ESSAYS ON SHARE REPURCHASES

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ESSAYS ON SHARE REPURCHASES

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Abstract

This dissertation has three essays. In the first essay, I investigate whether the decision to repurchase stock is driven by investor demand for repurchases. Specifically, I hypothesize that firms cater to investor demand for repurchases by initiating repurchases when investors place premiums on the stock prices of repurchasing firms. I propose proxies (analogous to Baker and Wurgler (2004)) that measure the repurchase premium. I find that the lagged repurchase premium is positively and significantly related to repurchase initiation and continuation decisions, even after controlling for tax effects, year trends and alternate investment opportunities. I find that a greater fraction of dividend paying firms also repurchase stock when the repurchase premium has been high. The fraction of dividend payers that repurchase stock is found to be negatively related to the lagged dividend premium, establishing the competing attractiveness of dividends and repurchases based on the respective dividend and repurchase premium. Firms are more likely to repurchase stock when the repurchase premium is high and the difference between the repurchase and dividend premium is positive. The second essay looks at a relatively new way of buying back shares, called Accelerated Share Repurchases (ASRs).

ASRs are credible commitments by firms to repurchase shares immediately. Including an ASR in a repurchase program reduces the flexibility that firms have to alter an announced program in response to subsequent changes in the price and liquidity of its stock, unexpected shocks to cash flow and/or investment, etc. We investigate whether firms' decisions to include ASRs in their repurchase programs are associated with factors expected to influence the costs of lost flexibility and the benefits of enhanced credibility and immediacy. The third essay looks at stock market trading characteristics around ASR announcements. I find that the trading costs decrease following an ASR announcement. On average, market quality improves; trading volume increases; and trade size increases following an ASR announcement. The information asymmetry component of spread also increases post ASR.

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Preface

There are three essays in this dissertation. The first essay investigates whether the decision to repurchase stock is driven by investor demand for repurchases. Firms may cater to investor demand for repurchases by initiating repurchases when the investors place a premium on the stock prices of repurchasing firms. I propose proxies (similar to Baker and Wurgler 2004) that measure the repurchase premium. The most intuitive of these proxies, the value weighted difference between market-to-book ratios of firms that buyback shares and those that don't, is used to test the catering aspect of repurchases. I find that the two year lagged value of this repurchase premium proxy is positively and significantly related to repurchase initiation and continuation decisions, after controlling for tax effects, year trends and alternate investment opportunities. I find that a greater fraction of dividend paying firms also repurchase stock when the lagged repurchase premium is high. The fraction of dividend paying firms that also repurchase stock is found to be negatively related to the lagged dividend premium, establishing the competing attractiveness of dividends and repurchases based on the relative magnitude of dividend and repurchase premium. Firms are more likely to repurchase stock when the repurchase premium is high and the difference between the repurchase and dividend premium is positive. Overall, I find support for catering as a motivation to buy back shares and also find that the difference between repurchase premium and dividend premium may be helpful in explaining the relative attractiveness of dividends and repurchases in US firms.

The second and the third essays are related to a relatively new form of buying back shares - accelerated share repurchase (ASR). In an ASR, a firm enters into a contract with an intermediary, typically an investment bank, whereby the intermediary immediately delivers a specified number of the firm's shares in exchange for a cash payment based on an agreed upon price per share. The intermediary obtains the shares that it delivers to the repurchasing firm by borrowing them, typically from institutions. The intermediary must then cover its short position by purchasing shares in the market over a subsequent time period, typically a few months. The ASR contract also includes a provision whereby the repurchasing firm is required to compensate or is entitled to receive compensation from the intermediary in shares and/or cash for part or all of the difference between the initial price per share the intermediary receives upon delivery of the shares to the firm and the weighted average price per share the intermediary pays in buying the shares to cover its short position. Thus, ASRs are repurchases with an associated forward contract that can be settled in cash or shares of the firm. In contrast to open market share repurchases, accelerated share repurchases represent credible commitments by firms to repurchase shares immediately. Thus, repurchase programs that include ASRs limit the flexibility that firms have to significantly alter an announced open market repurchase program in response to subsequent changes in the price and liquidity of its stock, unexpected shocks to cash flow and/or investment, etc.

The second essay investigates firms' motivations for including ASRs in their repurchase programs. We find that the choice to undertake an ASR as well as the fraction of a repurchase program conducted via an ASR are significantly negatively associated with the stock market illiquidity of the firms' shares and the variability of the firms' share prices and cash flows. Further, we find that firms tend to include ASRs in their repurchase program when the

repurchase is motivated by a desire to signal undervaluation, a desire to return cash to shareholders after asset sales, or an attempt to defend against an unsolicited takeover attempt. Additionally, we find that ASR announcements are associated with positive average abnormal stock returns; however, returns are lower for firms that are takeover targets and higher for firms that are buying back shares issued as consideration in a recent acquisition.

Considering the involvement of a financial intermediary who has a publicized short position following the ASR announcement, an obvious related question is how this affects trading behavior around ASR announcements. The third essay in my dissertation investigates market microstructure issues surrounding ASRs. I compute intra-day measures of trading cost, market quality and price volatility for firms that decide to buy back shares using ASRs. I find that on average, trading costs decrease following an ASR; market quality (as proxied by bid and offer size and market depth) improves following an ASR. Trading volume increases, trade size increases and net order flow improves following an ASR. Intra-day price becomes more volatile leading up to and even beyond the ASR announcement. These findings seem to suggest increased competition for trading volume between market participants. In multivariate test, I find that changes in volatility, relative volume and price cannot explain all of the decrease in percentage trading costs surrounding ASR announcements.

1.0 Chapter One: Do firms cater to investor demand when repurchasing?

1.1 Introduction:

Miller and Modigliani (1961) demonstrate that in a world with perfectly efficient and frictionless capital markets, payout policy is irrelevant. In such a world, rational investors do not have any preference between dividends and capital gains. However, subsequent literature (Black and Scholes (1974), Graham and Kumar (2006), Allen, Bernardo and Welch (2000), etc.) suggests that many factors such as taxes, institutional ownership constraints, transaction costs, and time horizons of investors might skew this preference. Shefrin and Thaler (1988) find that regret aversion, self control problems, and life cycle preferences also influence investors' preferences. As such, there may be times when some investors prefer firms that buy back stock over those that do not.

Previous research documents that the number of firms repurchasing stock (Dittmar (2000)) as well as dollars spent on share buybacks (Grullon and Michaely (2002), etc.) has varied over time. However, little work has been done in studying aggregate changes in the number of firms repurchasing stock. I present a catering view of repurchases to explain why firms initiate and continue share buybacks. This catering view posits that changes in the number of firms repurchasing stock are rational responses by managers to changing valuations assigned to firms that buy back stock. Some investors, driven by changes in their preferences at certain times, may prefer to hold shares of firms that are buying back stock. This demand drives apart the valuations of firms that buy back shares and those that do not, within the limits of arbitrage. Managers rationally cater to this investor demand by announcing and executing share buybacks

when the investors put higher prices on repurchasers compared to non-repurchasers. Baker and Wurgler (2004) present a catering theory of dividends using similar arguments.

To test the repurchase catering hypothesis, I measure the valuation differences between repurchasing and non-repurchasing firms in a particular year. This measure is expected to proxy for the excess valuation that the market assigns to firms that repurchase stock, i.e., the "Repurchase Premium."[1] The propensity to buy back shares in the marketplace is expected to depend on this premium. Using financial data for U.S. firms, I construct several proxies for the repurchase premium and consider the variation in these proxies over time. The broadest proxy is the difference between the logarithm of average (or value-weighted average) market-to-book ratios of repurchasing and non-repurchasing firms in a particular year. Another measure is the average announcement effect of recent repurchase initiations. Intuition suggests that repurchase premiums and the initiation effect of share repurchases should be positively related to the excess demand for repurchasers.

My results indicate that the aggregate rates of initiation and continuation of repurchases are positively and significantly related to the lagged values of repurchase premiums. The value weighted repurchase premium proxy results are robust to controls for relative after-tax amount kept from a dollar in repurchases (taxed at long term capital gains tax rate) to a dollar in dividends (taxed at income tax rate); year effects; tax law changes in 1986, 2001, and 2003;[2]

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[1] Contrary to some previous mentions in literature (Peyer and Vermaelen (2005)) the term "Repurchase Premium" here does not signify the premium that firms have to pay to buy back their own shares (e.g. greenmail etc).

[2] Tax Reform Act of 1986 lowered the top tax rate from 50% to 28% while the bottom rate was raised from 11% to 15% - the first time in the history of the U.S. income tax that the top rate was reduced and the bottom rate increased concomitantly. In addition, capital gains faced the same tax rate as ordinary income. The Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA) made significant changes in several areas of the U.S. Internal Revenue Code, including income tax rates, estate and gift tax exclusions, and qualified and retirement plan rules. The capital gains tax on qualified gains of property or stock held for five years was reduced from 10% to 8%. The Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA) accelerated the gradual rate reduction and

SEC adoption of Rule 10b-18 in 1982;[3] absolute market conditions (measured by the level of S&P 500 index); premiums in stock market returns over U.S. treasury rates; alternate investment opportunities and free cash flow available to firms. The results are most significant for a two year lagged value weighted repurchase premium. This two year time difference is in line with the Stephens and Weisbach (1998) finding that firms do not immediately repurchase all the shares they ultimately buy back. On average, firms acquire 68.7 percent of the shares announced as repurchase targets within two years of the repurchase announcement. Skinner (2008) also finds that "link between earnings and repurchases is stronger for 2-year windows than 1-year periods," suggesting "that earnings drive the level of repurchases over 2-3 year windows but that managers time repurchases within those windows."

I also explore how the market reactions to recent repurchase announcements affects the number of firms announcing repurchases. My results indicate that a higher fraction of firms announce repurchases when the market's response to recent repurchase program announcements has been positive. Taken together, these results provide support for the catering view of repurchases.

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increase in credits passed in EGTRRA. The maximum tax rate decreases originally scheduled to be phased into effect in 2006 under EGTRRA were retroactively enacted to apply to the 2003 tax year. JGTRRA increased both the percentage rate at which items can be depreciated and the amount a taxpayer may choose to expense. In addition, the capital gains tax decreased from rates of 8%, 10%, and 20% to 5% and 15%.

[3] Securities and Exchange Commission (S.E.C.) Rule 10b-18 provides a voluntary "safe harbor" from liability for manipulation under Sections 9(a)(2) and 10(b) of the Securities Exchange Act of 1934 (Exchange Act), and Rule 10b-5 under the Exchange Act, when an issuer or its affiliated purchaser bids for or purchases shares of the issuer's common stock in accordance with the Rule 10b-18's manner, timing, price, and volume conditions. These conditions are: (1) on any one day, firms may not purchase more than 25% of the average daily volume of their own shares during the prior four weeks, block trades and privately negotiated transactions are exempt from this guideline; (2) firms may not purchase their own shares at the opening and closing one-half hours of trading; (3) firms may not purchase their own shares at a price higher than the last independent bid, or the last reported sale price; and (4) all purchases on a single day must be executed through the same brokerage firm. This rule was adopted in November, 1982 and caused an increase in the number of open market repurchase programs adopted due to the resolution of the legal ambiguity (see Ikenberry, Lakonishok and Vermaelen (1995)).

It is worth noting, that I do not find the dollar amount spent on repurchases to be associated with the rate of initiations or continuations of repurchases. This makes it difficult to make a case for a rational clientele driven motive for catering. Any rational clientele would respond to the action of buying back shares, as well as the amount of the buyback. I do find that the repurchase premium proxy is correlated with a composite investor sentiment index (Baker and Wurgler (2006)) which is comprised of the closed end fund discount, share turnover, the number and average first day returns on initial public offerings (IPOs) and other measures. This might point to investor sentiment as driving catering incentives for share repurchases.

I also compare the repurchase premium to the Baker and Wurgler (2004) dividend premium. I find that the repurchase premium is negatively and significantly correlated with the Baker and Wurgler dividend premium (correlation coefficient of -0.361 with p-value of 0.046). This reflects the competing attractiveness of repurchases and dividends. The relative attractiveness of repurchases to dividend payers in a year is also found to be positively and significantly related to the lagged repurchase premium and negatively related to the lagged dividend premium. The dividend premium alone, in the presence of control variables, cannot capture this relative attractiveness of repurchases to dividend payers. This relative attractiveness ties together the dividend and the repurchase premiums and highlights that the dividend premium, by itself, cannot entirely explain repurchasing activity.

Using a firm level logit analysis, I find that firms are more likely to repurchase stock (issue dividends) when the lagged repurchase premium is high (low). Firms are more likely to repurchase stock when the difference between the repurchase premium and the dividend premium is positive. However, firms are more likely to issue dividends when this difference between the repurchase premium and dividend premium is negative. This result points to the

importance of the relative dividend and repurchase premiums in firms' decisions to issue dividends or repurchase stock. This finding that the dividend/repurchase decision is based on relative dividend and repurchase premium is a significant contribution of this essay.

The paper in the literature closest to my essay is Baker and Wurgler (2004). They relax the market efficiency assumption of Miller and Modigliani's dividend irrelevance theory to show that firms issue dividends when investors value dividend paying firms. However, we do not know if firms cater to investor preferences when determining their repurchasing strategy. Moreover, we do not know how dividend preferences and repurchase preferences correlate through time and how these correlations relate to firm's payout policies. My essay addresses these questions. Even though, arguably, dividends and repurchases compete for components of free cash flow, the idea of catering based on the relative magnitude of dividend and repurchase premiums is unique to this essay and has not been explored in the literature. The results in this essay also shed light on a possible reason why firms may announce (and initiate) repurchases in clusters. If the catering view holds, more managers will buy back stock when the repurchase premium is high, thereby leading to clustering. These results might also suggest an explanation for cyclicality of repurchases. As investor demand for shares of firms that repurchase stock varies, the valuations assigned to firms that repurchase stock also changes. Managers react to this varying demand by changing the supply (affecting the rate of initiations and continuations of repurchases).

Massa, Rehman and Vermaelen (2007) propose a signal mimicking strategy in concentrated industries as a possible reason for share repurchases. In their model, by repurchasing, "a firm sends a positive signal about itself and a negative one about its competitors. This induces the competing firms to mimic the behavior of the repurchasing firm

by repurchasing themselves." In my logit tests (on the decision to repurchase stock), I control for mimicking activity using proxies suggested by Massa et. al. and find that even after controlling for mimicking, firms are more likely to repurchase stock when the difference between the repurchase premium and dividend premium is positive. This seems to suggest that mimicking might be one of the channels through which catering works – but not the only one.

The rest of the chapter is structured as follows. Section 1.2 presents a brief review of the relevant literature. Section 1.3 explains the main assumptions and intuitive framework for the repurchase catering theory. Section 1.4 explains the data and results of some empirical tests. Section 1.5 considers some alternative hypotheses. Section 1.6 discusses the overall results on aggregate rates of initiation and continuation of repurchases and explores what might be driving the results. Section 1.7 explores the relation between the repurchase premium and the Baker and Wurgler dividend premium and proposes useful implications of the comparison. Section 1.8 concludes.

1.2 Literature Review

Black (1976) introduced the "Dividend Puzzle," asking why firms pay dividends when the tax differentials between capital gains and dividends suggest that investors would prefer the former. Firms should prefer retention over dividend payouts because retained earnings are a low cost way to secure funds for investment. However, DeAngelo and DeAngelo (2004) argue that a rational investor will not purchase shares whose expected distributions in present value terms fall below their initial cost and so firms must offer the genuine prospect of substantial future payouts to induce outsiders to purchase their equity. They suggest that aggregate net payouts of firms

must conform to the aggregate demand of individuals for time-dated consumption claims. Practically, firms will have to choose between paying out dividends and retaining them from time to time.

If a firm has to payout, share repurchase might have certain advantages over dividends. Research finds that repurchases are tax advantaged and may be a more efficient way for management to pay out cash to shareholders (e.g., see Brennan and Thakor (1990), Lucas and Macdonald (1998)). Announcements of share repurchase programs may be construed as signals of undervaluation (e.g., see Asquith and Mullins (1986), Comment and Jarrell (1991), and Vermaelen (1981)). Stock market reactions to repurchases are significantly positive on average; however, reactions to repurchases in the bond market are mixed (Jagannathan and Stephens (2003)). Maxwell and Stephens (2003), Dhillon and Johnson (1994), Handjinicolaou and Kalay (1984), Jayaraman and Shastri (1988) and others find scant evidence of repurchases being events that transfer wealth from bondholders to stockholders.

The existing literature suggests many motivations for repurchases. Dittmar (2000) finds that firms may have different time varying motives for repurchases, including distribution of excess cash, taking advantage of undervaluation, fending off takeovers (Denis (1990)) and even altering leverage ratios (e.g., see Bagwell and Shoven (1998), Hovakimian, Opler and Titman (2001)). Repurchase announcements have been found to convey earnings information to the market (e.g., see Dann, Masulis and Mayers (1991), Hertzel and Jain (1991)). Grullon and Michaely (2004) and Jagannathan, Stephens and Weisbach (2000) suggest that repurchases are funded mainly by variable component of firm's overall cash flow while dividends are paid out by the permanent components. Stock repurchase also tend to be pro-cyclic while dividends increase steadily over time.

Recently, stock repurchases have become more prominent than dividends. Grullon and Michaely (2002) show that firms finance their repurchases with funds that otherwise would have been used to increase dividends. Young firms use repurchases more than they have in the past and most firms initiating a payout do so through repurchases. Grullon and Michaely (2004) suggest that between 1984 and 2000, U.S. firms spent 26% of their annual earnings on share repurchases. Repurchases are viewed as a more flexible way of corporate payout. Brav, Graham, Harvey and Michaely (2005) have survey evidence to suggest that managers do view repurchases to be more flexible than dividends.[4] Skinner (2008) looks at the evolving relation between earnings, dividends and repurchases and finds that repurchases are increasingly used in place of dividends, even for firms that continue to pay dividends. Link between earnings and repurchases is stronger for two year periods than it is for one year periods and earnings drive the level of repurchases over 2-3 year windows with specific timing within those windows decided by managers.

A "clientele effect" or "catering" has been considered as a motivation for dividend payout. Miller and Modigliani (1961) suggested that dividend clienteles may form based on investor characteristics. Firms that pay higher (lower) dividends might attract investors who prefer (dislike) dividend income based on marginal tax rates, age or income preferences. Graham and Kumar (2006) find support for some "age clienteles" in their analysis of investor holdings, whereby older investors strongly prefer dividend paying firms. Shefrin and Statman (1984) argue that "mental accounting" might influence investor's preferences, whereby they code for gains and losses across investments using prospect theory functions. Shefrin and Thaler

[4]85% of CFOs agree that repurchase decisions convey information to investors and yet only 22% view that there are negative consequences of reducing repurchases or that they have to be maintained for consistence with historic payout policy.

