firms and tender offer repurchasing firms, therefore the sample of 1,587 firms excludes the 11 tender offer repurchasing firms. The results provide strong support for Propositions 1 through 5. Firms with low valuations as measured by PBN, low financial leverage as measured by DN, high cash inflows as measured by CFN, low investment cash outflows as measured by G, and more diversity of ownership as measured by LTA are expected to repurchase larger percentages of their market capitalization in the open market. Each coefficient estimate is significant at the 1% level.

A comparison of the three estimated coefficients of the standardized variables (PBN, DN, and CFN) indicates that changes in CFN have the greatest impact on RCAP. This suggests that distributing cash to shareholders is a stronger motivation for repurchasing shares than taking advantage of perceived undervaluation or increasing financial leverage.

The hazard rate, $\hat{\lambda}_i$, is estimated jointly from the Stage 1 Probit Model and the Stage 2 Regression Model. It measures the likelihood that a firm

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[26] The Open Market Repurchase Model was also estimated using the Heckman two-stage procedure, and the results are very similar. The coefficient estimates all have the hypothesized signs, but t-statistics are lower. The adjusted R-squared is .26.

repurchases stock in the open market. Its coefficient estimate is significant, indicating that the two-stage procedure is important. Also, the positive coefficient estimate indicates that the likelihood that a firm repurchases stock in the open market positively impacts RCAP.

The results of estimating the Tender Offer Repurchase Model over a sample of 1,002 firms are shown in Table 4-5. The sample includes 11 tender offer repurchasing firms and 991 non-repurchasing firms. The model is estimated using the Heckman two-stage procedure because this procedure uses all 1,002 observations in the Stage 2 regression. Joint estimation uses only observations for repurchasing firms in the Stage 2 regression.[29] The coefficient estimates of PBN and DN are negative, but insignificant.

The Small Firm Undervaluation Model is estimated in order to test whether or not the undervaluation motive is stronger for smaller firms. The sample of 1,598 firms includes 587 open market repurchasing firms, 11 tender offer repurchasing firms, and 991 non-repurchasing firms. The results of estimating the Stage 2 regression are shown in Table 4-6.[30] The marginal impact on RCAP of a one standard deviation movement in PBN for a firm in the smallest total asset quartile is -2.13%. Alternatively, the marginal impact on

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[29] Joint estimation results in a large standard error due to the limited number of tender offer repurchasing firms and the substantial variation in RCAP. The coefficient estimates of PBN and DN are negative, but the P-values are approximately 1.

[30] The Heckman two-stage procedure yields results that are very similar. The coefficient estimates all have the hypothesized signs, but the t-statistics are lower. The adjusted R-squared is .11.

RCAP of a one standard deviation movement in PBN for a firm in the largest total asset quartile is .76% (-2.13% + 2.89%). The P-value for the difference in the marginal impacts is .049. This result supports Proposition 8, which hypothesizes that the undervaluation motive is stronger for smaller firms.

Table 4-4: Regression Results from the Open Market Repurchase Model

$RCAP_i = \beta_0 + \beta_1 PBN_i + \beta_2 DN_i + \beta_3 CFN_i + \beta_4 G_i + \beta_5 LTA_i + \beta_6 \hat{\lambda}_i + u_i$

The dependent variable RCAP is the repurchase-to-market capitalization ratio. PBN is the beginning of the year price-to-book value ratio normalized by industry. DN is the beginning of the year debt-to-asset ratio normalized by industry. CFN is the cash flow-to-total asset ratio normalized by industry. G is the five-year compound annual growth rate in sales. LTA is the natural log of total assets. $\hat{\lambda}$ squared is the joint normal distribution between the Stage 1 probit error term and the Stage 2 regression error term. Rho is the correlation coefficient between the Stage 1 probit error term and the Stage 2 regression error term. The sample includes 596 open market repurchasing firms and 991 non-repurchasing firms. The Stage 1 Probit Model and the Stage 2 Regression Model are estimated jointly using the "Sampsel" command in TSP International Version 4.4.