(1988) and Thaler and Shefrin (1981) find that regret aversion, self control problems and life cycle preferences might also influence this preference for dividends. While clienteles for dividends have been extensively studied (e.g., see Black and Scholes (1974), Allen, Bernardo and Welch (2000)), clientele effects driving repurchase decisions have not been studied. Baker, Greenwood and Wurgler (2008) propose a catering theory based on nominal share prices. Baker and Wurgler (2004) develop a catering theory of dividends. However, they do not consider "repurchase catering" or how the dividend catering and repurchase catering might be related. The Baker and Wurgler (2004) dividend premium is quantifiable and hence very attractive for studying relative attractiveness of dividends and repurchases, if one develops corresponding measures of repurchase premium.

1.3 Repurchase Catering

I develop an intuitive framework for repurchase catering, along the lines of Baker and Wurgler (2004). Consider a firm in which managers face the choice of repurchasing shares. Exercising this choice reduces the value of the firm. The costs of repurchasing capture the tradeoffs between investment policy and payout policy, including the tradeoffs between dividends and buybacks. In the Miller and Modigliani perfect capital markets world, these costs are zero.

Assume that there are two types of investors in this world, category investors and arbitrageurs. Category investors prefer firms that repurchase stocks. In the spirit of Rosch (1978) and Barberis and Shleifer (2003), category investors put firms that repurchase stock in a separate investment category. Possible reasons for this categorization can be tax clienteles

(similar to Black and Scholes (1974) and Allen, Bernardo and Welch (2000) tax based dividend clienteles), time horizon of investments (Graham and Kumar (2006)), perception of repurchases as signals of undervaluation (Asquith and Mullins (1986), Comment and Jarrell (1991), and Vermaelen (1981)), high expected future returns (Vermaelen (1981), Massa, Rehman, Vermaelen (2007)) and even a popular belief that share buybacks are a shareholder friendly activity (Westphal and Zajac (2001), Sanders and Carpenter (2003)).

This category based demand may lead to an irrational expectation in the value of the firm. Category investors do not fully recognize the costs of repurchases. For example, category investors may categorize because they view non-repurchasers as high growth firms and might judge the future prospects of repurchasers relative to their current assessment of growth opportunities. Similar cases can be made for other motivations behind categorization. Category investors assign different valuations to the firm, V^B if the firm buys back shares and V^{NB} if the firm does not buy back shares. They misestimate the mean value but not the distribution around the mean. Typically, V^B and V^{NB} fall on opposite sides of the true fundamental value.

Arbitragers, on the other hand, have rational expectations and know the long run cost of repurchasing. Risk aversion of arbitrageurs and category investors might define limits of arbitrage. See Shleifer (2000) for survey of literature on the limits of arbitrage.

With limited arbitrage, the perceptions of category investors cause the relative prices of repurchasers and non-repurchasers to differ. In the presence of such pricing differences, managers would cater to the investor demand (of category investors) by repurchasing when they think that the net gain to catering, based on the cost of repurchasing, manager's time horizon and other measures of current price and long run value, is positive. In so far as a repurchase is a signal of undervaluation, the dollar amount of repurchase is less important than the fact that the

firm is repurchasing its shares (and hence considers itself undervalued). This framework provides the basic intuitive argument for repurchase catering.

Empirically, this catering view of repurchases posits that a higher fraction of firms will buy back stock when investor demand for firms that are repurchasing shares is high. More specifically, the rates of initiations and continuations of repurchases are expected to be positively related to the lagged repurchase premium.

1.4 Data and Empirical Tests

1.4.1 Firms and their repurchasing activity

Firm level financial statement data for this study are gathered from the Compustat database. For each calendar year t, I include those firms with fiscal year ends in t that have the following data (Compustat data items in parentheses): total assets (6), stock prices (199) and shares outstanding (25) at the end of the fiscal year, income before extraordinary items (18), interest expense (15), [cash] dividends per share by ex-date (26), preferred dividends (19) and (a) preferred stock liquidating value (10), (b) preferred stock redemption value (56) or (c) preferred stock carrying value (130). Firms must also have stockholders' equity (216), liabilities (181) or common equity (60) and preferred stock par value (130). Total assets must be available in year t and t-1. I exclude firms with book equity below $250,000 or assets below $500,000. These size cutoffs match Fama and French (2001). I also require that purchase of common and preferred stock (115) be also reported. In calculating the total repurchase amount for a firm year observation, this data item (115) is adjusted by decreases in preferred stock redemption value (56) between year t-1 and year t. As discussed in Stephens and Weisbach (1998) and Dittmar

(2000), this adjustment takes care of the conversion of preferred stock into common stock, retirement of preferred stock and retirement or redemption of redeemable preferred stock. If the repurchase amount, after this adjustment, is positive and at least 1% of the market value of equity of the firm, then the firm is identified as a repurchaser for the year t. This firm level information is aggregated into a time series of repurchasing firms. A repurchasing firm may have repurchased shares in the last year too. As such, the distinction between "old" and "new" repurchase might be helpful. Firms may also be dropped from or added to the sample for a particular year, based on size or data availability restrictions described above. As such, keeping track of changes in classification based on whether the firm was part of the last year's sample or not also makes sense. Identity (1) below defines the number of repurchasers and identity (2) describes the changes.

$$Repurchaser_t = New\ Repurchaser_t + Old\ Repurchaser_t + List\ Repurchaser_t \quad Eq.\ (1.1)$$

$$Old\ Repurchaser_t = Repurchaser_{t-1} - New\ Repurchaser_t - Delist\ Repurchaser_t \quad Eq.\ (1.2)$$

New Repurchaser is the number of repurchase initiators among last year's non-repurchasers. *Old Repurchasers* is the number of repurchasers that also repurchased stock last year, *List Repurchasers* is the number of repurchasers this year that were not in the sample last year, and *Delist Repurchasers* is the number of last year's repurchasers not in the sample this year. Note that list and delist are defined with respect to the sample screens, not with respect to

IPO or exchange listings. *Non-Repurchasers* are firms that did not repurchase in a year. Also note that analogous identities hold for *Non-repurchasers*. I define variables

$$Initiate_t = \frac{New\ Repurchaser_t}{Non\text{-}Repurchaser_{t-1} - Delist\ Non\text{-}Repurchaser_t} \qquad Eq.\ (1.3)$$

and

$$Continue_t = \frac{Old\ Repurchaser_t}{Repurchaser_{t-1} - Delist\ Repurchaser_t} \qquad Eq.\ (1.4)$$

Intuitively, the variable *Initiate* captures the fraction of surviving firms that become new repurchasers. *Continue* captures the fraction of surviving repurchasers that continue share buybacks.

These variables capture the decision whether to buy back stock, not how much to buy back. This approach fits more closely to the signaling theory of repurchases (Vermaelen (1981)), whereby share repurchase programs are signals of undervaluation. In line with some empirical work, the signal of undervaluation is more important than the level of undervaluation. As such, the decision to repurchase stock affects the premium more than the size of buyback, as long as the buyback is above a cut-off level. Ikenberry and Vermaelen (1996) note that firms sometimes announce their intention to re-acquire shares via open market transactions, but often completely forego the actual repurchasing of stock. Note that proxies based on financial data from the Compustat database are not prone to such errors because if a firm completely foregoes the repurchase, the announcement will not be reflected in the balance sheet. Firms may however repurchase less than 1% of their market value in a given year, in spite of announcing a

repurchase program and hence not meet the minimum cutoff of being classified as a repurchase in a year. One caveat is that firms delay their actual repurchases many quarters from the announcement (Stephens and Weisbach (1998)), and this delay might make some of the repurchase metrics less responsive than dividend metrics.[5]

The first set of results shows the variations in these variables constructed for every year from 1971-2005. The Compustat database starts reporting repurchases only from 1971 onwards. Table 1.1 shows the number of repurchasers and non-repurchasers for every year in my sample from 1971-2005. The number of repurchasers is broken down into New Repurchasers, Old Repurchasers and List Repurchasers. The portion of repurchasers that choose to initiate repurchases in a particular year varies from 5.91% to 24.49%. This is an indication repurchases have been in and out of favor at various points in time.

1.4.2 Repurchase premium variables

Here, I relate the repurchasing activity to several measures of demand for firms that repurchase stock. Ideally, I would like to capture valuation differences between firms that have the same investment policy but different payout policy. In a frictionless capital market, this valuation difference will be zero. However, the preference driven demand of some investors for firms that repurchase stock, within the limits of arbitrage, may cause a valuation difference. Measures of repurchase premium are motivated by this intuition.

The first measure of repurchase premium is given by the difference in the logarithm of Market-to-Book (M/B) values of repurchasers and non-repurchasers. M/B ratio for the repurchasers and the non-repurchasers are constructed following Fama and French (2001). The

[5] This delay, as I discuss later, might be explained by a higher firm specific repurchase premium threshold and so the manager in such a firm may just be waiting till the premium is high enough for him to act.

Equally Weighted (EW) Repurchase Premium is $[\log(M/B)_{repurchaser} - \log(M/B)_{nonrepurchaser}]$. The value weighted (VW) Repurchase Premium is the difference in the logarithm of VW M/B of repurchasers and non-repurchasers. The VW M/B weights the calculated M/B of a firm by its book value of equity. Table 1.2 lists the EW M/B and VW M/B and also the repurchase premiums. The repurchase premium varies from year to year and changes sign too.

Figure 1.1 shows the plot of the time series for the M/B ratio for repurchasers and non-repurchasers. Panel A shows the average for the EW M/B ratio. Panel B shows the average for the VW M/B for the repurchasers and the non-repurchasers and how it varies. There is considerable time variation in the values of M/B of the repurchasers and non-repurchasers and also in the difference between M/B of the two groups.

The EW and VW repurchase premium series are shown in Figure 1.2. The *VW Repurchase Premium* starts out negative in early 1970s but becomes positive in the late 1970s. It is important to note that the SEC Rule 10b-18 was adopted in late 1982 and this had a major impact on repurchase activity (see footnote 3 for details of the rule). In 1982, the *VW Repurchase Premium* rises moderately. The premium is positive again in 1990 and stays positive until 1997. The high premium in most of 1990s matches well with the reported rise in repurchases (Grullon and Michaely (2002)) in 1990s. The repurchase premium is negative between 1997 and 2002, after which it switches sign again. The drop in repurchase premium between 2003 and 2005 matches well with the JGTRRA tax law (see footnote 2), which made repurchasing less favorable. Thus, the VW Repurchase Premium captures some key historic changes that potentially affected the repurchase decision of firms in U.S.

It should be noted that a repurchase premium of 10% does not imply that a repurchase initiation will lead to a 10% jump in share price of the announcing firm. The repurchasers and

non-repurchases differ on a lot of potential firm characteristics, including size, maturity, profitability, etc., that the repurchase premium does not control for. These firm characteristics, unlike the decision to repurchases, may not be under management control. When used here as a proxy, M/B is meant to capture valuation and the repurchase premium is meant to capture relative valuation between repurchasers and non-repurchasers. However, M/B is also used in the literature as a proxy for growth options (Denis and Osobov (2005) etc.). As such, a disadvantage of this proxy is that it captures growth options of repurchasers relative to non-repurchasers. This is a concern I discuss (and control for) in more detail in section 5.

Another proxy for the repurchase premium is the abnormal return for recent repurchase program announcements. To get this data, I use the Thomson Securities Data Corporation (SDC) database and identify firms that announced repurchase programs. The earliest repurchase announcement data in SDC is from 1981. Using the firm identification data and the announcement dates as given in SDC, I calculate the three day cumulative market adjusted return, from day -1 to day +1 relative to the repurchase program announcement, using the Center for Research in Security Prices (CRSP) value weighted index to adjust for market return. Stock prices for the computations are extracted from the CRSP database.

For defining the classification groups within the SDC data, I just check the existence of the firm in the Compustat database and impose the size restrictions defined for the overall sample. So, if a firm A that announced a repurchase program in year 1990, as per the SDC database, is also present in the Compustat database for the year 1990 (irrespective of whether the firm bought back stock or not), I calculate the announcement return and include the announcement return in calculating the average announcement return for the year. Vermaelen

(1981) and others have documented that announcements of repurchase programs are greeted with positive market adjusted returns.

To control for the volatility across firms and time (Campbell, Lettau, Malkiel, Xu (2001)), the three day cumulative market adjusted returns for each firm are scaled by the square root of three (number of days) times the standard deviation of excess return, calculated using data from 120 calendar days prior to the repurchase program announcement and including data up to five trading days before the announcement. I then average the scaled returns for each firm by fiscal year to get the standardized cumulative abnormal return, AR, for announcement of repurchase programs by firms in that year. Table 1.3 reports the number of firms from the SDC database that announce repurchase programs and are included in the Compustat database, along with the average market adjusted return on repurchase announcements and the standardized average return for repurchase program announcements for the year, AR. The market adjusted return is 1.87% on average and the standardized average announcement return is 0.4274. The variable *Fraction*, reported in Table 1.3, is the number of SDC firms that announced a repurchase program in a year divided by the total number of Compustat firms in the sample for the same year. The number of firms announcing a repurchase program varies between 5 and 738, representing 0.14% and 22.66% of the Compustat sample in the corresponding years.

It is worth noting that the standardized announcement return proxy, AR, is measured using repurchase program announcements, not the actual execution of repurchases. It is perhaps a more timely measure of the market reaction to recent repurchase announcements. However, it has its own share of problems. Firms do not always buy back all the shares they say they are going to buyback. Firms sometimes buyback shares with long delays and sometimes do not buy back any shares at all (Stephens and Weisbach (1998), Bhattacharya and Dittmar (2008)). As a

result, attempts to link this announcement effect to actual buyback may be challenging (I explore this further a little later).

For the sake of comparison with Baker and Wurgler (2004), I document and report two other proxies of repurchase premium. I report these proxies and also their correlations with the main repurchase premium proxies but do not show any regression results, except briefly discussing them in section 5. These proxies can be broadly classified as "future returns" proxies.[6] More specifically, the first one is the difference between the one year return (from year t to year t + 1) on a value weighted portfolio of repurchasers and non-repurchasers. This is represented as $r^{B}_{t+1} - r^{NB}_{t+1}$. The second proxy is the cumulative return on a value weighted portfolio of repurchasers from year t+1 to year t+3 minus the return on a portfolio of non-repurchasers (in the same time). This is represented as $R^{B}_{t+1,\ t+3} - R^{NB}_{t+1,\ t+3}$. The only difference between these two is the timing. The first one measures the one year post buyback return (not from the day of the announcement of the program but from the day of categorization as a "repurchaser", i.e. end of fiscal year of buyback) and the second is a two year return further out from buyback. The general intuition behind proposing these proxies is that if managers are chasing some premium for short term gains, unrelated to fundamentals, then the future returns are not expected to persist. Table 1.4 shows these two additional repurchase premium proxies, together with the others described before.

Table 1.5, reports the correlations between all these five proxies. Correlation between the EW Repurchase Premium and the VW Repurchase Premium is positive and significant. The correlation between AR and the EW and the VW repurchase premiums is also positive. However, the correlation between the future returns proxies and the EW and the VW repurchase

[6] Reader is referred to Ikenberry, Lakonishok and Vermaelen (1995, 2000), Massa, Rehman and Vermaelen (2007) and other papers for investor under-reaction to repurchase announcements literature for details.

premiums is negative, as expected. The jump in stock price of the repurchasers might be causing the longer run underperformance, in turn driving the negative correlation with the EW and VW repurchase premiums and the AR.

1.4.3 Relationship between repurchase rates and premiums

Here I relate the aggregate repurchasing activity of firms to the repurchase premium variables. Figure 1.3 shows the rate of initiation of repurchases across time, together with one and two year lagged values of the value-weighted repurchase premium. The figure shows interesting correlation between the lagged values of the repurchase premium and the rate of initiation of repurchases. It appears that the two year lagged series of the repurchase premium proxy has a better correlation with the rate of initiation of repurchases.

Table 1.6 describes the first set of regression results. The dependent variable in panel A (B) is the rate of initiation (continuation) of repurchases, *Initiate (Continue)*, in a particular year, t. I regress the dependent variable on the different repurchase premium proxies and their one and two year lags. The regression coefficients for the *VW Rep Premium*$_t$, the *VW Rep Premium*$_{t-1}$ and the *VW Rep Premium*$_{t-2}$ are all positive. The coefficient on the *VW Rep Premium*$_{t-2}$ variable is significant but on the *VWRep Premium*$_{t-1}$ variable is not significant. Similarly, the coefficient on the two year lagged EW Rep Premium variable is positive and significant. This result, that the coefficient on the one year lagged repurchase premium proxy is not significant but the two year lagged VW and EW Repurchase Premium is significant, is not surprising. It is common in the repurchase literature to assume that it takes up to two years for the repurchase programs to be completed (Stephen and Weisbach (1998) and others). Stephens and Weisbach find that firms buyback 74 to 82 percent of the shares announced as repurchase targets within three years of the repurchase announcement. Within four quarters (one year) of announcing (an open market)

repurchase program, 27.22% of firms had bought back less than 20% of shares they intended to buy in the repurchase program (Stephens and Weisbach (1998), Table II, Panel D) and about half of these firms (13.11%) had repurchased even less than 1% of the total shares they intended to buyback. This delay in executing repurchases stems from the fact that firms are not under any obligation to complete an announced repurchase program. I believe that this delay in execution of repurchase programs brings about this longer than expected delay between repurchase premium and observed initiation and continuation rates of repurchases. Interestingly, to get around this problem, Kahle (2002) and others use a two year window to calculate the repurchase amount in a particular year when assigning the value of repurchases. Working with annual data also biases this study a little against picking up the effects of repurchases immediately, as the proxies described here pick up the effects only annually.

This positive and significant result lends support to the main prediction of the catering theory for repurchases: firms are more likely to initiate and continue repurchases when the repurchase premium is high.

When I regress the Initiate variable on the contemporaneous, one year and two year lagged standardized repurchase announcement returns in a particular year, AR, I don't find any significance. There are two things that may be complicating this result. Firstly, firms' announcements of buybacks do not always translate into actual buybacks, as discussed earlier. Secondly, the variable Initiate captures only the actual repurchase initiations in a particular year, whereas SDC announcements give the managers the mandate to buy back shares till the amount (in dollars) authorized by the firm's board is exhausted. As such, the variable Fraction, (reported in Table 1.3; defined as the fraction of firms in the Compustat sample that announce a share repurchase that is picked up in the SDC database, irrespective of the actual share buyback), is a

better variable to capture announcement effects. The standardized announcement return, AR, as a proxy is a little different from the VW Repurchase Premium proxy. AR captures the "announcement of repurchases" effect and the VW Repurchase premium captures the "actual share buyback" effect.

In panel C of Table 1.6, I show results for regression of the variable Fraction on the standardized announcement return. I find significance in the one year lagged and no significance in the contemporaneous or the two year lagged standardized announcement return proxy. This is in line with the catering hypothesis that a higher fraction of firms announce repurchase programs when the announcement returns are high. The announcement return proxy is, arguably, a more timely measure of repurchase premium proxy. However, the AR proxy is based on the repurchase announcement, not the actual buyback.[7] AR, as a proxy, is also coarse as one misses the initiation and continuation rate and just captures announcement effects.