Variable	Estimated Coefficient	t-statistic	P-value (two-tailed test)
C	-5.86	-7.36	.000
PBN	-.64	-2.81	.005
DN	-.99	-4.32	.000
CFN	1.84	7.60	.000
G	-.04	-2.96	.003
LTA	.65	5.35	.000
$\hat{\lambda}$	5.62	42.75	.000
Rho	1.00	3.62	.000

Table 4-5: Regression Results from the Tender Offer Repurchase Model

$RCAP_i = \beta_0 + \beta_1 PBN_i + \beta_2 DN_i + \beta_3 \hat{\lambda}_i + u_i$

The dependent variable RCAP is the repurchase-to-market capitalization ratio. PBN is the beginning of the year price-to-book value ratio normalized by industry. DN is the beginning of the year debt-to-asset ratio normalized by industry. $\hat{\lambda}$ squared is the joint normal distribution between the Stage 1 probit error term and the Stage 2 regression error term. Rho is the correlation coefficient between the Stage 1 probit error term and the Stage 2 regression error term. The sample includes 11 tender offer repurchasing firms and 991 non-repurchasing firms. The Stage 1 Probit Model and the Stage 2 Regression Model are estimated using the Heckman two-stage procedure in TSP International Version 4.4.

Variable	Estimated Coefficient	t-statistic	P-value (two tailed test)
C	.32	2.53	.011
PBN	-.13	-1.05	.295
DN	-.14	-1.05	.293
$\hat{\lambda}$	11.21	24.21	.000

Table 4-6: Regression Results from the Small Firm Undervaluation Model

$$RCAP_i = \beta_0 + \beta_1 TA2_i + \beta_2 TA3_i + \beta_3 TA4_i + \beta_4 PBN_i + \beta_5(PBN_i{}^*TA2_i) +$$
$$\beta_6(PBN_i{}^*TA3_i) + \beta_7(PBN_i{}^*TA4_i) + \beta_8 DN_i + \beta_9 CFN_i + \beta_{10}G_i + \beta_{11}\hat{\lambda}_i + u_i$$

The dependent variable RCAP is the repurchase-to-market capitalization ratio. TA2 is a dummy variable coded one for firms in the second total asset quartile and zero otherwise. TA3 is a dummy variable coded one for firms in the third total asset quartile and zero otherwise. TA4 is a dummy variable coded one for firms in the fourth total asset quartile and zero otherwise. PBN is the beginning of the year price-to-book value ratio normalized by industry. PBN*TA2, PBN*TA3, and PBN*TA4 are interaction terms. DN is the beginning of the year debt-to-asset ratio normalized by industry. CFN is the cash flow-to-total asset ratio normalized by industry. G is the five-year compound annual growth rate in sales. $\hat{\lambda}$ squared is the joint normal distribution between the Stage 1 probit error term and the Stage 2 regression error term. Rho is the correlation coefficient between the Stage 1 probit error term and the Stage 2 regression error term. The sample includes 596 open market repurchasing firms, 11 tender offer repurchasing firms, and 991 non-repurchasing firms. The Stage 1 Probit Model and the Stage 2 Regression Model are estimated jointly using the "Sampsel" command in TSP International Version 4.4.

Variable	Estimated Coefficient	t-statistic	P-value (two-tailed test)
C	-8.84	-8.76	.000
TA2	-.35	-.25	.804
TA3	3.09	2.26	.024
TA4	5.49	3.89	.000
PBN	-2.13	-2.54	.001
PBN*TA2	1.59	1.00	.317
PBN*TA3	1.72	1.41	.160
PBN*TA4	2.89	1.96	.049
DN	-1.74	-3.40	.001
CFN	2.78	5.16	.000
G	-.05	-1.29	.196
$\hat{\lambda}$	11.67	103.24	.000
Rho	1.00	6.93	.000

CHAPTER 5

CONCLUSIONS

There are three primary conclusions of this study. First, perceived undervaluation, financial leverage, excess cash, and agency costs all play important roles in determining the percentage of market capitalization a firm repurchases in the open market. Second, no evidence is found to support the hypothesis that perceived undervaluation and financial leverage impact the percentage of market capitalization a firm repurchases through a tender offer. This is possibly due to the fact that only 11 tender offers were observed during the period studied. Third, small firms are more likely to repurchase stock in order to take advantage of perceived undervaluation, and large firms are more likely to repurchase stock in order to reduce agency costs.

Section 1 of Chapter 5 reviews the eight propositions and the empirical evidence relating to each one. Section 2 details the literary contributions and managerial implications of this study. Section 3 identifies limitations of this study and presents directions for future research.