To quantify this difference in timing between repurchase announcements and actual buybacks, I find all repurchasing firm-year combinations when shares are actually bought back (using data from the Compustat database, thereby picking up actual share buybacks). I then assign these firm-year combinations to the closest SDC repurchase announcement of buybacks. The distribution of time elapsed between SDC repurchase announcement and the Compustat categorization as a repurchaser varies between 0 (firm repurchases in the same year as announced) to 21 (firm waits a very long time to repurchase its stock after SDC announcement). The median (mean) of this distribution of the number of years elapsed between SDC

[7] In order to separate out the type of repurchases from SDC into tender offers, open market repurchases and negotiated repurchases, announcement return on each type of repurchase was calculated. Returns on all announcements are correlated to the overall market adjusted returns and standardized announcement returns reported here, with the open market repurchases being the most correlated. Any of the individual types of announcement are not significantly related to the rate of initiation or continuation.

announcement and Compustat categorization as repurchase is 2 (2.5) years. I also investigate the correlation between the two (one) year lagged repurchase premium and the elapsed time before which the firm repurchases stock. I find this correlation to be 0.515 (0.599) and significant with a p-value of 0.0141(0.0032). This suggests that firms may wait a while to buy back stock, even after announcing a buyback and the wait time is correlated with the repurchase premium. A firm may also wait before actually repurchasing stock because different firms may have different target repurchase premiums (to meet the firm specific cost of repurchases e.g., flexibility they give up in committing resources to buyback, cash constraints, liquidity needs etc.).

Data supports the general intuition that a firm might wait after announcing a repurchase program and that it will actually repurchase stock when the incentive is high enough for it to repurchase (i.e., the repurchase premium is high). To test this, I match all SDC program announcements to the Compustat data on actual categorization as a repurchases. I then calculate the mean equally (value) weighted repurchase premium prevailing at the time of SDC announcement and found it to be -0.1554 (0.0181). I also calculate the mean equally (value) weighted repurchase premium in the first year post SDC announcement that the firm gets categorized as a repurchaser and found it to be -0.1389 (0.0204). The difference in premiums between announcement of repurchase program and initiating share buyback is significantly positive. This might explain, albeit ex post, why firms might announce a repurchase when the returns to repurchase announcements are high, but wait before repurchasing stocks (i.e., the prevailing repurchase premium may not be high enough for the firm to start repurchasing and we see the firm acting on the announcement only when the prevailing repurchase premium meets the unobservable threshold). In this sense, the catering view of repurchases might explain the delay

observed by Stephens and Weisbach (1998), between announcing a repurchase program and the actual buying back of shares.

1.5 Alternate Explanations

The positive and significant relationship between rate of initiation (and continuation) of repurchases and the lagged values of repurchase premium proxies can be viewed as a rational managerial response to the investor demand for repurchases. Managers observe the valuation differences and act rationally, thereby catering to investor demand for repurchases. However, in this section I consider some alternative explanations that could be driving the results in Table 1.6.

1.5.1 Time Varying Investment Opportunities

One possible scenario is that the rate of initiation is just an artifact of time variations in investment opportunities. Non-repurchasers may be initiating repurchases not because they are chasing the repurchase premium but because their investment opportunities are low in an absolute sense. The first point in this line of thought is that the repurchasers are more likely to discontinue repurchases when the investment opportunities for the firm are high. Repurchases and investments could be inversely related if external financing is costly. Cutting repurchases would create the free cash that the managers need to invest in the new investment opportunities. This, in turn, would imply a negative relationship between continuation rate of repurchases and the repurchase premium.

One test, to see if time-varying investment opportunities drive the relationship between rate of initiation of repurchases and the repurchase premium, is to control for the level of investment opportunities. To control for the investment opportunities, I consider three potential measures: the market-to-book ratio of firms in the relevant group, the CRSP value weighted Repurchase/Price ratio and the growth rate of sales. Regressions in Table 1.7, panels A and B, describe the results for two of these (market-to-book ratio of firms in question and CRSP value weighted Repurchase/Price ratio).

1.5.2 Free Cash Flow

Another possible scenario is that the firms have high levels of free cash flow available at their disposal. As a result, the favorable free cash flow balance, rather than the catering motivation, could be driving the repurchase initiations and continuations. Available free cash flow is a commonly cited reason (e.g., see Dittmar (2000), Jagannathan, Stephens and Weisbach (2000)) for repurchases. By this explanation, non-repurchasers may be initiating repurchases because they have cash at their disposal after fulfilling their investment needs. Similarly, repurchasers could be continuing repurchases because they have surplus cash, even after repurchasing in the last year. I control for the level of free cash available to firms in the relevant group. I measure free cash flow by subtracting the sum of depreciation (Compustat data item 14), tax payments (item 16), interest expense (item 15), dividends (sum of items 19 and 21) and repurchases (item 115) from gross operating income (item 13) and scaling the difference by total assets.

1.5.3 Market Condition

A possible concern is that managers buy back shares not based on catering incentives but based on the overall market level. To control for this, I use the level of S&P 500 market index as a proxy. The variable *SP500* captures this. A related concern can be that the performance of market, relative to risk free asset, might also affect repurchase decisions. A steep negative stock market performance might make shares of a firm look attractive for buybacks if the managers feel that the long term prospects of the business are still good and not captured by the current market conditions. Jagannathan and Stephens (2003) find that repurchases are common after declines in stock market. To control for relative performance of the stock market, I construct a proxy, $Stock\ Premium_t$. This is the return on S&P500 market index for the year t, adjusted by the average yearly return on one year U.S. treasury notes (averaged monthly over the twelve months in the calendar year t). This proxy also controls for any changes in growth options due to discount rate fluctuations in a particular year.

1.5.4 Taxes and Law Changes

Taxes are one of the motives for repurchases (e.g., see Brennan and Thakor (1990), Lucas and Macdonald (1998)). Traditionally, repurchases have been taxed at a lower capital gains tax rate whereas dividends have been taxed at the higher income tax rate. A concern could be that the rates of initiation and continuation of repurchases are rational choices based on tax rates. I compute a control variable Tax_t which is the ratio of after tax income from a dollar in capital gains to a dollar in dividends in year t. The Tax variable captures changes in relative rates between capital gains and income taxes.

To capture other changes as a result of changes in tax laws, I use binary dummy variables. Grullon and Michaely (2004) explain that 1986 was an important year for tax

changes. The binary variable *After86* takes a value of 1 if the year is after the calendar year 1986 and 0 otherwise. This dummy variable captures the effect of these important tax changes in year 1986. Another major landmark year for tax reform was the year 2001 (see footnote 2 related to EGTRRA). The binary dummy variable *After01* captures the effect of these important tax changes in year 2001. The variable A*fter01* takes a value of 1 if the year is after the calendar year 2001 and 0 otherwise. The binary dummy variable *After03* captures the effect of important tax changes in year 2003 (see footnote 2 related to JGTRRA). The variable *After03* takes a value of 1 if the year is after the calendar year 2003 and 0 otherwise.

Grullon and Ikenberry (2000) talk about SEC adoption of Rule 10b-18 in 1982 (see footnote 3) increasing the number of U.S. firms adopting share buyback programs. To control for any shift in repurchasing activity after 1982, I introduce the dummy variable *After82*, which takes a value of 1 if the year is after 1982 and 0 otherwise.

1.5.5 Time Trend

Yet another possibility is that the relationships between repurchase activity and repurchase premiums are mere manifestations of a time trend caused by some systemic forces, not captured by other factors mentioned here. To control for the possibility of a time trend, I introduce the variable, $Year_t$. This is a trend variable.

1.5.6 Tests controlling for alternate explanations

Here I describe the results of tests conducted to control for the alternative explanations considered above. In specification (1) of panel A in Table 1.7, I regress the rate of initiation of repurchases, $Initiate_t$, on the variables $VW\ NonrepM/B_{t-2}$ and $VW\ Rep\ Premium_{t-2}$, which are the VW M/B ratio of non-repurchasers and the VW repurchase premium in year t-2, respectively.

Here, I am using M/B as a proxy for alternate investment opportunities. For initiations, considering the non-repurchasers makes sense because these are the firms considering initiations in a particular year (if a firm was already a repurchaser last year, this year it faces the decision to continue repurchases, not the decision to initiate). The repurchase premium is positive and significant after controlling for M/B of non-repurchasers. The coefficient on the VW Nonrep M/B_{t-2} variable is positive and significant implying that firms that have good investment opportunities also have higher rates of repurchase initiations. Firms with better investment opportunities should have been expected to reduce repurchase initiations, not increase them. This reduces the concern that the repurchase premium is capturing investment opportunities alone.

In specification (2), I introduce the proxy for available free cash flow to non-repurchasers (again, because non-repurchasers are the relevant group deciding to initiate repurchases), represented by *VW Nonrep* FCF_{t-2}. The coefficient on the variable VW Nonrep FCF_{t-2} is positive but not significant. This reduces concern of initiations being driven just by available free cash flow at the disposal of non-repurchasers. In specification (3), I control for the tax effects by introducing the variable Tax_{t-2}. The repurchase premium proxy holds significance even after controlling for tax effects. In specification (4), I introduce the market level proxy $SP500_{t-2}$ as the additional control variable and the co-efficient on the repurchase premium proxy is still positive and significant. I introduce the Stock $Premium_{t-2}$ variable in specification (5). The coefficient on this variable is positive and significant suggesting higher rates of initiation when lagged value of the stock premium is positive. This is in line with other evidence that repurchasing activity tends to be pro-cyclical with stock market (Hertzel and Jain (1991)). In specification (6), I introduce the controls for the law changes (variables for tax law changes, namely After86, After01 and

After03, and the variable After82 which captures SEC rule adoption) and the year trend variable $Year_{t-2}$.

These results together suggest that the lagged value of the value weighted repurchase premium are positive and significant in explaining the initiation rate of repurchases, after controlling for alternate investment opportunities, tax effects and market conditions, including the level of the market and excess market returns. The results are also hold after controlling for SEC adoption of Rule 10b-18 in 1982, and year trends. This shows robust support for the catering hypothesis, after controlling for a host of alternative explanations.

In specifications (7) through (12), the regressions are repeated with the VW NonrepM/B_{t-2} variable replaced by $Rep/Price_{t-2}$, which is the ratio of repurchase to price (total dollar amount spent on repurchases divided by market price of equity) in year t-2. The results are similar to the first set of regressions. This set of regression results strongly supports the catering hypothesis. Results also indicate that catering does not depend on the dollar amount of repurchases. This is in line with the prediction of the catering hypothesis that more firms would initiate repurchases when the repurchase premium is high but the size of the repurchases may not be directly related to the rate of initiation of repurchases.

Panel B in Table 1.7 shows regression results using Continue as the dependent variable. The coefficient on the Rep/$Price_{t-2}$ variable is negative in the first few regression specifications but it is never significant. Results in panel B also strongly support the catering hypothesis, when tested on rates of continuation of repurchases. More firms continue repurchases when the repurchase premium is high, after controlling for a host of alternate explanations. The dollar amount spent on repurchases does not matter in the aggregate rate of continuation of repurchases.

In results not shown here, I run the same tests, using the one year and the two year rate of growth in sales of firms as alternate proxies of investment opportunities, and get identical results. The two year lagged VW repurchase premium proxy still comes out positive and significant in explaining the rates of initiation and continuation of repurchases.

Overall, results in panels A and B of Table 1.7 show that the two year lagged value-weighted repurchase premium is significant in explaining the rates of initiation and continuation of repurchases, after controlling for investment opportunities and free cash flow available to repurchasers and non-repurchasers, tax effects, absolute level of the market, stock premium, year trends, dummy for SEC rule change in 1982 and dummies for tax law changes in year 1986, 2001 and 2003. The dollar amount of repurchases does not significantly affect the rates of initiation or continuation of repurchases. These results strongly support the catering theory of repurchases.

In panel C of Table 1.7, I perform some robustness checks on the standardized announcement return proxy, AR. The relevant dependent variable for testing this proxy, as explained earlier, is the fraction of Compustat firms that announce a share repurchase program in a given year, irrespective of whether they buy back any shares. In specification (1), I introduce the Tax_{t-1} variable and find that the coefficient on the announcement return is positive and significant. The coefficient on this repurchase premium proxy is also significant after controlling for the $SP500_{t-1}$ variable (specification (2)). After the introduction of the Stock $Premium_{t-1}$ variable, year trends, tax law changes, this repurchase premium proxy variable is not significant at the conventional 10% level. It is worth noting that the size of the coefficient changes from 0.1175 to 0.1306 between specifications (1) and (4) but the significance reduces dramatically. This is reflective of the noise in this proxy.

A closer examination of Table 1.3 will reveal that the standardized announcement return, AR, is available only from 1981 onwards (because of data limitations on SDC). Even when available, the number of repurchase announcements in the first few years is very few (5 in 1981, 15 in 1982). As such, the data for the AR variable is noisy.

To further test for robustness of the standardized announcement returns proxy, I have tried to change my classification of a repurchasing firm based on the actual buying back of stock to the announcement of a repurchase program for the entire data. On making this change, I find that the results are not robust to the repurchase announcement classification (for any lags of the premium). This is evidence that classification post buyback is more robust, compared to classification of a firm as a repurchaser at the announcement of a buyback program. This may be due to the documented problems of delays in buying back shares, as discussed earlier. The repurchase premium calculated using actual buyback data is more reliable than the one solely based on announcement (without credible follow through).

Kahle (2002) suggests that managerial stock options explain repurchase activity. I construct proxies to control for options exercised and exercisable by top managers in the forthcoming year, using Execucomp data from 1992 to 2005, and introduce them in regressions with the other control variables reported on Table 1.7. I do not report these results, but the lagged repurchase premium still comes out positive.

In results not included here, I have run similar regressions using the "future stock returns" proxies for repurchase premium, $r^{B}_{t+1} - r^{NB}_{t+1}$ and $R^{B}_{t+1,\ t+3} - R^{NB}_{t+1,\ t+3}$. I find that the results are similar to the results of the VW repurchase premium proxy in sign but do not always have strong statistical significance. Evidence linking repurchases and future performance is mixed. Ikenberry, Lakonishok and Vermaelen (1995, 2000) document long run under-reaction

to open market repurchases. Massa, Rehman and Vermaelen (2007) suggest that only repurchasing firms in low concentration industries outperform the market and their non-repurchasing peers in statistically and economically significant way. In my sample, I also do not find consistent significant post repurchase abnormal returns in the portfolio of repurchasers (over non-repurchasers) on a value weighted basis. The weighted average excess return on a portfolio long on repurchasers and short on non-repurchasers, from the end of the year after repurchasing, is 0.45% (Table 1.4) and the average two year return from year t+1 to year t+3 is a -1.09%.

Overall, the value weighted repurchase premium proxy gives the most robust results. The results for the equally weighted repurchase premium proxy are also very strong. Results using standardized repurchase announcement return are strong but not robust to inclusion of all control variables. The future returns proxies give the same sign as expected by catering theory but lack strong statistical significance.

1.6 Discussion

The results shown here hint at some difficulty in explaining the repurchase premium using rational repurchase clienteles. The value weighted repurchase premium proxy is significant in explaining the rates of initiation and continuation of repurchases after controlling for alternate investment opportunities, free cash flow, market conditions, stock premium, tax law changes, tax effects and year trends. However, the dollar amount of repurchase is not significant in explaining the rate of initiation or continuation of repurchases, thereby hinting at failure of rational Black and Scholes (1974) type taxes or transaction cost imperfections to drive this. Graham and Kumar (2006) do suggest some degree of tax related trading clientele trading

activity that might affect prices. Diversified rational clients will, however, not care about the number of repurchasers (rather would care about the aggregate dollar amount of buyback).

In my tests, I have tried to control for time varying investment opportunities, free cash flow effects or other time trends. Together, these results seem to suggest that any of the traditional time varying explanations fall short. I have also controlled for relative tax advantage of repurchases to dividends. This shows the inability of tax related motivation in explaining the repurchase initiation. The lack of significance in the long term returns proxy also suggests that managers are not able to "time" the market for long term gains.

Baker and Wurgler (2004) find investor sentiment to be driving their dividend premium proxy. For the sake of completion, I investigate how investor sentiment varies with the repurchase premium. Baker and Wurgler (2006) propose a measure to "get a more tangible sense of intrinsically elusive concept of investor sentiment" and develop a more comprehensive measure, *SENTIMENT*, which is a "composite index of sentiment that is based on the common variation in six underlying proxies for sentiment: the closed end fund discount, NYSE share turnover, the number and average first day returns on IPOs, the equity share in new issues and the dividend premium". They also construct an alternate measure ($SENTIMENT^{\perp}$) that explicitly removes business cycle variation from each of the proxies. The correlation between lagged repurchase premium and *SENTIMENT* ($SENTIMENT^{\perp}$) is 0.38 (0.37) with a p-value of 0.03 (0.03). Figure 1.4 shows the plot of SENTIMENT and the two year lagged VW repurchase premium. This provides some support for sentiment based clientele effect for repurchasing stocks.

1.7 Relation between Dividend and Repurchase Premium

Grullon and Michaely (2002) and others report that U.S. firms are substituting dividends with share repurchases. After finding evidence supporting the relationship between lagged repurchase premium and rates of initiation and continuation of repurchases among the firms in my sample, the next obvious question is, how is the repurchase premium related to the Baker and Wurgler (2004) dividend premium? It is plausible to think that dividend premium captures repurchase catering too. In this section, I argue that the dividend premium does not entirely explain the share repurchase activity. I also investigate how the relative magnitudes of the repurchase and dividend premium affect firm level decision to repurchase stock or issue dividend.

1.7.1 Attractiveness of repurchases to dividend payers

The first intuition for the relation between the dividend and the repurchase premium is that the repurchase premium is expected to be negatively related to the dividend premium. Dividends and repurchases are competing ways of disbursing payout, so, attractiveness of one should make the other one less attractive. I find that the value-weighted repurchase premium and the dividend premium have a correlation coefficient of -0.361 (significant with a p-value of 0.046).

To investigate if the repurchase premium explains repurchasing activity for dividend payers, I construct a time series of firms that paid dividend in the year t-1 and year t. If a firm paid dividend in year t-1 as well as in year t, it is labeled as a CONTDIV firm for year t. These are the firms that continue to pay dividends. From within the CONTDIV firm for year t, if a firm also bought back stock in year t, then that firm is labeled as a CONTDIVREPURCHASER for

year t. The ratio, which I call $CHOOSEREP_t$, is the number of CONTDIVREPURCHASER firm in year t divided by the number of CONTDIV firms in year t. This ratio is used as a proxy for the relative attractiveness of repurchases over dividends (amongst the dividend payers) in the year t. All CONTDIVREPURCHASER firms chose to pay dividends in year t-1. In year t, in addition to paying dividends, these firms also chose to repurchase stock. The fact that a CONTDIVREPURCHASER firms paid dividends, in addition to buying back stock, in year t clearly shows a conscious choice to repurchase stock, even when the firm was paying dividends. These firms had the option to pay more dividends or to repurchase stock with the money they chose to spend on repurchases and they clearly chose repurchases over (additional) dividends.[8] I claim that this ratio, $CHOOSEREP_t$, captures the attractiveness of repurchases over dividends (amongst the dividend payers) in a particular year t. Intuitively, I expect this ratio to be positively related to the lagged repurchase premium. I also expect this ratio to be negatively related to the lagged Baker and Wurgler VW dividend premium.