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Section 1: Propositions and Empirical Evidence

This study investigates eight propositions presented in Chapter 1. The propositions are restated in this section along with the evidence that supports or refutes each one. The Open Market Repurchase Model (Equations 1-a and 1-b on page 50) is used to test Propositions 1 through 5. The Tender Offer Repurchase Model (Equations 2-a and 2-b on page 50) is used to test Propositions 6 and 7. The Small Firm Undervaluation Model (Equations 3-a on page 50 and 3-b on page 51) is used to test Proposition 8.

Proposition 1:

Firms that appear undervalued relative to industry peers are motivated to repurchase a greater percentage of their market capitalization in the open market in order to benefit long-term shareholders.

The regression results in Table 4-4 on page 66 support this proposition. The proxy used for undervaluation is the price-to-book value ratio normalized by industry (PBN), and its estimated marginal impact on the repurchase to market capitalization ratio (RCAP) is negative and significant at the 1% level.

Proposition 2:

Firms that use little financial leverage relative to industry peers are motivated to repurchase a greater percentage of their market capitalization in the open market in order to move the firm closer to its optimal capital structure.

The regression results presented in Table 4-4 on page 66 support this proposition. The proxy used for financial leverage is the debt-to-asset ratio normalized by industry (DN), and its estimated marginal impact on RCAP is negative and significant at the 1% level.

Proposition 3:

Firms that have high cash inflows relative to industry peers are motivated to repurchase a greater percentage of their market capitalization in the open market. The larger a firm's cash inflows, the greater the need to distribute cash to shareholders, holding other factors constant.

The regression results presented in Table 4-4 on page 66 support this proposition. The proxy used to measure cash inflows is the cash flow-to-total asset ratio normalized by industry (CFN), and its estimated marginal impact on RCAP is positive and significant at the 1% level.

Proposition 4:

Firms that have lower investment cash outflows are motivated to repurchase a larger percentage of their market capitalization in the open market. The smaller the firm's investment cash outflows, the greater the need to distribute cash to shareholders, holding other factors constant.

The regression results presented in Table 4-4 on page 66 support this proposition. The proxy used for cash outflows is the compound annual growth

rate calculated over the preceding five–year period (G), and its estimated marginal impact on RCAP is negative and significant at the 1% level.

Proposition 5:

Firms that have more diverse ownership structures will repurchase a larger percentage of their market capitalization in the open market in order to reduce agency costs. Distributing cash through repurchases lowers agency costs by forcing the company to rely more heavily on external funds.

The regression results presented in Table 4-4 on page 66 support this proposition. The proxy used to measure the diversity of ownership is the natural log of total assets (LTA), and its estimated marginal impact on RCAP is positive and significant at the 1% level.

Proposition 6:

Firms that appear undervalued relative to industry peers are motivated to repurchase a greater percentage of their market capitalization through a tender offer. A tender offer allows a firm to quickly repurchase a large percentage of its stock, thus sending a powerful undervaluation signal to investors.

The regression results presented in Table 4-5 on page 67 provide no support for this proposition. The proxy for perceived undervaluation is the price-to-book value ratio normalized by industry (PBN), and its estimated marginal impact on RCAP is negative but insignificant at the 10% level. The

insignificant coefficient estimate likely stems from having only 11 tender offer repurchasing firms in the sample.

Proposition 7:

Firms that use little financial leverage relative to industry peers are able to repurchase a greater percentage of their market capitalization through a tender offer in order to take advantage of perceived undervaluation.

The regression results presented in Table 4-5 on page 67 provide no support for this proposition. The proxy used for financial leverage is the debt-to-asset ratio normalized by industry (DN), and its estimated marginal impact on RCAP is negative but insignificant at the 10% level. The insignificant coefficient estimate likely stems from having only 11 tender offer repurchasing firms in the sample.

Proposition 8:

The undervaluation motive to repurchase stock is stronger for smaller firms because they are typically followed by fewer analysts and management is therefore more likely to believe the firm is undervalued.

The regression results presented in Table 4-6 on page 68 support this proposition. The estimated marginal impact of the price-to-book value ratio normalized by industry (PBN) on RCAP for firms in the lowest total asset quartile is negative and significant at the 1% level. The estimated marginal

impact is higher for firms in the largest total asset quartile, and this difference is significant at the 5% level.

Section 2: Literary Contributions

This study makes several literary contributions. It is the only study to investigate share repurchase motivations by examining cash distributions made to shareholders through share repurchases. Other studies have approached this issue either through surveys or by focusing on share price reactions following repurchase announcements. This is also the only study on share repurchases that employs a censored regression model.