Panel A in Table 1.8 shows the results of regressing the $CHOOSEREP_t$ variable on a set of control variables described earlier and the $VW\ Rep\ Premium_{t-2}$ variable. The results clearly show that the two year lagged VW repurchase premium is positively and significantly related to the CHOOSEREP variable. This relationship holds after controlling for tax effects, year trends, repurchase attractiveness after SEC rule change of 1982, tax law changes in 1986, 2001 and 2003, lagged value of the absolute level of the broad market index (the S&P 500 index) and stock premium. I also control for M/B (as a measure of investment opportunities available to dividend payers) and free cash flow of dividend payers. This result is especially important in the light of Fama and French (2001) observation that "repurchases are largely the province of

[8] I assume that the choice to repurchase stock for these firms comes after paying dividends because of the sticky nature of dividend payments.

dividend payers", implying that a lot of dividend payers do buyback stock. Results in panel A of Table 1.8 indicate the attractiveness of repurchase premium in explaining repurchase activity among dividend payers. A higher fraction of dividend payers buy back stock when the repurchase premium is high.

Specification (1) in panel B of Table 1.8 shows that the one year lagged Baker and Wurgler dividend premium[9] variable, $VW\ BW\ Div\ Premium_{t-1}$, is negatively and significantly related to the $CHOOSEREP_t$ variable. I have chosen a one year lag in this case because Baker and Wurgler find the one year lagged dividend premium to be significantly related to the dividend initiation and continuance rate. To keep similar time line, the other control variables e.g. tax effects, level of S&P 500 index, stock premium, year trends etc. are all lagged by one year in this regression panel (specifications (2) to (7)). The one year lagged value of the dividend premium loses significance when the market level ($SP500_{t-1}$) is introduced in the regression specification. The lagged repurchase premium (as shown in panel A of Table 1.8), however, is significant after controlling for all of the above mentioned effects.

Results in Table 1.8 seem to suggest that after controlling for the effects of taxes, tax law changes, alternate investment opportunities, year trends, absolute market level, stock premium and free cash flow, the repurchase premium is positive and significant in explaining the relative attractiveness of repurchases to dividend payers. However, this attractiveness is not captured robustly by the Baker and Wurgler dividend premium. The repurchase premium is negatively correlated to the dividend premium, but, the dividend premium does not entirely explain the attractiveness of repurchases to dividend payers.

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[9] Baker and Wurgler (2004) is the source of the dividend premium from year 1971 to year 2000. For 2001 – 2005, I construct the dividend premium following the methodology described in the paper. Of the proxies mentioned in the paper, I use the value weighted dividend premium as the proxy for dividend premium.

These results provide evidence indicating not only the importance of repurchase premium in explaining the overall repurchasing activity but also the importance of repurchase premium in explaining the relative choice of repurchase over dividends, for firms that could have chosen to pay more dividends but chose to buy back stock instead, based on the attractiveness of the repurchase premium. Managers choose to payback using stock repurchases, even when they were paying dividends, when the repurchase premium is favorable. This interaction is a significant contribution to literature that ties together the dividends and repurchases as competing decisions in firms' payout policy.

1.7.2 Firm level dividend/repurchase decision

To further examine the interaction of the repurchase and dividend premiums, I look at the firm level decision to repurchase stock or issue dividend. I test how the value weighted repurchase premium affects the payout choice, in the presence of firm level controls for size, debt, cash, operating performance, level and variability of cash flow, future growth opportunities, and recent returns on firm's stock price.

Div yield is the dividend to price ratio and *Rep yield* is the repurchase to price ratio. *Market Cap* is the market capitalization of the firm at the end of the calendar year. It is used as a control for firm size (Kahle (2002)). *Debt* is defined as long term debt scaled by book value of assets, *Cash* is defined as cash and cash equivalents (Compustat data item 1) scaled by book value of assets. *Return on assets* is the operating income scaled by book value of assets and is used here as a proxy of operating performance. *FCF* is the free cash flow of the firm scaled by book value of assets; *Std. dev. FCF* is the standard deviation of free cash flow calculated using last three years values of free cash flow. *M/B* is market-to-book ratio for the firm and *Return* is the yearly return on stock of the firm between year t-1 and year t. All the variables or their

components are as defined in earlier sections of this essay. All of these variables are known to affect payout policy decisions (e.g., see Kahle (2002), Grullon and Michaely (2002), Hovakimian, Opler and Titman (2001), Jagannathan, Stephens and Weisbach (2003)).

After controlling for firm level variables, and the dummies for industry (based on 2 digit Standard Industry Classification (SIC) code), I investigate the relative effect of the lagged repurchase premium, the lagged dividend premium and also the difference between the repurchase and the dividend premiums on firm's choice to issue dividends or buy back stock. The variable *Diff. Premium* is the VW Repurchase Premium less the VW Baker Wurgler Dividend Premium. The one year and two year lagged values of the Diff. Premium variable are also examined in the logit analysis. For this analysis, I first separate out firms that have either repurchased stock or paid dividends in any year within the broad Compustat sample, described earlier in the essay. After identifying these firms, I then take all available data for the chosen set of firms. So if a firm, say R, repurchased stock (or issued dividend) in year 1976, then all available data for the firm R from year 1971-2005 was used in this analysis. The rationale behind this choice is that the firms chosen in this manner have either repurchased stock or issued dividends at some time in the sample period. Having done so, they must have faced the choice between repurchasing and issuing dividends. As such, the dividend and the repurchase premiums, as per the hypothesis, may have played a role in their ultimate decision to issue dividends, repurchase stock or do neither.

Panel A of Table 1.9 shows result of logit analysis on the decision to repurchase stock. The dependent variable is a binary choice variable that takes a value of 1 if the firm repurchased stock in a given year and 0 otherwise. After controlling for the firm level financial data and industry dummies, I find that a firm is more likely to repurchase stock when the two year lagged

value of the repurchase premium is positive, less likely to repurchase stock when the one year lagged value of the dividend premium is positive, more likely to repurchase stock when the one and the two year lagged values of the Diff. Premium are positive. These results support the hypothesis that firms are more likely to repurchase stock when the lagged value of the repurchase premium is high. Firms are also more likely to repurchase stock when the value of the repurchase premium is greater than the value of the dividend premium. It is worth noting that the dividend and the repurchase premium are both measures of relative valuation (captured by M/B differences) and the difference between the two premiums captures the relative valuation difference between repurchasers and dividend payers in a given year. Results in this Table support the view that firms are more likely to repurchase stock when the repurchasers are valued more than the dividend payers.

Panel B of Table 1.9 shows results of similar logit analysis using the same sample, modeling the decision to issue dividend. Here the dependent variable takes a value of 1 if the firm issued dividend in a particular year and 0 otherwise. Using similar controls as in Panel A, I find that firms are more likely to issue dividends when the lagged dividend premium is high, less likely to issue dividends when the lagged repurchase premium is high, less likely to issue dividends when the lagged Diff. Premium is high. This is again consistent with the hypothesis that a lower repurchase premium increases the likelihood of a dividend payout.

Taken together, results in Table 1.9 show that the decision to issue dividends or to repurchase stock is related to the repurchase premium, the dividend premium and also on the relative magnitude of the two premiums. Firms are more likely to repurchase stock when the difference between the repurchase premium and the dividend premium is positive. Firms are more likely to issue dividends when the difference between repurchase premium and dividend

premium is negative. This interaction between the repurchase and the dividend premium is a significant contribution of this paper. My results show that the Baker and Wurgler dividend premium should be considered relative to the repurchase premium when modeling repurchase and dividend decisions. These results also provide support to the extant evidence on dividend substitution (Grullon and Michaely (2002)) reported in literature. This might also hint at competing clienteles for repurchases and dividends driving the observed substitution of dividends with repurchases.

1.7.3 Mimicking

Massa, Rehman and Vermaelen (2007) present a mimicking aspect to repurchases. They argue that by repurchasing stock, firms send a positive signal about themselves and a negative one about their competitors. By buying back shares, firms set the expectation that their competitors will follow suit. This induces competitors in the same industry to repurchase stock, simply to correct the negative market perception. Mass el. al. create a variable, *Wave*, which is the number of firms buying back shares in the same industry (as defined by 3 digit SIC code), excluding the firm in question, in the prior year. They also calculate Herfindahl index of industries (defined by sum of the square of the share of sales of all firms in a given 3 digit SIC code) and classify firms into concentrated and unconcentrated industries (cutoff being decided by 20^{th} percentile of the Herfindahl index in a given year) and represent it with a dummy, *Conc*, that takes a value 1 if the industry is concentrated and 0 if the industry is not concentrated. Interaction between Wave and Conc then captures the interaction of the repurchases of competitors and the industry concentration. Massa et. al. find that firms that operate in concentrated industry do mimicking repurchases.

In my view, the distinction between catering and mimicking is subtle. Mimicking is a strategic interaction where managers decide with an eye to competitors' actions whereas catering posits that managers decide based on the valuation that the market assigns to repurchasing firm, which is not necessarily a competitor. As such, catering encompasses mimicking when stock market assigns a higher valuation to firms that are buying back stock. Predictions from catering and mimicking theories differ when the market does not assign a higher valuation to the repurchasing firms. In such a situation, mimicking suggests that the average firm will disregard market reaction and buy back stock to correct the negative impact from its competitor's buyback decision. However, catering suggests that the average firm will not buy back stock because the repurchase premium is low. In my view, mimicking and catering are not always mutually exclusive. In many cases, mimicking may be one of the channels through which catering manifests itself. However, considering the similarity at some level, it is meaningful to see if the catering hypothesis holds after controlling for mimicking behavior.[10]

Results in Table 1.10 show results of additional logit tests (on the decision to repurchase stock) after controlling for mimicking. In specification (1), I attempt to recreate the main result in Massa et. al. Positive and significant coefficient on the interaction term between the Wave and the Conc variables is similar to Massa et. al. and shows support for their "mimicking hypothesis." On introducing Diff. Premium_{t-1}, Diff. Premium_{t-2} in specifications (2) and (3) respectively, the repurchase premium proxy is positive and significant. This shows that firms are more likely to repurchase stock when the difference between repurchase premium and dividend premium is positive, even after controlling for mimicking behavior. In specification (4) and (5), I interact the Wave variable and the Conc variable with Diff. Premium_{t-1} and Diff. $\text{Premium}_{t-2,}$

[10] I thank Malcolm Baker for this suggestion.

respectively. The positive and significant coefficient on the interaction term suggests that firms are more likely to buy back stock when they operate in concentrated industry and their competitors have done buybacks and the repurchase premium has been high. Overall, the results in this Table show that the catering hypothesis is supported even after controlling for mimicking behavior of firms. Firms are more likely to mimic when the difference between repurchase premium and dividend premium is positive.

1.8 Conclusion

I propose a catering theory of share repurchases. The main idea in this theory is that managers do what investors value. When investors put a relatively high valuation on shares of firms that repurchase stock, managers rationally cater to investor demand by initiating and continuing their own share buybacks.

I propose some measures of "Repurchase Premium"- the most common one being the difference between the logarithms of market-to-book ratio of firms that repurchase their stock and firms that do not. Using a time series of repurchases done by firms from 1971-2005, I calculate the rates of initiation and continuation for repurchases. I find that the repurchase premium is significant in explaining the rates of initiation and continuation of repurchases among the sample firms, after controlling for tax effects, market level, year trends, alternate investment opportunities, free cash flow, SEC adoption of Rule 10b-18 in 1982 and major tax law changes in 1986, 2001 and 2003.

I also find that the repurchase premium is negatively correlated with the Baker and Wurgler (2004) dividend premium, underlining the substitute nature of dividends and

repurchases. I calculate a proxy of relative attractiveness of repurchases among dividend payers and find that the lagged repurchase premium positively affects the fraction of repurchasers among dividend payers. Baker and Wurgler dividend premium cannot capture this relative attractiveness robustly.

The rate of initiation and continuation of repurchases does not depend on the dollar amount spent on repurchases. This poses a problem in using traditional clientele theories in explaining the observed catering effect. Investor sentiment seems to be one of the factors related to the repurchase premium.

I find that individual firms are more likely to repurchase stock when the two year lagged value weighted repurchase premium is high, when the one year lagged dividend premium is low, and also when the difference between the repurchase premium and the dividend premium is high. Firms are more likely to issue dividends when the lagged dividend premium is high, lagged repurchase premium is low, and also when the difference between the repurchase premium and the dividend premium is low. Taken together, these results show that the decision to repurchase stock or to issue dividends is also driven by the relative magnitude of the dividend and the repurchase premium. Even after controlling for mimicking (Massa, Rehman and Vermaelen (2007)), firms are more likely to repurchase stock when the repurchase premium is higher than the dividend premium.

2.0 Chapter Two: Accelerated Share Repurchases

2.1 Introduction

A fundamental area of research in financial economics is the study of firms' payout policies. The level, frequency, and form of payouts have individually and collectively been the subject of considerable investigation.[11] This paper examines a relatively recent and important innovation in the share repurchase form of payouts, namely, accelerated share repurchases (ASRs). Specifically, we analyze the determinants of the choice to include an ASR as part of a repurchase program as well as the choice of the fraction of the shares in a program to be obtained via an ASR. We also document the stock price reactions to announcements of ASRs.

In an accelerated share repurchase, a firm enters into a contract with an intermediary, typically an investment bank, whereby the intermediary immediately delivers a specified number of the firm's shares in exchange for cash based on an agreed upon price per share (ordinarily the most recent closing price). The intermediary obtains the shares that it delivers to the repurchasing firm by borrowing them, typically from institutions. The intermediary then covers its short position by purchasing shares in the market over a specified time period, normally several months. The ASR contract also includes a provision whereby the repurchasing firm is required to compensate or is entitled to receive compensation from the intermediary in shares or cash. The amount of compensation is based on part or all of the difference between the initial price per share paid to the intermediary and the estimated price per

[11] For a review of the payout literature, see Allen and Michaely (2003).

share the firm would have paid for the shares in an open market repurchase (OMR) conducted during the same period over which the intermediary buys the shares to cover its short position. The settlement terms are also structured to compensate the repurchasing firm for the opportunity cost of full prepayment for the initial shares when the intermediary actually acquires these shares (closes its short position) over a period of several months. Note that, absent any contractual caps or floors on the settlement amount, the repurchasing firm bears all of the risk of changes in its stock price between ASR initiation and settlement. Thus, the intermediary essentially acts as the firm's proxy in borrowing the firm's shares and the proceeds the intermediary receives at initiation are a source of financing for the intermediary. In sum, ASRs are repurchases with an associated forward contract that can be settled in cash or shares of the firm.[12] Figure 2.1 illustrates the structure and timeline of an ASR and the Appendix A includes a description of the common provisions observed in ASR contracts.

For a sample of repurchase programs announced between 1996 and 2008, we collect data on whether or not the programs included an ASR as well as details of the ASR transactions. The magnitude and frequency of ASRs have increased dramatically in recent years. Over the period 2004 to 2008, $131 billion of stock was repurchased via ASRs, and, in 2007, ASR announcements (97) represented about 26% of the total number of program announcements (376) as illustrated in Figure 2.2. Further, over the period 2004 to 2008, the frequency and dollar volume of ASRs have generally exceeded that of privately negotiated repurchases, fixed-price self-tender offers, Dutch-auction self-tender offers, and large special dividends as illustrated in

[12] The Financial Accounting Standards Board's Emerging Issues Task Force (EITF) has, by consensus, agreed that an entity should account for an accelerated share repurchase as two separate transactions: (a) as shares of common stock acquired in a treasury transaction recorded on the acquisition date and (b) a forward contract indexed to its own common stock. See EITF Issue No. 99-7 "Accounting for an Accelerated Share Repurchase Program." Also, see Dickinson, Kimmel, and Warfield (2008) for the accounting consequences of ASRs.

Figures 2.3 and 2.4. Lastly, we note that in recent years the "boilerplate" language used by firms to announce repurchase program authorizations has evolved to generally include ASRs as potential mechanisms by which share repurchases will be implemented.[13] In short, ASRs have become part of the repurchase vernacular and an important element of repurchase program activity.

We analyze the stage of payout policy formulation where a firm has concluded that a share repurchase is the optimal mechanism for distributing cash to shareholders and it now must decide how best to execute the repurchase. Given the vast majority of repurchase programs in recent years have been executed predominantly via OMRs (as opposed to self-tender offers or privately negotiated repurchases) where firms announce authorizations to repurchase shares periodically at market prices, we initially consider the decision to undertake ASRs relative to the alternative of repurchase programs comprised of OMRs. In a subsequent section of the paper, we consider the decision to undertake an ASR relative to executing repurchase programs, in part, via self-tender offers or privately negotiated transactions.

In contrast to conducting an OMR-only repurchase program, including an ASR in a program commits the firm to actually repurchase shares and the firm receives these shares immediately. Consequently, the larger the ASR portion of a repurchase program, the less flexibility the firm retains to significantly alter the program in response to subsequent changes in the price and liquidity of its stock, unexpected shocks to cash flow and/or investment, etc. In other words, the choice to undertake an ASR in a repurchase program represents a substantial

[13] For example, H.B. Fuller Co. announced in 1996 that, "Terms of the program allow the company to make such purchases from time to time at prevailing prices in the open market, by block purchase or in private transactions." H.B. Fuller Co. announced in 2007 that, "Under the program, the Company, at management's discretion, may repurchase shares for cash on the open market from time to time, in privately negotiated transactions or block transactions, or through an accelerated repurchase agreement."

partial exercise of the "flexibility option" inherent in a repurchase program that would otherwise be comprised entirely of an OMR. Therefore, factors affecting the costs of early exercise of the flexibility option inherent in an OMR should be important determinants of a firm's choice to include an ASR in a repurchase program, a possibility we refer to as the *flexibility hypothesis*.

In an ASR, the repurchasing firm is credibly committed by contract to repurchase a significant number of shares immediately from the intermediary. In contrast, Stephens and Weisbach (1998) document that, three years after an OMR announcement, a substantial number of firms have repurchased no shares, about ten percent of firms repurchased less than five percent of the shares authorized, and just more than half of firms bought back the total number of shares authorized.[14] Further, although the OMR portion of a repurchase program is often constrained by "safe harbor" rules limiting repurchase implementation, an ASR is not bound by these constraints.[15] Thus, the ASR portion of a repurchase program permits the firm to more credibly and quickly accomplish certain goals, e.g., signaling information to shareholders, adjusting capital structure, defending against an unwanted takeover attempt, avoiding dilution from the exercise of employee stock options, or managing reported earnings per share through changes in shares outstanding. To the extent that certain objectives of a repurchase would be better met with enhanced credibility and rapid completion of the repurchase, the particular

[14] The standard language used to announce OMR programs justifies any actual repurchase outcome from zero to 100% of the total authorization, e.g., IRIS International's 2008 announcement notes that, "The timing and actual number of shares repurchased will depend on a variety of factors including the common share price, corporate and regulatory requirements and other market and economic conditions. The share repurchase program may be suspended or discontinued at any time."

[15] For an open market repurchase to qualify for "safe harbor" protection a firm must satisfy the four criteria detailed in the U.S. Securities and Exchange Commission's (SEC) rule 10b-18 anti-manipulation guidelines. These four criteria are: (1) on any one day, firms may not purchase more than 25% of the average daily trading volume of their own shares during the prior four weeks, block trades and privately negotiated transactions are exempt from this guideline; (2) firms may not purchase their own shares in the opening and closing one-half hours of trading; (3) firms may not purchase their own shares at a price higher than the last independent bid, or the last reported sale price; and (4) all purchases on a single day must be executed through the same brokerage firm. This rule was adopted in November, 1982. An ASR does not qualify for "safe harbor."

objectives for a program should also influence a firm's decision to include an ASR in the program as well as the fraction of the repurchase to complete via an ASR, a possibility that we refer to as the *credibility and immediacy hypothesis*.

We find that the choice to undertake an ASR as well as the fraction of a repurchase program to conduct via an ASR are significantly negatively (positively) associated with the variability of the firm's share price and the stock market *illiquidity* of the firm's shares (the size of the repurchase authorization). These findings are strongly consistent with the predictions of the flexibility hypothesis.

We find that the recent stock price performance of firms conducting ASRs is significantly better than firms not conducting ASRs, which is somewhat inconsistent with ASR being used by firms facing greater undervaluation. However, further investigation of the undervaluation motive for ASRs using a variety of proxies for misvaluation generates some evidence suggesting that firms facing greater undervaluation are more likely to conduct ASRs. We find that firms tend to include ASRs and complete a greater fraction of repurchase programs via ASRs when the firms have fewer growth opportunities. We also find that firms tend to include ASRs and complete a greater fraction of repurchase programs via ASRs when the firms have recently completed asset sales or been the targets of unsolicited takeover attempts. However, we find no indication that ASRs are undertaken to manage reported earnings per share (EPS) via altering average shares outstanding. Taken together, these results are consistent with the predictions of the credibility and immediacy hypothesis.

The time series of ASR activity is also shown to vary with changes in the firm characteristics that our analysis indicates are important in firms' decisions to include ASRs in their repurchase programs. For instance, the standard deviation of returns and illiquidity

increased during the recent upheaval in financial markets. Given these changes, our model predicts a sharp drop in the number of ASRs in 2008, an outcome which we observe in the data, and our model has significant out-of-sample predictive power. We also find that relative to alternative repurchase methods and large special dividends, ASRs appear to serve a unique role and, thus, represent an important innovation in the payout methods available to managers.

We also examine abnormal stock returns around ASR announcements. We find that ASRs announced simultaneously with repurchase programs are associated with positive and significant abnormal returns. Further, we find that ASRs announced subsequent to repurchase programs are also associated with positive and significant abnormal returns consistent with shareholders viewing these transactions as incrementally wealth increasing relative to repurchase programs comprised entirely of OMRs. Cross-sectional determinants of ASR abnormal returns are also investigated. We find that the abnormal returns at ASR announcement are positively associated with the fraction of shares that are repurchased via ASR, negatively associated with recent prior stock performance, and, consistent with ASRs reducing the likelihood of a successful acquisition, negatively associated with the firm having been the recent target of a takeover attempt. We also find that the likelihood that a firm announces an ASR subsequent to announcing a repurchase program is decreasing in the program announcement abnormal return perhaps consistent with firms choosing to undertake an ASR to enhance the credibility of the signal inherent in the program announcement when that signal was weakly received by the market. Finally, we find that the announcement returns to programs that include ASRs are not significantly different from programs that do not include ASRs.

Our findings contribute generally to the literature on share repurchases and specifically to the nascent literature on accelerated share repurchases. The earliest paper to make

note of ASRs was Cook and Kim (2006). In an unpublished working paper, Cook and Kim mention that accelerated share repurchase programs are only one method of buying back shares using derivative contracts. They document that firms engaging in repurchases using derivative contracts are generally larger (in total assets) than OMR firms. Unlike the present study, Cook and Kim do not investigate the relative importance of the flexibility inherent in OMRs or the immediacy of ASRs in determining firms' choices to undertake ASRs as part of their repurchase programs.

Marquardt, Tan, and Young (2009) investigate the use of ASRs to manage earnings in a sample of 70 ASRs. Specifically, Marquardt et al. hypothesize that managers will have an incentive to undertake ASRs when their compensation depends in part on reported EPS and they have short horizons. Marquardt et al. document that 57.5% of firms that conduct ASRs disclose that managers' annual bonuses explicitly depend on EPS versus only 30.0% of firms that undertake only OMRs. They also document that the frequency of voluntary chief executive officer turnover in the year after a repurchase is 23.8% for ASRs versus 7.6% for OMRs. Again, the Marquart et al. paper does not investigate the relative importance of the flexibility inherent in OMRs or the immediacy of ASRs in determining firms' choices to undertake ASRs as part of a repurchase program. While the present paper's univariate comparisons reveal a similar pattern in bonus structure and turnover for a much larger sample of ASRs, these variables are not significant in the presence of proxies for the value of flexibility. Thus, we conclude that earnings management is not a primary determinant of ASR choice.

In a contemporaneous working paper, Chemmanur, Cheng, and Zhang (2010) investigate many of the same potential explanations for ASRs as the present paper. However, despite the similarities in the papers' aims, the conclusions reached by the papers in terms of

which factors are associated with the decision to include an ASR as part of a repurchase program are very different. While Chemmanur et al. note prominently in their hypothesis development that an ASR does not permit a repurchasing firm the flexibility to change or discontinue a share repurchase as in an OMR, they do not include in their analysis several variables that proxy for the relative value of this flexibility across firms. In contrast, the present paper finds these variables to be the most important determinants of the choice to include an ASR in a program and the fraction of a repurchase program to complete via an ASR. Further, our treatment of ASRs as part of repurchase programs is distinct from that of Chemmanur et al. who classify firms as strictly conducting OMRs versus ASRs. As described below, the strict classification of firms as ASR versus OMR is not consistent with certain features of the data that reveal how ASRs are used by firms and leads to important differences in sample construction. Thus, the difference in results and conclusions across the two papers are largely attributable to several important variables omitted by Chemmanur et al. as well as fundamental differences in sample construction.

Michel, Oded, and Shaked (2010) report a positive average announcement period abnormal return and negative post-announcement drift in the stock market performance of ASR firms. Michel et al. interpret this pattern of returns as indicating that the information content of ASRs is negative but the market does not recognize the full extent of the "negative news" in an ASR at announcement. Also, Akyol, Kim, and Shekhar (2009) investigate the efficacy of ASRs as takeover defenses. They find that firms choosing to conduct ASRs are significantly more likely to have been the subject of takeover rumors prior to the ASRs; however, they also find that, after conducting ASRs, these firms are still more likely to receive bids, a result the authors interpret as an indication that ASRs are not effective takeover deterrents.

This chapter proceeds as follows. In Section 2.2, we develop the hypotheses to be tested. We describe our sample construction in Section 2.3. We report results in Section 2.4 and offer a concluding discussion in Section 2.5.

2.2 Hypothesis development

When a board of directors authorizes managers to distribute cash via a share repurchase, a portfolio of options is created where the various methods with which the repurchase may be executed determine the properties of the options embedded in the authorized program, e.g., see Ikenberry and Vermaelen (1996) and Oded (2005).

In the case of an OMR-only program, managers announce that they have received approval to repurchase (either a dollar amount or a specified number of) shares periodically at market prices over a relatively open-ended time frame. Note that this repurchase method preserves maximum flexibility in terms of if and when shares will be repurchased as well as the price at which shares will be repurchased. As Stephens and Weisbach (1998) points out, "An open-market repurchase program allows managers the flexibility to purchase less stock than planned if the stock becomes more expensive or more stock if it remains less expensive… such adjustments would not be possible if the manager were required either to precommit to a specific quantity, or dollar value, of share repurchases or to precommit to the timing of these repurchases."

Including an ASR in a program credibly commits the firm to repurchase a certain number of shares immediately and forgo the flexibility to adjust the size and timing of the

repurchases (at least for the portion of the program that is executed via ASR) based on subsequent changes in the market for its shares or its cash flow/investment needs. As evidenced by the cross-sectional variation in both the amount and timing of actual repurchases in OMR programs, e.g., see Stephens and Weisbach (1998) and Cook, Krigman, and Leach (2003), firms clearly utilize this flexibility. Consequently, factors that determine the value of the flexibility option inherent in an OMR-only program should be directly related to the costs of conducting an ASR and, all else equal, these factors should be important determinants of a firm's choice to conduct an ASR as well as the fraction of the repurchase to effect via an ASR, a possibility we refer to as the *flexibility hypothesis*.

The cost of an ASR resulting from the early exercise of the flexibility option will clearly vary across firms. For instance, because the value of the flexibility option inherent in an OMR is increasing in the volatility of the firm's stock price, greater uncertainty in a firm's stock price increases the cost of exercising the option to subsequently adjust the repurchase amounts and timing. Thus, the flexibility hypothesis predicts that firms with greater stock market volatility will be less likely to choose to conduct an ASR.

Barclay and Smith (1988) posit that the stock market liquidity of a firm's shares should be an important determinant of a manager's choice of payout form, i.e., dividend versus repurchase. Brav, Graham, Harvey, and Michaely (2005) report that, in surveys and interviews, more than half of corporate executives "feel that the liquidity of their stock is an important or very important factor affecting their repurchase decisions." Similarly, Brockman, Howe, and Mortal (2008) find that firms initiating repurchases have significantly greater stock market liquidity than firms not initiating repurchases and repurchase size is increasing in the liquidity of the repurchasing firms' shares. While the results from these papers apply to the general decision

to repurchase, these findings also suggest that the cost of credibly committing to quickly repurchase shares via an ASR will be less for firms with higher stock market liquidity. Purchasing large numbers of shares quickly has a greater impact on the price of less liquid shares, incrementally increasing the average price paid for the less liquid shares. Thus, the flexibility hypothesis predicts that firms with less liquid stock will be less likely to conduct an ASR.

Guay and Harford (2000) and Jagannathan, Stephens, and Weisbach (2000) also examine the determinants of payout method choice and find that greater variability of operating income is associated with a higher probability of observing a repurchase versus a dividend. A firm with less predictable cash flows or investment opportunities stands to benefit more from the ability to adjust its payout policy in response to unanticipated changes in cash flows or investment needs. Thus, under the flexibility hypothesis, greater variability of cash flow and/or greater imbalance between cash flow and investment needs are expected to be associated with a reduced probability of including an ASR in a repurchase program and, when included, less reliance on the ASR as a fraction of the total program authorization.

To the extent that a larger program authorization reflects an ex-ante intention to actually repurchase a substantial number of shares, all else equal, the marginal cost of the lost flexibility associated with an ASR will be lower for larger authorizations as the decision to repurchase these shares is less sensitive to changes in firm characteristics or the market for its shares. Thus, under the flexibility hypothesis, we would expect larger programs to be more likely to include an ASR.[16]

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[16] There are other reasons that we might expect larger programs to be more likely to include ASRs. For instance, an OMR-only program requires managers to devote time and attention to deciding whether or not to

In summary, the flexibility hypothesis predicts that, all else equal, the costs of an ASR are greater for firms with greater stock price uncertainty, less stock market liquidity of its shares, less predictable cash flows, greater imbalance between cash flow and investment needs, and smaller program authorizations.

It could be argued that an OMR-only program where shares are repurchased as rapidly as possible and in which these repurchases are easily verifiable by outsiders would eventually lead to approximately the same outcome as an ASR-only program. Nonetheless, immediacy of impact and credibility of commitment clearly distinguish the ASR portion of a repurchase program from the OMR portion and cannot be completely replicated via OMR. An ASR credibly commits the firm by contract to repurchase a certain number of shares from the intermediary. Thus, outsiders need not expend resources verifying that the repurchase has taken place as the intermediary ensures that the repurchasing firm meets its obligations under the ASR contract.[17] Additionally, the firm receives the shares immediately in an ASR and, hence, the effects of an ASR on the firm's capital structure, ownership structure, and financial position are immediate. Just as the costs of an ASR (in terms of the foregone flexibility option inherent in an

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repurchase each day and at which price to repurchase. Thus, another potential benefit of ASRs is that they free management from some of the demands on their time associated with administering OMRs. Additionally, replicating the credibility and immediacy of an ASR is more difficult as the size of the repurchase program increases. Therefore, larger programs require more time to complete, thus delaying both the direct effects of the repurchase and the verification of the extent of the firm's intention to repurchase shares. Lastly, any fixed costs associated with ASRs could also explain an increased likelihood of including an ASR in larger programs.

[17] Verifying repurchases of shares has become easier in recent years as the SEC has required since December, 2003 that all U.S. listed firms to report monthly volume and price data on their repurchase activity in their quarterly filings (see Purchases of Certain Equity Securities by Issuers and Others, Exchange Act Release No. 33-8335 at http://www.sec.gov/rules/final/33-8335.htm). However, given the need to access quarterly filings for this information, OMR repurchases can still only be verified with significant time lags.

OMR) are expected to vary across firms, the benefits of enhanced credibility and immediacy of including an ASR are also expected to vary with the underlying objectives for a repurchase and firm characteristics, a possibility that we refer to as the *credibility and immediacy hypothesis*.

Many studies investigate the signaling motivation for repurchases, i.e., the notion that repurchases can be used to signal better future prospects or a willingness on the part of managers to distribute free cash flow to shareholders rather than overinvest. Regardless of the particular information being signaled, an ASR or a rapidly completed and verifiable OMR could serve to convey this information, albeit with a delay in credibility for the OMR. Including an ASR strengthens the credibility of the signal as shareholders do not have to wait to determine and verify the share purchases as they must with an OMR. The value of a stronger signal varies across firms. Presumably, a firm facing declining investment opportunities and generating large free cash flows or receiving a large non-recurring free cash flow would benefit more from a stronger signal of its commitment to return cash to shareholders, e.g., see Jensen (1986) and Grullon and Michaely (2004). Similarly, firms that face greater undervaluation might view including an ASR in a program as strengthening this signal as well.

An ASR is also expected to increase the effectiveness of a repurchase program as a takeover defense. Bagwell (1991) demonstrates that a Dutch-auction repurchase decreases the likelihood of a takeover if the supply curve for shares is positively sloped, e.g., see Brown and Ryngaert (1991). Also, Billet and Xue (2007) find empirical support for the role of repurchases as takeover defenses in a sample of OMRs. In this context, the inclusion of an ASR in a repurchase program increases the effectiveness of a program as a takeover defense because the ASR ensures the necessary number of shares is repurchased immediately. Therefore, an ASR is more likely in a repurchase program implemented to defend against a takeover, particularly when

the takeover threat is imminent, e.g., see Akyol, Kim, and Shekhar (2009).

Firms can use a repurchase to adjust capital structure. Hovakimian, Opler, and Titman (2001) find that repurchases tend to move firms toward their "target" capital structures. If the benefit of a capital structure adjustment increases as the distance from the target level increases, then, to the degree that adjusting the capital structure motivates a repurchase program, an ASR could be more likely in firms that are further from their target capital structure because the effects of an ASR are more immediate. Therefore, in a repurchase program motivated by capital structure adjustment, the likelihood of an ASR increases as the firm's distance from its target capital structure increases.

Managers can use share repurchases to manipulate reported quarterly accounting information.[18] In particular, managers whose bonuses are explicitly tied to EPS might have an incentive to undertake repurchases to increase the probability of receiving a bonus and the size of the bonus, e.g., Cheng, Harford, and Zhang (2009). With an ASR, the number of shares outstanding adjusts as soon as the shares are delivered to the firm by the intermediary, which occurs immediately after the ASR agreement is in place. With an OMR, the adjustment does not occur until the firm buys the shares in the market. As a result, an ASR has a larger impact on the average number of shares outstanding used in the calculation of the accounting ratios in the period in which it is undertaken. Thus, the decision to include an ASR in a repurchase program could be, in part, motivated by a desire on the part of managers to quickly manipulate earnings for the current period.

In summary, the credibility and immediacy hypothesis predicts that the benefits of enhanced credibility and immediacy of ASRs are larger for firms where the repurchases are

[18] See for example Hribar, Jenkins, and Johnson (2006), Bens, Nagar, Skinner, and Wong (2003), Brav, Graham, Harvey, and Michaely (2005).

motivated by a desire on the part of managers to: signal their willingness to return cash to shareholders in an expedited manner, signal undervaluation, defend against unwanted takeover attempts, significantly alter capital structure, or manage reported earnings per share.

2.3 Sample formation and descriptive statistics

2.3.1 ASR sample

We search the U.S. Securities Exchange Commission (SEC) Edgar online database for any filing that mentions an accelerated share repurchase. The Edgar Full-Text searchable database includes a rolling window of the previous four years of SEC filings. Our initial search was conducted on October 2, 2007; hence, we obtained search results for all filings dated October 2, 2003 and later. We have continued to access the database quarterly to update the sample of ASRs to include those reported after October, 2007. Given the rolling time window limitation of the Full-Text database, we also search Factiva for any newswire or business publication story that mentions an ASR in the period January, 1996 through December, 2008.[19] For those firms identified in a news story as having announced an ASR, we corroborate the news reports by reviewing contemporaneous SEC filings of these firms. In sum, every ASR

[19] Keywords for the Edgar search were: accelerated share repurchase OR accelerated share buyback OR accelerated stock buyback or accelerated stock repurchase OR accelerated equity buyback OR accelerated equity repurchase OR overnight share repurchase OR overnight share buyback OR overnight stock buyback OR overnight stock repurchase OR overnight equity buyback OR overnight equity repurchase. The search terms for the Factiva search were: "(accelerated or overnight) and (share or equity or stock) and (repur* or buyback or buy-back or buy back)".

in our sample is definitively reported as such in an SEC filing.[20] Our search efforts identify a total of 256 distinct ASR transactions.