One significant conclusion of this study is that investment policy has a stronger negative impact on dividend distributions than on repurchase distributions. A plausible explanation for this finding is that high-growth firms prefer to make any cash distributions to shareholders through an open market repurchase because of its flexibility. Open market repurchases can be discontinued easily without upsetting the firm's stock price. Alternatively, the elimination of a dividend distribution is likely to upset investors and depress the firm's stock price. Therefore, it is concluded that high-growth firms have a stronger aversion to paying dividends than to repurchasing stock.

Ikenberry, Lakonishok, and Vermaelen (1995) conclude that small firms use tender offer repurchases to correct for undervaluation and large firms use repurchases to restructure. The present study's second contribution is the

finding that small firms use repurchases either through the open market or tender offers to correct for perceived undervaluation.

The third contribution of this study is that firms are motivated to repurchase stock through the open market in order to take advantage of perceived undervaluation, increase financial leverage, distribute cash to shareholders, and reduce agency costs. This is also the first study to argue that reducing agency costs motivates firms to repurchase stock in the open market.

Section 3: Limitations and Directions for Future Research

Several limitations exist regarding the application of the preceding results. First, the sample consists of only U.S. firms that existed for the five years prior to April 1, 1997. Second, the firms in the sample were all relatively healthy in that they all had positive equity book values for their fiscal year ending no later than April 1, 1997. Third, the results only apply to the industries included in the analysis and the fiscal year under study. Changes in the external environment, such as ordinary and capital gains tax rates, may make some repurchase motivations more or less important.

In conducting this study, several directions for future research were apparent. First, there is no empirical study that analyzes total cash distributions that firms make to shareholders. This study looks at the determinants of the repurchase distribution, and Rozeff's (1982) study looks at

the determinants of the dividend distribution. No study, however, looks at the determinants of the total cash distribution to shareholders.

Second, a limitation of previous studies by Rozeff (1982) and Casey, Anderson, Dickens, and Mesak (1998) is that "unhealthy" firms were eliminated from the study because of negative earnings and/or cash flows. While there are disadvantages of expressing dividends as a percentage of market capitalization, one significant advantage is that many unhealthy firms do not have to be eliminated. An empirical study that analyzes the determinants of dividend distributions, expressing dividends as a percentage of market capitalization, would provide important insights.

Third, one could argue that the significant cut in the capital gains tax rate from 28% to 20% in 1997 gives repurchases an even greater tax advantage over dividends. A time series analysis should show a structural shift away from dividends and towards repurchases in 1997. This issue could be analyzed on a macro and micro level.

APPENDIX

Exhibit 2-1: Theoretical Justification for Share Repurchases

Bierman, Jr. and West (1966)	Repurchase distributions are more tax friendly than dividend distributions.
Elton and Gruber (1968)	Considers transaction costs and heterogeneous investors and concludes that some companies find a dividend strategy optimal, while others find a repurchasing strategy optimal.
Vermaelen (1984)	Analyzes tender offers in a signaling framework and determines that management's primary incentives for signaling the market are to prevent takeovers and to increase the value of their stock options. (1962-1977, 131 tender offers)
Ofer and Thakor (1987)	Share repurchases elicit a higher share price response than dividend increases because of false signaling costs.
Williams (1988)	Derives the efficient mix of dividends, investments in real assets, and new equity sales.
Constantinides and Grundy (1989)	Provides justification for repurchases that is not based on a premium above the market price.
Bagnoli, Gordon, and Lipman (1989)	Repurchases are used as a takeover defense by managers to signal shareholders.
Talmor and Titman (1990)	Compares the tax effects of dividend distributions and share repurchases.
Hausch and Seward (1993)	High-quality firms can distinguish themselves from low-quality firms by repurchasing shares.
Persons (1994)	The fixed-price method is a better signaling device than the Dutch auction method, but the Dutch auction method is a better takeover deterrent.

Ikenberry and Vermaelen (1997)	Open market repurchase programs create an option for management to repurchase shares when the "true" value is greater than the market value. The price change during the announcement period reflects the value of this option. (1980-1990, 892 firms)
Persons (1997)	Develops a signaling model that incorporates heterogeneous shareholder reservation values.