From the filings, announcement stories, and actual ASR agreements, we gather information, where available, about the ASR transactions, e.g., dates, dollar values, prices at which the agreements were negotiated, the mode of payment at settlements, the firms' stated motivations, the identities of the intermediaries, etc.[21]

Panel A of Table 2.1 details the number of ASR transactions announced in each year of the sample period. The earliest ASR in our sample was announced in 1997. The number of ASRs is very small for each year in the sample prior to 2004; however, the number of ASRs increases dramatically each year beginning in 2004 and reaches a high of 97 in 2007 before declining to 25 in 2008. Figure 3.2 plots the ratio of ASRs to total repurchase programs announced for each year of the sample period as an approximate indication of how important ASR activity has become among repurchase programs. While not reported in Table 2.1, we observe at least one ASR in 35 of the 48 Fama and French (1997) industry classifications with banking, insurance, utilities, retail, and business services the five most frequently represented industries.

Panel B of Table 2.1 reports the transaction characteristics of the ASRs in our sample. The mean (median) deal size is $530.55 ($250.00) million which represents, on average, 5.3% of

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[20] It is necessary to confirm ASR transactions in SEC filings since the news search results often include announcements by firms that they are "accelerating" their repurchases. For example, Microsoft's $19 billion repurchase in 2005, is not an ASR. Microsoft announced (as do a number of other firms over the sample period) that they were accelerating the pace of their repurchases, i.e., increasing the frequency of their open market repurchases to speed completion of an OMR-only program.

[21] When we cannot get an exact ASR announcement date from a newswire report, we use as the announcement date the first day the information appears to be available to the public, i.e., the filing date of 10-K or 10-Q in which the ASR was first disclosed. We use a filing date in 36 instances (of 256 total ASR announcements). For the 2004-2008 period, we use the filing date in 28 instances (of 243 total ASR announcements). Given potentially confounding information in filings, we assess the robustness of our abnormal returns results to the exclusion of these observations. The results are very similar to those reported.

the outstanding equity of the firms at the time of the announcements. For reference, Grullon and Michaely (2004) report that, for the period 1980 through 1997, the average repurchase program authorization represents 6.8% of outstanding equity. Considering an ASR is generally only a portion of a repurchase program and is completed over a very short time frame in comparison with the OMR portion of the program, ASRs are clearly significant buyback events for firms. On average, the shares repurchased via ASR comprise approximately 58.0% of the total program authorization.

For the 93 transactions for which we are able to obtain information on the price per share paid to the intermediary at the initiation of the ASR, we compute the percentage difference between the price paid to the intermediary under the ASR agreement and the closing price of the stock on the previous trading day. The mean (median) percentage difference between the ASR agreement price and the previous closing price is 0.13% (0.00%). The vast majority of ASRs do not involve the intermediary receiving any significant premium or accepting any discount for the shares they initially deliver to the repurchasing firm. We are able to obtain the details of the settlement period for 178 of the ASRs in our sample, and the average settlement period was approximately 140 calendar days. In the 103 (71) instances where the intermediary made (received) a payment to (from) the repurchasing firm at settlement, the payment averaged $54.2 ($33.5) million. Approximately 42% of the contracts were settled in cash with the remainder settled in shares of the repurchasing firm. Finally, we note that 23.8% of ASRs in our sample included a cap, floor, or collar provision associated with the settlement terms.

Panel C reports the stated motivations, if any, for our sample of ASRs. Approximately 31% of firms mention undervaluation as one of the motivations for the ASR transaction. The next most frequently stated motivation is the desire to alter capital structure. We are able to

identify the intermediary for 191 ASRs. Panel D reports the frequencies that various entities served as the intermediaries for the ASRs. In a few instances where there was more than one intermediary identified, we assign credit for the transaction equally across the intermediaries named. Goldman Sachs is the most commonly identified intermediary, with 52.33 deals. J.P. Morgan is the next most common intermediary with 21.33 deals. We document a total of 15 distinct investment banks serving as ASR intermediaries. The market for ASR intermediaries appears fairly competitive with a Herfindahl Index of 1,322 (1,374) based on the number (dollar value) of transactions.

2.3.2 Repurchase programs

Our sample of repurchase program announcements is obtained primarily from the Securities Data Corporation (SDC) database on Mergers and Acquisitions. Initially, we consider repurchase programs announced between January, 1996 and December, 2008. We match each of our ASRs with a repurchase program identified in SDC or via a search of Factiva.[22] While 62 of the ASRs are announced simultaneously with a repurchase program, the remaining ASRs are announced sometime after a repurchase program. Thus, we match each of these ASRs with the repurchase program that immediately preceded the ASR announcement. Note that our treatment of ASRs as part of repurchase programs is distinct from that of Chemmanur et al. (2010) and Marqaurdt et al. (2009) who classify firms as strictly conducting OMRs versus ASRs. We note that this approach forces Chemmanur et al. to drop observations where firms announce repurchase programs (OMRs in their parlance) on the same day or even in the same month as an

[22] A total of 151 of the 217 distinct program announcements associated with ASRs are from SDC. We identify the remaining program announcements via searches in Factiva.

ASR.[23] The strict classification of firms as ASR versus OMR is not consistent with certain features of the data that reveal how ASRs are used by firms. For instance, nearly 25% of our sample ASRs are announced simultaneously with OMRs and the overwhelming majority of ASRs are announced within one year of an OMR program announcement which indicates that ASRs and OMRs are not pure substitutes in repurchase programs.

The 256 ASRs in our sample can be linked to 217 distinct repurchase programs. Of these 217 distinct repurchase programs associated with ASRs, 205 (94.5%) are related to ASRs announced after 2003. For those firms that conduct multiple ASRs within a single repurchase program, we only include the first ASR in the program in the ASR election analysis below. The maximum number of ASRs by a firm in a particular repurchase program is three.

2.4 Results

2.4.1 Univariate comparisons

As reported in Table 2.1, nearly 95% of the ASRs in our sample were undertaken after 2003. Thus, we limit our sample period to 2004 through 2008 when analyzing ASR election choice. This ensures that we are comparing firm characteristics over a period when ASRs are common enough to not be considered extremely rare events. Table 2.2 reports characteristics of repurchasing firms based on their election to include an ASR in a repurchase

[23] There are several other important differences between Chemmanur et al.'s sample formation procedure and ours. First, Chemmanur et al. drop program authorization announcements where a firm includes the option to execute the program via non-OMR transactions, e.g., privately negotiated repurchases, tender offer repurchases, etc. Second, Chemmanur et al. conclude that, when an ASR from their hand-collected sample is also reported in SDC, SDC has erroneously classified an ASR as an OMR, so they drop these "OMRs" from their sample.

program or not. Stock price, volume of trade information, and financial statement data are obtained from the merged Center for Research in Security Prices (CRSP) and Compustat databases. Independent variables constructed using financial statement data for programs that do not include ASRs and for ASRs that are announced simultaneously with a program are measured at the fiscal year end immediately prior to the program announcement. Independent variables for ASRs that are not announced simultaneously with a program, i.e., subsequent ASRs, are measured at the fiscal year end immediately prior to the ASR announcement.

ASRs require an intermediary to borrow a significant number of the repurchasing firm's shares. Thus, for firms whose securities are subject to binding short sale constraints, including ASRs in their repurchase programs may not be feasible. As an indication of a firm's available supply of borrowable securities, we follow Diether and Werner (2008) and calculate the imputed interest rate that a short-seller would have to pay to a lender.[24] If the imputed loan fee in the calendar month prior to the repurchase announcement is greater than the 90th percentile for all stocks on the same exchange over all months in the period 2002 to 2008, then we code a dummy variable (Short-sale constrained), to equal one and zero otherwise. As reported in Table 2.2, no firm conducted an ASR when, in the month prior to the announcement, its imputed loan fee exceeded the 90th percentile of all firms on the same exchange over the same period. To ensure that we are comparing ASR election across firms for which an ASR is feasible, we restrict our analysis to those program announcements by firms that are not short sale constrained. This

[24] Imputed loan fees are calculated each month for all firms on NYSE and Amex as -0.009*the natural log of market equity-0.021*the natural log of book to market (as in Fama and French 1993) -0.308*the return in month t-1-0.177*the return over months t-12 to t-2-0.494*institutional ownership as a fraction of shares outstanding-0.049*natural log of stock price+0.219*natural log of turnover+3.357*standard deviation of daily returns over the prior twelve months-0.096*natural log of one plus the number of analysts+30.474*risk free rate+1.925. We calculate loan fees for Nasdaq firms using the same variables but with Nasdaq-specific coefficients.

restriction excludes 60 programs without ASRs from the analysis.[25]

As an indication of the uncertainty regarding the value of a firm's shares, we calculate the standard deviation of daily stock returns for the period starting 255 trading days prior to the repurchase announcement and ending 46 trading days prior to the repurchase announcement, where day 0 is the date on which the repurchase program is announced or the day the ASR is announced if the program included an ASR (and the ASR was not announced simultaneously with the program). While firms not including an ASR in their program have a mean (median) standard deviation of returns of 0.021 (0.019), firms including an ASR have a mean standard deviation of 0.015 (0.014). Thus, ASR firms have less volatile share prices than non-ASR firms and the difference in means (medians) is highly significant as indicated by a *t*-test (Wilcoxon rank sum test).

As an indication of the stock market liquidity of a firm's shares, we calculate the Amihud (2002) measure of illiquidity. Amihud defines illiquidity as the ratio of the daily absolute return to the dollar trading volume on that day. This ratio gives the absolute percentage price change per dollar of daily trading volume, or the daily price impact of the order flow. We average daily illiquidity for each firm over the period starting 255 trading days prior to the repurchase announcement and ending 46 trading days prior to the repurchase announcement. To minimize the influence of extreme values, we use the natural logarithm of illiquidity in our tests. As indicated in Table 2.2, firms not including ASRs in their repurchase programs have markets

[25]When we include the 60 programs for which the firms' shares were short-sale constrained, the results of specification (1) of Table 3 are very similar with two perhaps notable exceptions. The coefficient on the recent asset sale variable enters the regression with a p-value of 0.101 and the coefficient on Voluntary turnover enters with a p-value of 0.071. Further, when we vary the short-sale constrained cutoff from the 90th percentile to the 85th or 80th percentile, we obtain very similar results to those reported. We have also conducted the analysis on the subsets of repurchase programs where all firms were required to have a minimum of 10% institutional ownership or to not have been subject to failures to deliver relative to outstanding shares greater than the 90th percentile for all firms over the same period. In both cases the results are similar to those reported indicating that the reported results are robust to the choice of proxy for short sale constraints.

for their shares that are significantly less liquid (higher logarithm of illiquidity) than firms including ASRs in their programs.

As a measure of firm size, we calculate the natural logarithm of the book value of total assets (Compustat item 6). Firms conducting ASRs tend to be larger relative to those firms that do not conduct ASRs. As an indication of a firm's balance sheet liquidity position, we calculate the ratio of cash and short term securities (item 1) to total assets. As an indication of the firms' free cash flow available for payout to shareholders, we follow Acharya, Almeida, and Campello (2007) and measure free cash flow by subtracting the sum of depreciation (item 14), tax payments (item 16), interest expense (item 15) and dividends (sum of items 19 and 21) from gross operating income (item 13) and scaling the difference by total assets. Somewhat surprisingly, firms including ASRs in repurchase programs have significantly smaller holdings of cash and marketable securities relative to assets and slightly lower levels of free cash flow relative to assets.

We also calculate the standard deviation of free cash flow scaled by total assets for the five year period preceding the repurchase or ASR announcement. We require a minimum of three consecutive years of operating income to calculate standard deviation of free cash flow. Firms electing to undertake ASRs have significantly less volatile free cash flows. Note that firms including ASRs in their programs having less volatile cash flows may account for why these firms also hold less cash on their balance sheets since, all else equal, reduced uncertainty in cash flows would prompt firms to hold less cash as a precaution against unanticipated changes in cash flows, e.g., see Bates, Kahle, and Stulz (2009).

We also calculate the correlation between a firm's free cash flow and the median R&D expenditures of its industry (defined at 3-digit Standard Industrial Classification (SIC) level) for

the three years preceding the ASR or repurchase program announcement. A large positive correlation indicates that a firm generally has higher cash flows when the median R&D investment in its industry is high and so the firm's need for a hedging program to help better align its cash flows and investment needs is low, e.g., see Froot, Scharfstein, and Stein (1993). A large negative correlation would imply that the firm will not have free cash flow to invest when industry median investment is high and, as such, the firm's need for a hedging program to better align cash flow and investment needs is high. We follow Acharya et al. (2007) and create indicator variables to classify firms into groups based on the sign and magnitude of the correlation between cash flow and investment needs. As in Acharya et al., High-hedge takes a value one if a firm's correlation between cash flow and investment needs is less than -0.2 and zero otherwise and Low-hedge takes a value one if the firm's correlation coefficient is greater than 0.2 and zero otherwise. Firms conducting ASRs are significantly less frequently identified as high-hedge relative to those firms conducting repurchases comprised entirely of OMRs. This is consistent with firms avoiding ASRs when the correlation between their cash flows and investment needs are low. The frequencies that ASR versus non-ASR firms are identified as low-hedge firms do not significantly differ across the two groups.

To the extent that a larger program authorization reflects an ex-ante intention to actually repurchase a substantial number of shares, all else equal, the marginal cost of the lost flexibility associated with an ASR will be lower for larger authorizations as the decision to repurchase these shares is less sensitive to changes in firm characteristics or the market for its shares. We calculate the size of the announced program relative to the value of common equity outstanding and find that programs including ASRs have significantly larger authorization amounts than programs not including ASRs.

Repurchases may be used to signal that a firm will not overinvest in response to declining investment opportunities, e.g., Grullon and Michaely (2004). Alternatively, repurchases may be used to signal better future prospects, e.g., Vermaelen (1981). Regardless of the particular information intended to be conveyed through the repurchase, including an ASR strengthens the signal. As a proxy for potential undervaluation, we calculate a measure of prior stock performance, i.e., the abnormal return over the period beginning 43 days prior to the announcement and ending four days prior to the announcement, e.g., see Kahle (2002). Previous literature documents that firms generally experience significant negative performance prior to announcing OMR programs, a pattern that is evident in our sample of non-ASR programs as well. Interestingly, the average abnormal return prior to a firm announcing an ASR is indistinguishable from zero but significantly greater than for programs without ASRs perhaps consistent with ASRs being motivated by factors other than a desire to signal undervaluation.

As a proxy for a firm's growth opportunities, we calculate the natural log of the firm's market to book ratio as the natural log of the ratio of market value of assets to book value of assets where market value of assets is market value of equity (item 24*item 25) plus book value of assets (item 6) minus book equity (item 60) minus deferred taxes (item 74). The mean and median values of this variable are smaller for ASR firms but the differences are not statistically significant.

We follow Rhodes-Kropf, Robinson, and Viswanathan (2005) in decomposing the natural logarithm of market to book into three components. The first component, M/B firm, captures the difference between the observed price and a valuation measure that reflects current sector (Fama and French (1997) 48 industries) fundamentals. It is the difference between market value and fundamental value conditional on time and sector valuation effects and captures "purely firm-

specific deviations from fundamental value." The second component, M/B sector, captures the difference between valuation based on current sector fundamentals and valuation based on long-run sector fundamentals. The third component, M/B long-run, captures the difference between valuation based on long-run sector fundamentals and book value. M/B long-run is thus a proxy for long-run growth opportunities. We use the time period between 1996 and 2008 to calculate long run values for different sectors. While we observe no significant differences between ASR and non-ASR firms in terms of firm specific misvaluation relative to fundamental value or differences between valuations based on current versus long run sector multiples, we do observe that non-ASR firms have significantly larger median but not mean measures of long-run growth options.

As an indication that a firm's repurchase program might be motivated by a desire on the part of its managers to signal their willingness to return non-recurring cash inflows to shareholders, we search SDC to determine if the firm completed an asset sale in the six months prior to the announcement of the repurchase program or ASR. Approximately 24% of firms undertaking an ASR completed an asset sale in the prior six months compared with only 10% of firms not undertaking an ASR. Thus, it appears that the ASR decision is in part driven by a desire of managers to signal a willingness to return the proceeds of asset sales to shareholders in an expedited fashion. We also use SDC to determine if a firm was the target of a takeover attempt in the six months preceding the announcement of its repurchase program or ASR.[26] Consistent with an ASR being more likely when employed as part of a takeover defense, we find

[26] For those firms undertaking an ASR, we searched Factiva for any indication of "footsteps." Our footsteps variable takes a value of one if the ASR firm was the subject of takeover speculation, an outright bid, an interfirm acquisition attempt, or a proxy fight in the six months prior to the ASR announcement date. We found that approximately 13.4% of ASR firms were the subject of footsteps in the six months prior to announcing an ASR. The classification of takeover involvement using the data from SDC revealed fewer takeover attempts than the more thorough search of newswires. For consistency, we use the SDC-based takeover attempt variable since it is available for all firms announcing a repurchase program.

that firms conducting an ASR were significantly more likely to have been the target of a takeover attempt than firms not including an ASR in a repurchase program.

We examine capital structure differences across ASR election by calculating leverage as long term debt (item 9) plus debt in current liabilities (item 34) divided by total assets. ASR firms have higher debt ratios than non-ASR firms with the median difference across the two groups significant at the five percent level. As an indication of how a firm's actual leverage ratio compares with its "target" leverage ratio, we calculate the difference between predicted leverage as in Hovakimian, Opler and Titman (2001) and actual leverage.[27] ASR firms have actual leverage ratios that are closer to their predicted ratios than do non-ASR firms. Further, the difference between median actual and median predicted leverage is significantly smaller for ASR firms relative to non-ASR firms. To the extent that being further from their optimal capital structure might prompt a firm to view an ASR more favorably given the relative speed with which they can effect changes in capital structure, it is perhaps somewhat surprising that ASR firms are closer to their optimum debt levels than non-ASR firms.

As an indication of whether or not ASR activity might reflect an effort on the part of managers to manipulate reported earnings per share, we use data from proxy filings to construct several variables that measure the motives and power that CEOs might have to undertake an ASR to enhance a bonus. First, we include a dummy variable, EPS bonus, that indicates whether or not the annual bonus of a repurchasing firm's CEO depends explicitly on EPS. Second, as an indication of CEO entrenchment/power, we note whether or not the CEO was also the chairman of the board. Finally, as an indication of managerial horizon, we note

[27] Target leverage is the predicted value obtained by regressing debt of all firms in Compustat between 2002 and 2008 on firm level explanatory variables including the log of assets, capital expenditures scaled by total assets, market to book ratios, R&D expenses scaled by sales, value of property, plant and equipment scaled by total assets, selling expenses scaled by sales, and industry dummies (coded at the 2-digit SIC code level).

whether or not a CEO voluntarily relinquishes the position of CEO in the year following the repurchase announcement.[28] Similar to Marquardt et al. (2009), univariate comparisons reveal that firms conducting ASRs are more likely to base CEO bonuses on EPS, to have CEOs that are also chairmen, and to experience voluntary turnover of the CEO in the year following the ASR.

In sum, the univariate analysis reveals that firms including ASRs in their repurchase programs have less variable stock prices, greater stock market liquidity, greater firm size, less variable cash flows, less imbalance between cash flows and investment needs, larger program authorizations, better recent stock performance, more frequent recent asset sales and unsolicited takeover attempts, smaller deviations from "target" leverage ratios, more frequent use of EPS as a basis for bonuses, more frequent CEO/chairmen, and more frequent post-repurchase announcement voluntary turnover of the CEO than firms not including ASRs in their repurchase programs. Additionally, no short-sale constrained firms included ASRs in their repurchase programs. While the univariate results are informative and generally consistent with our hypotheses, the usual caveats about making inferences based on univariate comparisons apply. Thus, we next turn our attention to multivariate investigation of the choice to include an ASR as part of a repurchase program.

2.4.2 Logit regressions of ASR choice

We hypothesize that an ASR is undertaken if the benefits from the ASR outweigh the costs. We define the latent variable y_i^* as the expected net benefit from including an ASR in a

[28] The indicator variable Voluntary turnover is equal to one if the CEO is at least 60 years old based on the proxy statement preceding the program announcement and is no longer the CEO at the time of the first proxy statement at least one year after the program announcement.

repurchase program. The net benefit is assumed to be a linear function of the observed characteristics in Table 2.2 and an error term ε_i:

$$y_i^* = \alpha + \sum_{j=1}^{M} \beta_j x_{ji} + \sum_{k=1}^{N} \beta_k x_{ki} + \varepsilon_i \qquad \textit{Eq. (2.1)}$$

where the x_j variables represent the cost associated with the loss of flexibility inherent in an ASR and the x_k variables represent the benefits associated with enhanced credibility and immediacy. Because the net benefit of an ASR is unobservable, we define the observable dichotomous variable *ASR* which equals one if an ASR is included in the repurchase program and zero otherwise. We then use a logit analysis to estimate the equation:

$$ASR_i = \delta + \sum_{j=1}^{M} \gamma_j x_{ji} + \sum_{k=1}^{N} \gamma_k x_{ki} + \eta_i . \qquad \textit{Eq. (2.2)}$$

Table 2.3 reports the results of logit regressions explaining ASR choice. The coefficients on the independent variables are reported along with their p-values in brackets. Reported p-values are based on robust standard errors. Year and industry dummies are also included in the regressions but, to conserve space, the coefficients are not reported.[29]

As in the univariate tests, we limit the analysis in Table 2.3 to ASRs announced in 2004 or later. We also limit the analysis in Table 2.3 to those programs announced by firms which are not short-sale constrained. Other than short-selling its own shares, the key features of an ASR could be nearly duplicated by a repurchasing firm (especially if the firm were willing to forfeit 10b-18 protection) with a large, easily verifiable, expedited OMR. Thus, the intermediary in an ASR functions as a proxy through which a firm can borrow its own shares. As indicated in panel D of Table 2.1, there is a relatively competitive market for providing this service. Thus,

[29] Industry classifications are in accordance with the twelve groupings identified on Kenneth French's website, http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/changes_ind.html.

the only real "supply" hurdle a firm might face in conducting an ASR is if an intermediary cannot borrow the firm's shares. Hence, by conducting our analysis on all programs except for the 60 that were deemed short-sale constrained, we can reliably interpret the coefficients on the specifications below as reflecting how the firms' characteristics are associated with the firms' demand for an ASR, i.e., the net benefits to the firm of conducting an ASR.[30]

As reported in specification (1), firms with greater stock price volatility are significantly less likely to include ASRs as a part of their repurchase programs. Similarly, firms with less liquid markets for their shares are significantly less likely to undertake ASRs. The coefficient on High-hedge (Low-hedge) is negative (positive) but not significant at conventional levels. Firms with larger program authorizations are significantly more likely to conduct ASRs. Taken together, these findings are consistent with the flexibility hypothesis.[31] As in the univariate analysis, the coefficient on Prior stock price performance is positive indicating that ASRs are not announced subsequent to relatively poor performance as would be expected if ASRs were utilized to signal undervaluation. The negative coefficient on Ln(Market-to-book) can be interpreted as evidence that firms with declining growth options use ASRs to a commitment not to overinvest. The asset sale indicator enters with a positive and significant coefficient consistent with ASRs being motivated, in part, by the desire of managers to signal a willingness

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[30] This approach is similar to that taken in other repurchase contexts utilizing an intermediary, e.g., self-tender offers as in Lie (2002). Further, this approach is often taken in much of the literature examining securities issuance where the role of the intermediary (underwriter) is less mechanical, e.g., initial public offerings as in Pagano, Panetta, and Zingales (1998) and seasoned equity offerings as in Gao and Ritter (2010).

[31] The correlations of Std. dev. returns with Ln(Illiquidity) and Std. dev. free cash flow are 0.33 and 0.28, respectively. The correlation between Ln(Illiquidity) and Std. dev. free cash flow is 0.07. While each of the correlations is significant at the 1% level, the respective variables enter the regressions with the same sign and significance level if included separately or in combination. Further, the variance inflation factors for these three variables are not larger than 4.37 for the ASR election regressions.

to pay out non-recurring cash inflows to shareholders. Firms that were the subject of recent takeover interest were also more likely to include an ASR as were firms that were further below their target leverage ratios. Lastly, none of the variables intended to reflect motive and opportunity to manage EPS via ASRs are significant. In sum, these results are consistent with the flexibility hypothesis and the credibility and immediacy hypothesis.

As an additional test of signaling undervaluation as a motive for ASRs, in specification (2), we replace the market-to-book ratio with its components. We find that M/B firm, the firm specific deviation from value, is negative and significant. Thus, consistent with an undervaluation motive for ASRs, firms who are subject to greater firm specific undervaluation are more likely to undertake ASRs. Also, we find that firms with greater long-run growth opportunities are less likely to conduct ASRs.[32]

Next, we examine the characteristics of firms that announce a repurchase program and an ASR simultaneously. A simultaneous ASR might be an indication that, in light of the objective of the repurchase, enhanced credibility and immediacy are viewed as being particularly valuable. Specification (3) reports the results of a logit regression in which the dependent variable equals one for simultaneous ASRs. The sample excludes programs that include a subsequent ASR. As before, firms with greater stock price volatility and firms with less liquid markets for their shares are less likely to undertake simultaneous ASRs. All else equal, firms with larger authorizations, firms with better prior stock performance, firms with fewer growth opportunities, firms facing the threat of a takeover, and firms further below their target leverage

[32]In unreported results, we used alternative measures of undervaluation calculated as in Purnanandam and Swaminathan (2004) and Chemmanur, et al. (2010). In short, of the six alternative measures, two (multiples based on EBITDA) entered the regression with a negative coefficient significant at the ten percent level. Thus, these results appear sensitive to the algorithm used to estimate misvaluation and the particular measure employed. These results are available from the authors upon request.

ratios are more likely to include simultaneous ASRs in their repurchase programs consistent with the benefits of credibility and immediacy being larger for these firms.

While the preceding analysis investigates the decision to include an ASR in a repurchase program, we now turn our attention to the fraction of the authorized repurchase that is completed via an ASR. In specification (4), we report the results of a Tobit regression where the dependent variable is the fraction of the authorized repurchase that is completed via an ASR. Interestingly, not only is the decision to include an ASR in a program associated with the flexibility variables, but also the fraction of the repurchase program completed via an ASR is also significantly associated with variables that proxy for the value of flexibility. Specifically, firms with greater share price variability, less liquid markets for their shares, and smaller repurchase authorizations complete significantly less of their repurchase programs via ASRs consistent with the flexibility hypothesis. Further, firms that have completed asset sales, were the targets of takeover attempts, have less valuable growth opportunities, and experience better recent stock price performance conduct a larger portion of their repurchase programs via ASR consistent with the credibility and immediacy hypothesis.

To gauge the economic magnitude of the estimates, we select the model in specification (1) of Table 2.3 and calculate the effect of changes in the explanatory variables on the implied probability of including an ASR in the repurchase program. We vary the explanatory variables, one at a time, from the 25th percentile level to the 75th percentile level for scalar variables and from zero to one for dummy variables. All other variables are held constant at their sample means. For the standard deviation of returns variable, the estimated probability of including an ASR in the repurchase program of the firm decreases from 11.9% to 4.3%. The corresponding estimates for the Ln(Illiquidity) variable are 19.3% to 2.9%. These results indicate that the

probability of including an ASR in a repurchase program decreases sharply as the variability of a firm's share price or the illiquidity of its stock increases. Increasing the size of the program authorization corresponds to a change in the estimated probability of including an ASR in the repurchase program from 5.3% to 7.5%. As Ln(Market-to-book) increases, the estimated probability of including an ASR in the repurchase program decreases from 9.2% to 4.4%. As the distance from optimal leverage increases, the probability of including an ASR in the repurchase program increases from 6.0% to 7.5%. Also, an increase in Prior stock performance corresponds to an increase in the probability of an ASR from 5.5% to 8.4%. Finally, for the takeover (asset sale) variable, the estimated probability of including an ASR in the repurchase program increases from 6.4% to 18.3% (6.3% to 9.4%) as the variable changes from zero to one. Thus, the factors that are found to be statistically significant in the analysis above are also economically significant in the decision to include an ASR in a repurchase program.

2.4.3 Robustness and additional results

In unreported results, we find that the inverse relation between illiquidity and the likelihood of ASR inclusion is robust to alternative measures of illiquidity. Specifically, we consider three alternative measures: the natural logarithm of quoted spread calculated as the log of the ratio of the offer price minus the bid price to the trade price; the log of the effective spread as defined in Lee (1993); and the log of the price impact measure defined in Huang and Stoll (1996). We substitute these measures for Ln(Illiquidity) into the logit regression in specification (1) of Table 2.3. The resulting coefficients on the measures of illiquidity are -1.069, -1.329, and -1.169, respectively, and each is significant at the 1% level. Thus, greater illiquidity, as proxied for by any of the alternative measures, is associated with a decreased probability of including an

ASR in a program.

In the results reported in Table 2.3, we place no restriction on how timely the ASR announcement is relative to the repurchase program announcement. When we rerun specification (1) of Table 2.3 excluding the 27 ASRs in our sample that are not announced within 365 days of a program, the results are very similar to those reported. Additionally, the results continue to hold for the subsample where regulated (financial and utility) firms are excluded.

Given the upheaval in financial markets in 2008, we also repeated our analysis on the subsample of repurchase programs announced prior to 2008. The results are very similar to those reported in Table 2.3, with two notable exceptions. Namely, the coefficient on High-hedge also enters specification (1) with a negative and significant (p-value of 0.090) coefficient and the coefficient on Leverage difference is positive but no longer significant (p-value of 0.136).

The logit analysis in Table 2.3 assumes a linear relation between ASR choice and our independent variables. To allow for possible nonlinearities, we mean center the variables found to be significant in specification (1) of Table 2.3 and include squared terms of the mean centered variables. The coefficients on the linear variables remain significant with the exception of Ln(Illiquidity), Ln(Assets), Ln(Market-to-book), and Leverage difference. The coefficient on squared illiquidity is negative and significant suggesting that the relation between illiquidity and the likelihood of an ASR is caused predominantly by more illiquid firms. The coefficients on squared program size and squared leverage difference are also negative and significant. The coefficients on squared standard deviation of returns, squared log of assets, squared prior stock performance, and squared market to book are not significant. The signs and significance of the remaining coefficients remain unchanged.

2.4.4 Why do ASRs decline in 2008?

Figure 2.2 reveals that the ratio of ASR announcements to repurchase program announcements increases from 2004 through 2007 and then drops sharply in 2008.[33] To investigate whether our model of ASR choice explains the sharp drop in ASRs, we estimate the probability of including an ASR for each firm that announces a repurchase program. Specifically, we estimate the coefficients of specification (1) in Table 2.3 based on the 2004 to 2007 data. We use the coefficient estimates to predict the probability of an ASR for the in-sample programs in 2004 through 2007 and the out-of-sample programs in 2008. We define an indicator variable, Predicted ASR, that is equal to one if the estimated probability is above a specified threshold and zero otherwise. Because the unconditional probability of an ASR for the in-sample firms is 17.06%, we define the threshold as the in-sample 82.94th percentile of Predicted ASR. The resulting threshold probability is 33.13%. Therefore, Predicted ASR equals one if the estimated probability of including an ASR in a repurchase program is greater than 33.13% and zero otherwise.

The predicted and observed percentages of ASRs for each year are reported in Table 2.4. Strikingly, the predicted (observed) percentage drops sharply from 23.0% (20.6%) in 2007 to 12.7% (6.4%) in 2008. Consistent with our model, the results suggest that the decrease in ASRs in 2008 results to a large degree from changes in the characteristics of repurchasing firms.

As an out-of-sample test of the validity of our predictions, we divide the 2008 repurchase programs into three groups based on the estimated probability of an ASR. Within each tercile, we total the number of ASRs observed. The totals, listed from the lowest third to the highest

[33] Note that no ASRs were announced during the period in September, 2008 when the SEC banned short selling in the stocks of 799 financial firms.

third, are 1, 3 and 15 respectively. A Pearson chi-squared test rejects the hypothesis that the proportion of ASR firms is the same in each tercile with a p-value of 0.000. This suggests that our ASR model has significant power, out-of-sample, to predict which firms will include ASRs in their repurchase programs. Our results also suggests that the dramatic increase in ASRs over the years 2004-2007 will not likely turn out to be simply a historical curiosity as ASR activity would be predicted to rebound as volatility of share prices and the illiquidity of firms shares revert to more "normal" levels.

2.4.5 ASRs Relative to Other Repurchase and Payout Methods

While we characterize ASRs relative to OMR-only programs in the analysis above, other repurchase and payout methods are potential alternatives to ASRs. Thus, we investigate whether firms' decisions to conduct ASRs are associated with their past or concurrent use of alternative repurchase or payout methods. Figures 2.3 and 2.4 report, respectively, the annual frequency and dollar volume of ASRs, fixed-price self-tender offers, Dutch-auction self-tender offers, privately negotiated repurchases, and large special dividends (defined as greater than five percent of the market value of equity). As can be seen in Figure 2.3, the frequency of ASRs first exceeds fixed-price self-tenders and Dutch-auction self-tenders in 2004 and continues to exceed the respective types of self-tender offers through 2008. ASR activity first exceeds privately negotiated repurchases in 2005 and continues to exceed privately negotiated deals through 2008. ASR frequency first exceeds large special dividends in 2005 and continued to exceed large specials until 2008 when large specials again become more frequent than ASRs. Largely similar patterns are also evident in dollar volumes as shown in Figure 2.4.

Visual inspection of Figure 2.3 suggests that aggregate ASR frequency in recent

years is positively correlated with that of the alternatives other than perhaps privately negotiated repurchases. It should also be noted that there are important distinctions between ASRs and the alternatives included in the figures. Thus, we consider below the relative choice of ASRs versus the various alternatives in light of these differences.

In contrast to ASRs, Peyer and Vermaelen (2005) document that most privately negotiated repurchases are announced after the transaction with no intent by the firm to repurchase more shares. Also, only about 109 out of 737 transactions in their sample are conducted at market prices with the majority involving a premium (greenmail) or discount. Further, the zero premium deals are typically repurchases from insiders who exercise options and prefer to sell their shares to the firm. Nonetheless, we include dummy variables in specification (1) of Table 2.3 indicating, respectively, whether a firm had completed a privately negotiated repurchase in the three years prior to the program announcement or in the one year after the program announcement (as the vast majority of ASRs in our sample are observed within one year of a program announcement). In short, neither dummy enters the regression significantly suggesting that, at the firm level, ASRs serve a unique role relative to privately negotiated repurchases.

Note that while tender offer repurchases, like ASRs, are credible commitments to repurchase and can be completed relatively quickly, tender offer repurchases (both fixed-price and Dutch-auction) nearly always result in selling shareholders receiving significant premiums, e.g., see Comment and Jarrell (1991). As an indication of whether or not ASRs are substituting for tender offer repurchases, we include dummy variables in specification (1) of Table 2.3 reflecting whether a firm had completed a fixed-price tender offer or a Dutch-auction repurchase, respectively, in the three years prior to the program announcement or the one year after the

program announcement. In the specification including the Dutch-auction dummies, neither of the dummies is significant. In the specification including the fixed-price dummies, the variable reflecting prior fixed-price repurchase activity is also not significant. Further, we note that no firm that conducted an ASR in a program also conducted a fixed-price tender offer in the same program (which makes including the dummy for concurrent fixed-price offers infeasible). This outcome could be interpreted as indicating ASRs are perfect substitutes for fixed-price repurchases or that ASRs and fixed-price repurchases are used to achieve entirely different objectives. Given the large premiums conveyed in fixed-price repurchases and the absence of any premium in ASRs, the latter interpretation seems more likely. Thus, taken together, these results suggest that ASRs serve a unique role relative to self-tender offers.

On a continuum of the credibility of commitment among payout types, it could be argued that ASRs would lie near declaring a large special cash dividend, e.g., see DeAngelo, DeAngelo, and Skinner (2000). Thus, we create dummy variables indicating whether a firm had completed a large special dividend in the three years prior to the program announcement or the one year after the program announcement. In short, no firm that paid a large special dividend also undertook an ASR. Given that large specials are often issued as part of major corporate restructurings (average payout of 17.3% of the market value of equity over 2004-2008) whereas ASRs (average 5.3% of the market value of equity over 2004-2008) are not, this suggests that the objectives for these respective transactions differ substantially. As a further indication, we create dummy variables reflecting whether a firm had issued any special dividend in the three years prior to the program announcement or the one year after the program announcement. Neither dummy enters the regression significantly suggesting that ASRs serve a unique role relative to special dividends.

In sum, ASRs appear to represent an important innovation relative not only to OMR-only programs, but also to alternative payout methods like self-tender offers, privately negotiated repurchases, and large special dividends. It does not appear that ASRs are simply substituting for alternative payout methods. Thus, our characterization of the choice to include an ASR as being relative to an OMR-only program appears to accurately reflect how ASRs are used in practice.

2.4.6 Abnormal returns analysis

Table 2.5 reports the abnormal returns for the repurchase announcements in our sample. We calculate the three-day cumulative abnormal returns (CARs) in the window -1 to +1 in trading days relative to the repurchase announcement. CARs are calculated using the standard event study methodology, e.g., see Brown and Warner (1980). The parameters of the market model are estimated over 255 trading days, ending 46 days prior to the announcement using the CRSP value-weighted index as the market portfolio and requiring a minimum of 100 trading days over the estimation window.

ASRs announced simultaneously with repurchase programs are associated with positive and significant abnormal returns. Further, ASRs announced subsequent to repurchase programs are also associated with positive and significant abnormal returns consistent with shareholders viewing these transactions as incrementally wealth increasing relative to the previously announced repurchase programs. With the exception of the median returns to programs associated with subsequent ASRs, the mean and median returns for all program announcements are positive and significantly different from zero at the 5% level. Additionally, with the exception of programs associated with subsequent ASRs, positive announcement returns

are significantly more frequent than negative announcement returns for all groups as indicated by sign tests. The evidence suggests that, on average, ASR announcements and program announcements are value increasing events. We further find that the mean (median) return of 1.70% (2.01%) for programs announced simultaneously with ASRs is not significantly different than the mean (median) return of 1.46% (1.21%) for program announcements not associated with any ASR.