Exhibit 2-2.1: Repurchase Announcement Effects on Share Prices: Tender Offers and Open Market Repurchases

Stewart, Jr. (1976)	Repurchasing firms outperform non-repurchasing firms in the years following a repurchase. (1954-1973, 5,591 repurchasing and 11,128 non-repurchasing firms)
Dielman, Nantell, and Wright (1980)	Tender offers have a positive effect on a company's return in the short run. (1957-1974, 174 repurchases)
Masulis (1980)	Calculates an average tender offer announcement period return of 17% and attributes the increase in wealth to shareholder tax reductions and wealth transfers from senior security holders. (1963-1978, 199 announcements)
Dann (1981)	Fails to support the expropriation hypothesis. (1962-1976, 143 offers)
Vermaelen (1981)	Supports the signaling hypothesis and analyzes the determinants of the announcement period abnormal return. (1962-1977, 243 open-market repurchases, 131 tender offers)
Asquith and Mullins (1986)	Reviews work on equity cash flows.
Barclay and Smith (1988)	Repurchase announcements cause bid-ask spreads to increase, which reduces liquidity and causes the required rate of return on stock to increase. (1970-1979, 244 announcements)
Netter and Mitchell (1989)	Firms announcing repurchase programs following the October 1987 stock market crash earned positive abnormal returns. (1987, 598 firms)

Davidson and Garrison (1989)	Finds a negative price reaction to tender offers used as a takeover defense mechanism. (1978-1983, 62 firms)
Pugh and Jahera (1990)	Finds that the abnormal returns earned during a tender offer are positively related to a firm's debt-to-asset ratio. Supports leverage hypothesis. (1978-1985, 32 firms)
Lakonishok and Vermaelen (1990)	Two trading rules involving tender offers earn substantial abnormal returns. (1962-1986, 221 tender offers)
Comment and Jarrell (1991)	Provides support for the signaling hypothesis by analyzing abnormal returns during the announcement period for fixed-price tender offers, Dutch auction tender offers, and open market authorizations. (1984-1989, 165 Dutch auction and tender offers, 1,197 open market announcements).
Dann, Masulis, and Mayers (1991)	Concludes that a company typically experiences a reduction in risk and an increase in earnings following a tender offer announcement. (1969-1978, 122 repurchases)
Hertzel and Jain (1991)	Concludes that tender offer announcements convey favorable information about the level and riskiness of future earnings. (1970-1984, 226 announcements)
Bartov (1991)	Concludes that a company typically experiences a reduction in risk and an increase in earnings following open market repurchase announcements. (1978-1986, 185 announcements)

Howe, He, and Kao (1992)	Finds no evidence that Jensen's free cash-flow theory explains the market reaction to announced tender offers. (1979-1989, 115 announcements)
Brown and Ryngaert (1992)	Argues that accepting stock from another company is more costly than tendering and paying capital gains taxes. (1978-1986, 143 tender offers)
Singh, Zaman, and Krishnamurti (1994)	Contrary to Barclay and Smith (1988), they find that bid-ask spreads do not increase following open market repurchase announcements. (1983-1990, 181 open market repurchase announcements)
Wiggins (1994)	Identifies firms that repurchased shares and finds no change in their bid-ask spreads. (1988-1990, 195 open market repurchase announcements)
Miller and McConnell (1995)	Reports no change in bid-ask spreads following open market share repurchase announcements. (1984-1988, 248 announcements)
Ikenberry, Lakonishok, and Vermaelen (1995)	Firms announcing an open market repurchase program earned positive risk-adjusted returns in the four-year period following the announcement. (1980-1990, 1,239 announcements)
Raad and Wu (1995)	Finds that net insider purchases of stock prior to a share repurchase announcement is a positive determinant of the announcement period abnormal return. (1982-1990, 204 firms)
Vafeas and Joy (1995)	Finds that the abnormal return associated with an open market repurchase announcement is negatively related to agency costs. (1985-1992, 162 repurchases)

Ratner, Szewczyk, and Tsetsekos (1996)	The researchers find that a larger tender offer announcement period abnormal return is associated with lower levels of institutional ownership. (1970-1986, 88 announcements)
Tsetsekos, Liu, and Floros (1996)	Finds that the market reaction to repeat announcements is similar to initial announcements. (1981-1988, 417 announcements)
Chhachhi and Davidson (1997)	The researchers find that tender offer announcements generally have higher abnormal returns than specially designated dividend announcements and attribute the difference to taxes. (1978-1989, 117 observations)
Liu and Ziebart (1997)	Findings suggest that firms having positive abnormal returns during the announcement period tend to have negative abnormal returns over the 10, 40, and 60-day post-announcement periods. (1984-1989, 244 observations)
Forjan and McCorry (1997)	Report that bid-ask spreads during the announcement period of a Dutch auction repurchase increase and then decrease during the expiration period. They attribute this to the increased risk exposure of security dealers during a Dutch auction repurchase. (1981-1991, 81 observations)
Kadapakkam and Seth (1997)	Findings indicate that abnormal returns earned on the expiration day of Dutch auction repurchases are inversely related to the marginal investor's capital gains tax rate. This helps explain the upward sloping supply curve in tender offers. (1987-1989, 42 observations)

Exhibit 2-2.2: Repurchase Announcement Effects on Share Prices: Targeted Share Repurchases

Bradley and Wakeman (1983)	Repurchases from insiders or small shareholders increase the wealth of non-participating shareholders. Block repurchases decrease the wealth of non-participating shareholders. (1974-1980, 25 insiders, 15 small holdings, and 61 block repurchases)
Dann and DeAngelo (1983)	Calculates negative returns for standstill agreements and block repurchases. (1977-1980, 30 standstill agreements and 41 targeted repurchases).
Holderness and Sheehan (1985)	Target firms earn a positive abnormal return during the purchase-to-repurchase period. (1977-1981, 12 repurchases)
Klein and Rosenfeld (1988)	Findings partially support shareholders' interest hypothesis. (1979-1983, 77 firms)
Klein and Rosenfeld (1988)	Firms that engage in block repurchases have higher management turnover, which supports the management entrenchment hypothesis. (1978-1983, 73 repurchases)

Exhibit 2-3: Operating and Financial Characteristics of Firms that Repurchase Shares

Young (1969)	Repurchasing firms use less financial leverage, have relatively lower operating performance, and have relatively lower P/E ratios when compared to non-repurchasing firms. (1960-1967, 227 firms)
Norgaard and Norgaard (1974)	Repurchasing firms have lower market-to-book value ratios, P/E ratios, dividend payout ratios, historical growth rates, liquidity ratios, and higher debt-to-equity ratios. (1973, 60 repurchasing firms and 60 non-repurchasing firms)
Finnerty (1975)	Equity issuers use more financial leverage and have lower dividends than equity repurchasing firms. (1972, 715 firms).
Medury, Bowyer, and Srinivasan (1992)	Repurchasing firms use less financial leverage, have less liquidity, have higher dividend yields, and are more profitability than non-repurchasing firms. (1983-1986, 860 firms)

Exhibit 2-4: Other Research

Austin (1969)	Concludes that using funds to repurchase stock is an important event. (1961-1967, 1000 firms)
Baker, Gallagher, and Morgan (1981)	According to CFOs, the two main reasons for repurchasing shares are for investment purposes and to acquire shares for stock options. (1980, 73 repurchasing CFOs, 63 other CFOs)
Kale, Noe, and Gay (1989)	Transferable put rights (TPRs) are more tax efficient than fixed-price tender offers.
Bagwell and Shoven (1989)	Highlights ways that firms distribute cash to shareholders.
Denis (1990)	Payout strategies in response to a hostile takeover have differing effects on shareholder value. (1980-1987, 49 firms)
Gay, Kale, and Noe (1991)	Dutch auctions and TPRs are efficient and better for non-tendering stockholders, but fixed-price tender offers send the strongest signal.
Gay, Kale, and Noe (1991)	Survey supports signaling hypothesis and rejects dividend substitution hypothesis. (1988, 140 responses)
Tsetsekos, Kaufman, and Gitman (1991)	Survey of CFOs indicates that the leverage hypothesis is the most common motive for repurchasing shares. (183 responses).
Gay, Kale and Noe (1996)	Finds that tender premiums in a Dutch auction are negatively associated with bidding competition and positively associated with the number of shares sought.
Cudd, Duggal, and Sarkar (1996)	Shareholder wealth is positively related to share repurchases that are undertaken for control or for signaling reasons. (1984-1987, 77 repurchases)

Cole, Helwege, and Laster (1996)	The dividend yield is low by historical standards even after adjusting for repurchases.
Cash and Dickens (1996)	Discusses the tax consequences of a share repurchase for an oil and gas company and its shareholders.

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IMAGE EVALUATION
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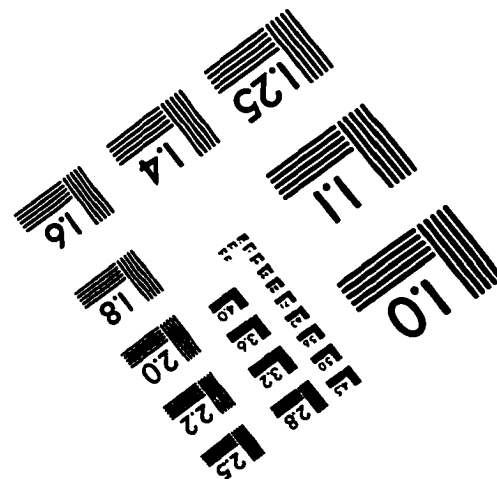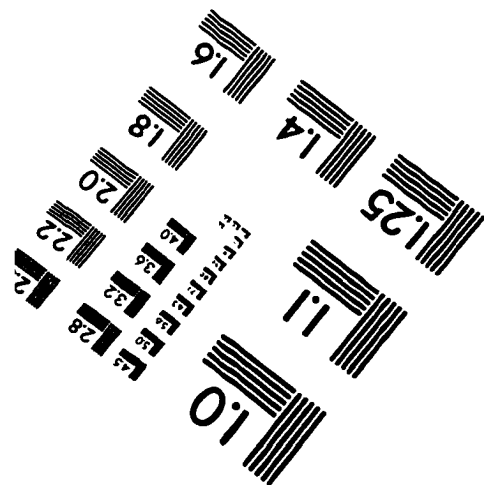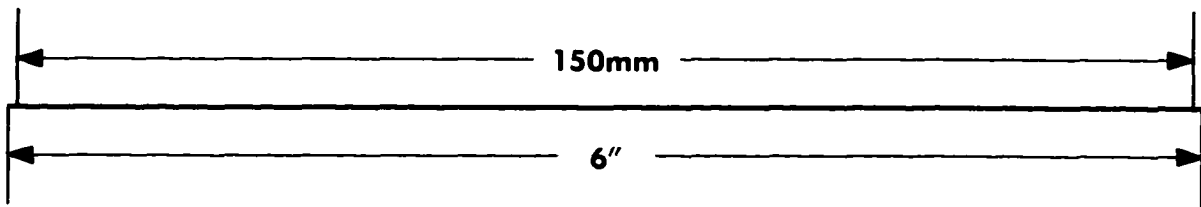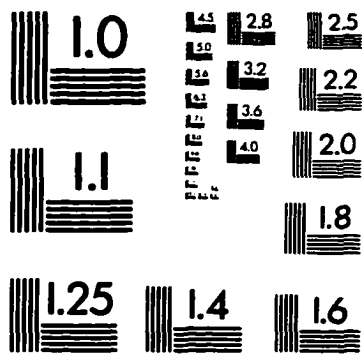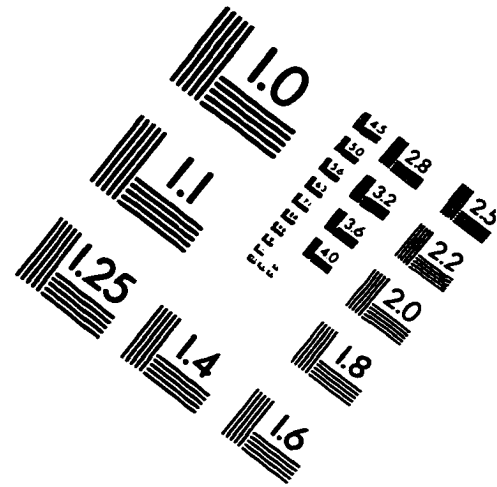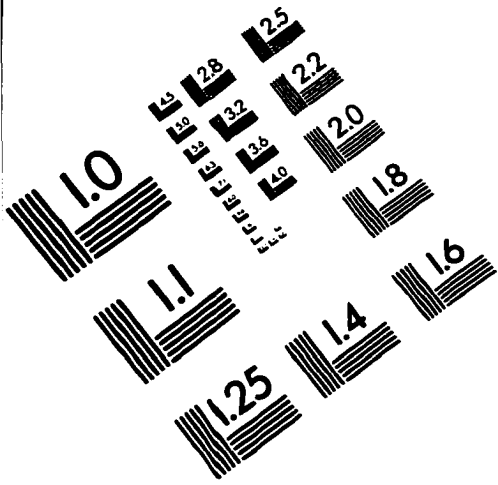
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