Within the context of the credibility and immediacy hypothesis, a plausible objective for undertaking an ASR after a repurchase program has already been announced is that the response to the program announcement was weak and the firm wants to send a more credible signal. If this is the case, then we would expect program announcements associated with subsequent ASRs to have lower announcement returns than program announcements not associated with any ASR. We investigate the validity of this conjecture for the pattern of returns by testing the differences across the two groups. The mean and median returns to programs without ASRs are uniformly larger than those for programs with subsequent ASRs with the differences between the median returns of the two groups significant at the 5% level. Thus, the results of the univariate tests suggest that a lower abnormal return at program announcement may be a consideration in a firm's election to conduct a subsequent ASR.

In Table 2.6, we analyze ASR announcement returns in a multivariate setting. The dependent variable in specifications (1) and (2) is the three-day cumulative abnormal return around the ASR announcement, the sample is all ASR announcements from 1996 to 2008, and we include all of the independent variables considered in the logit regressions of Table 2.3 as well as the percentage of the firm's outstanding equity that is repurchased in the ASR. Larger ASRs, as a fraction of the firm's outstanding equity, are associated with greater announcement

returns. Insofar as larger ASRs send stronger signals, this result supports the credibility and immediacy hypothesis. Similar to findings in the literature examining program announcements, prior stock performance is significantly negatively associated with announcement returns. ASRs announced when firms are targets of takeover attempts are met with lower abnormal returns perhaps owing to the reduced likelihood that the proposed acquisitions will be completed in light of the ASRs.

In specification (2), we split Ln(Market-to-book) into three components as in Rhodes-Kropf, Robinson and Viswanathan (2005). The coefficients on each of the three components are statistically insignificant.[34] Further, the market-to-book ratio in specification (1) along with the uncertainty in returns, the illiquidity of the firm's shares, and the size of the program authorization in both specifications are not significantly related to the announcement returns. Given these characteristics are significant in Table 2.3, it appears that firms consider them when deciding to include an ASR such that differing values of the characteristics themselves are then unrelated to announcement returns.[35]

Specification (3) reports the results of a logit regression where the dependent variable takes a value of one if a firm announced an ASR subsequent to announcing a repurchase program and zero if the program was not associated with an ASR. We include the market response to the

[34] In unreported results, we used alternative measures of undervaluation calculated as in Purnanandam and Swaminathan (2004) and Chemmanur, et al. (2010). The only significant coefficient of these six alternative measures is the coefficient on the price to valuation ratio based on a price to sales multiple calculated as in Chemmanur, et al. (2010). However, this coefficient is positive and significant, the opposite of what we would expect if greater undervaluation is associated with greater announcement returns to ASRs. These results are available from the authors upon request.

[35] In unreported results, we have added indicator variables for the stated motivations for the ASRs as independent variables in specification (1) of Table 2.6. None of the coefficients on the indicator variables enter significantly.

repurchase program announcement as an independent variable. The significantly negative coefficient on the program announcement return is consistent with an ASR being a mechanism to send a more credible signal to the market after a relatively weak response to the program announcement.

The univariate analysis in Table 2.5 suggests that announcement returns to programs including simultaneous ASRs are not distinguishable from the returns to programs without ASRs. In specification (4) of Table 2.6, we test this in a multivariate setting. The sample for this test excludes programs that include a subsequent ASR. We regress the three-day cumulative abnormal return for program announcements on our basic control variables and a variable indicating that the program includes a simultaneous ASR. Consistent with the univariate results, the coefficient on the simultaneous ASR indicator variable is not significant.

Finally, in specification (5), we test whether the announcement returns to programs associated with any ASR differ from the returns to programs that are not associated with ASRs. For programs not associated with an ASR, the dependent variable in the regression, Combined CAR3, is the abnormal return at the program announcement. For programs associated with an ASR, the dependent variable is the sum of the abnormal returns at the program announcement and the abnormal returns for any subsequent ASRs conducted within the program. The indicator variable ASR is equal to one for a program that is associated with a simultaneous or subsequent ASR and zero otherwise. The insignificant coefficient on the ASR indicator variable suggests that the combined announcement returns for programs associated with at least one ASR are no different than the announcement returns for programs not associated with an ASR.

2.5 Conclusion

This paper investigates ASRs, a recent and important innovation in share repurchase transactions, relative to both open market repurchases and other alternative methods of distributing excess cash to shareholders. ASRs are credible commitments by firms to repurchase shares immediately. Including an ASR in a repurchase program reduces the flexibility that firms have to alter an announced program in response to subsequent changes in the liquidity and price of its stock, firm conditions, etc. However, ASRs provide the benefits of enhanced credibility of commitment and immediate execution. Thus, we investigate whether firms' decisions to include ASRs in their repurchase programs are associated with factors expected to influence the costs of lost flexibility and the benefits of enhanced credibility and immediacy.

We find that the choice to undertake an ASR and the fraction of a repurchase program to conduct via an ASR are significantly negatively associated with proxies for the costs of lost flexibility. We also find that firms are more likely to undertake ASRs in situations where the benefits of credibility and immediacy are larger. Further, our ASR model has significant power, out-of-sample, to predict which firms will include ASRs in their repurchase programs. Additionally, we investigate the abnormal returns around the announcement of an ASR. We find that ASR announcements are associated with positive and significant abnormal returns. This result holds for ASRs announced simultaneously with a repurchase program and ASRs announced subsequent to the repurchase program announcement. These results suggest that ASRs are, on average, value increasing events and add incremental value when announced subsequent to a repurchase program announcement.

3.0 Chapter Three: Trading activity around Accelerated Share Repurchases

3.1 Introduction

The level, frequency, and form of payouts have been the subject of considerable investigation in finance literature.[36] Some studies have also looked at payout policy issues from a market microstructure perspective (e.g. see Barclay and Smith (1988), Cook, Krigman and Leach (1995), Miller and McConnell (1995), Wiggins (1994)) using open market repurchases (OMRs) and tender offer. In this study, I look at the behavior of stock market trading characteristics around a relatively new way of buying back shares; *accelerated share repurchases* (ASRs).

ASRs are a relatively new form of share repurchase. In an ASR, a firm enters into a contract with an intermediary, typically an investment bank, whereby the intermediary immediately delivers a specified number of the firm's shares in exchange for a cash payment based on an agreed upon price per share. The intermediary obtains the shares that it delivers to the repurchasing firm by borrowing them, typically from institutions. The intermediary must then cover its short position by purchasing shares in the market over a subsequent time period, typically a few months. The firm and the intermediary settle, in cash or shares, the difference between the initially agreed price and the weighted average price per share the intermediary pays in buying the shares from the market. Thus, ASRs are repurchases, with an associated forward contract, in which the intermediary is acting as the firm's proxy in borrowing the firm's shares.

[36] For example, see Allen and Michaely (2003), Brav, Graham, Harvey, and Michaely (2005). And others describe papers in the payout literature and results from surveys and field interviews of financial executives intended to determine how payout policies are determined.

The first instance of ASRs I find is in 1996. The number of ASR transactions has picked up since 2003 (e.g. see Bargeron, Kulchania, Thomas (2010), BKT2010 hereafter). Over $130 billion of stock was repurchased via an ASR over the period 2004-2008. In 2007, the number of ASR announcements (97) represented about 23% of the total number of OMRs (384).

Trading characteristics around OMR announcements have been studied in the finance literature. Barclay and Smith (1988) document a significant increase in the bid-ask spreads following the repurchase announcement. Miller and McConnell (1995) find no evidence of an increase in bid-ask spreads surrounding OMR announcements. Wiggins (1994) and Singh, Zaman and Krishnamurti (1994) report evidence documenting a decline in the bid-ask spreads when buyback programs are announced. There are no reported microstructure event studies around ASR announcements. Recently, BKT2010, Chemmanur, Cheng and Zhang (2010) find that stock market liquidity measures play a role in the decision to conduct an ASR. However, to the best of my knowledge, no paper has systematically examined how the stock market trading characteristics of firms change when they announce ASR transactions[37].

In my view, the speed of buyback and the involvement of a sophisticated financial intermediary in an ASR are the two key distinguishing features that might be important from a market microstructure perspective. Rather than going out and buying shares from the open-market over a relatively long time frame - typically varying from a few months to as much as three years (Stephens and Weisbach (1998)) - firms announcing ASRs buy back the announced

[37] Bargeron, Kulchania and Thomas (2010) and Chemmanur, Cheng and Zhang (2010) use level of quoted and effective spreads as a variable of interest in the choice to conduct an ASR. Both these papers find that firms that do ASR transactions have lower spreads (higher liquidity) compared to other firms that announce open market share repurchase (OMR) programs. In a more recent version of their paper, Chemmanur, Cheng and Zhang (2010) report that the reduction in quoted spread and improvement in market depth is more for ASR firms, compared to OMR firms. However, they limit their analysis to quoted spread and market depth and mainly how these variables change between ASR and non-ASR firms. They do not consider any other measure discussed in this paper. None of the existing papers focus on changes in market microstructure properties just for ASR firms.

shares in a matter of weeks or months. This aggressive buying of shares makes an ASR an interesting event to study the effect of increased buying pressure on shares of a firm. Although an OMR program is constrained by rules limiting the timing as well as the number of shares that an issuer can repurchase on a given day, an ASR is not bound by any such constraints.[38] Publicized involvement of a sophisticated financial intermediary, an investment bank, is another key distinction of an ASR transaction. The effects of a vastly publicized short position that an investment bank takes, by selling the firm a chunk of shares immediately, might have interesting microstructure implications for the shares of the firm. Barclay and Smith (1988) posit that the market maker of a firm's shares may face increased competition when a firm announces share repurchase. Intuition suggests that the involvement of a sophisticated financial intermediary with a publicized short interest will make this competition even more intense.

Very little is known about the exact trade timing of open market repurchases in the US. The US Securities and Exchange Commission (SEC) does not require any disclosure of the buyback schedule of shares. Brockman and Chung (2001) look at repurchase trading activity of firms in Hong Kong, where such data is required to be disclosed, and find a significant reduction in liquidity, an increase in spreads and an increase in information asymmetry on days when firms buy back shares. Ginglinger and Hamon (2007) use repurchase data from French firms and document adverse effects on spreads and liquidity when firms buyback shares. Using a small sample of 64 US firms that disclosed supplemental trading information on share repurchases, Cook, Krigman and Leach (2003) find that spreads decrease and market liquidity improves on

[38] For an open market repurchase to qualify for "safe harbor" protection a firm must satisfy the four criteria detailed in S.E.C. rule 10b-18 of the Securities and Exchange Commission's anti-manipulation guidelines. These four criteria are: (1) on any one day, firms may not purchase more than 25% of the average daily trading volume of their own shares during the prior four weeks, block trades and privately negotiated transactions are exempt from this guideline; (2) firms may not purchase their own shares at the opening and closing one-half hours of trading; (3) firms may not purchase their own shares at a price higher than the last independent bid, or the last reported sale price; and (4) all purchases on a single day must be executed through the same brokerage firm.

days of share buybacks. Because of relatively quick buyback activity, ASRs are in some ways closer to such studies of repurchase activity on certain days compared to generic studies of market microstructure after open market repurchases announcements. Although not strictly comparable, ASRs give us a way of studying the market microstructure effects of repurchase activity directly involving a financial intermediary using a larger sample of US firms.

I hand collect a detailed sample of ASR announcements between 1996 and 2008 using publicly available sources. The primary objective of this essay is to document the market microstructure properties in shares of firms that announce ASR transactions. In this essay, I also develop hypotheses, based on the expected changes in trading characteristics, and see which of these hypotheses hold. I examine how trading costs, market quality and trading volume changes for stocks of firms that announce ASR transactions. I also compare these measures relative to a benchmark period before the announcement of ASR. I find that the percentage quoted and effective spreads decrease immediately following the ASR announcement. I also find significant improvement in bid size, offer size and market depth. I find that the trading volume jumps significantly, the average trade size increases and the net order flow changes. I also look at the information asymmetry component of spread, decomposed using Lin, Sanger and Booth (1995) methodology, and find an increase in the information asymmetry component of the spread following the ASR announcement. Changes in volatility are significant in explaining the changes in spreads around ASR announcements.

These findings contribute specifically to the nascent literature on ASRs. The earliest paper to make note of ASRs was Cook and Kim (2006). In an unpublished working paper, Cook and Kim mention that accelerated share repurchase programs are only one method of buying back shares using derivative contracts. They document that firms engaging in repurchases using

derivative contracts are generally larger (measured by total assets) than OMR firms. They also find evidence that more profitable firms and firms that spend more on research and development and capital expenditures use put warrant issues more frequently than ASRs. More recently, BKT2010 argue that ASRs are increasingly important component of a firm's overall share repurchase program and are sufficiently different from tender offers and privately negotiated repurchases. The ASR portion of a repurchase program permits the firm to move much faster in terms accomplishing certain goals of a repurchase program, e.g., credibly signaling undervaluation, returning cash to shareholders, adjusting capital structure, defending against an unwanted takeover attempt, avoiding dilution from the exercise of employee stock options, or managing reported earnings per share through changes in shares outstanding (e.g. see BKT2010, Chemmanur, Cheng and Zhang (2010), Marquardt, Tan and Young (2009)). While all these papers examine possible reasons for including an ASR in a firm's repurchase program and some find that trading characteristics such as stock market liquidity and variability in returns are important drivers of the choice, we still do not understand how these trading measures change around the announcement of ASR. This essay aims to fill this gap. Results obtained while looking at ASRs might also be useful in understanding the changes in market quality measures, volatility and information asymmetry around events that increase buying pressure on stocks and might have some broader implications in the market microstructure literature.

This chapter proceeds as follows. Section 3.2 develops the main hypotheses to be tested. Section 3.3 describes the sample construction. Section 3.4 describes the variables, the methodology used and reports the results. Section 3.5 offers a concluding discussion.

3.2 Hypothesis Development:

In this section I discuss some relevant hypothesis from microstructure literature and explore how they apply to the unique characteristics of ASR transactions.

Competing Market Maker Hypothesis:

An important characteristic of an ASR transaction is the involvement of an investment bank in the agreement. Glosten and Milgrom (1985), Easley and O'Hara (1987) and others note that a market maker or a dealer (together referred to as a *specialist trader*) in a stock trades with two broad category of investors, the liquidity traders and the informed traders. Liquidity traders trade for immediacy and informed traders trade to gain from their information. On average, the specialist expects to lose to informed traders and gain from the liquidity traders by maintaining a difference in price at which she buys and the price at which she sells shares. When the firm announces a share repurchase program, the firm is competing with the specialist for trade in their own shares. This competition for the specialist is, arguably, more intense after a firm announces an ASR transaction. When the investment bank tries to buy shares from the market to cover its short position, the investment bank, in effect, is competing with the specialist. This increased competition may potentially affect the bid and ask prices, and also the trading liquidity in shares of the firm. Increased competition for trading volume, ceteris paribus, is expected to put pressure on the trading margins of the specialist's trades and thereby reduce the bid-ask spreads (e.g. see Demsetz (1968)). ASRs should, in the absence of information asymmetry, result in greater liquidity and a lower bid-ask spread. Following Barclay and Smith (1998), I call this the *competing market maker hypothesis*. This hypothesis predicts that the spreads will decrease following an ASR announcement. Another related prediction will be increase in bid size, offer size and market depth as the investment bank and the specialist compete for volume.

Inventory Holding Cost Hypothesis:

In an ASR, the investment bank is committed to buying back shares that it has sold short. The average size of an ASR transaction is about 6% of the firm's market value of equity (see Table 3.1). Considering the size of the transaction, as the investment bank covers its short position, the trading volume of shares of the firm is expected to increase. Stoll (1978) posits a direct relationship between trading volume and holding period for the stock. The higher the trading volume in a stock, the easier it is for the specialist to reverse her position in a stock. Thus, the spreads are expected to decline following an ASR announcement, driven by the decrease in inventory holding costs for the specialists. I call this the *inventory holding cost hypothesis*. It predicts that the spreads will decrease following an ASR, driven by increased trading volume that is expected following an ASR announcement.

Information Asymmetry Hypothesis:

As an ASR is announced, the specialist trader may be less certain that she is dealing with a liquidity trader in a particular transaction. Due to a publicized mandate of the investment bank to buy shares, the specialist is more likely to trade with an informed buyer than she is to trade with a liquidity seeker. As such, the specialist is likely to charge a higher spread (more specifically the asymmetric information component of the bid-ask spread) to cover herself from the possibility of dealing with an informed trader. I call this the *information asymmetry hypothesis*. It predicts that the information asymmetry component of the spread will increase following an ASR. It should be noted, that I am not making the assumption that the investment bank has any special information about the firm. The specialist would potentially safeguard herself from the possibility of dealing with someone who has some mandate about trading at some price levels (sometimes specified in an ASR agreement using a price range or a collar),

covering a short position quickly (driven by duration of ASR agreements) etc. The information asymmetry in this hypothesis is limited to this specific aspect (and not about the true price of shares or any other information about future plans of the firm). There may be some other sources of information asymmetry around ASR transactions. There is some evidence to suggest that firms that have been targets of takeover attempts, that have conducted an asset sale, that are trying to adjust their capital structure closer to the target capital structure, are more likely to conduct an ASR (e.g. see BKT 2010, Chemmanur, Chang and Zhang (2010), Akyol, Shekhar and Kim (2010) etc.). This hypothesis also predicts that the volatility will increase post ASR.

These hypotheses are by no means mutually exclusive and firms might see a combination of more than one of the cases described above. Predictions from competing market maker hypothesis and inventory holding cost hypothesis are the same (decrease in spreads, increase in bid size, offer size, trading volume etc). Both of these hypotheses do not predict anything about the volatility or information asymmetry component of the spread. However, the reasons driving the change are different. Competing market maker hypothesis posits that increased competition drives the change in the market measures whereas the inventory holding cost measure posits that increased volume drives the spreads lower. It may be necessary to use a multivariate setting to see whether the changes in volume drive the changes in spreads. The information asymmetry hypothesis has specific prediction about increase in information asymmetry component of spread and increased volatility.

3.3 Sample

ASRs are identified by searches on news announcements (using factiva database) and by conducting text searches on SEC Edgar database from 1995-2008. The earliest ASR found was in 1996. Repurchases are part of share repurchase programs announced by firms. Of the entire sample of ASR announcements, I use the announcements from 2004 onwards (this represents about 90% of the sample)[39]. Of the 256 possible ASR transactions in our sample, I include only those announcements where I can unambiguously identify the announcement date and impose the additional restriction that the primary listing of the stock be either the New York Stock Exchange (NYSE) or the Nasdaq stock exchange. These filters reduce the sample to 214 ASR announcements between 2004 and 2008. The exact date is critical for this study because of the event study type methodology I use[40]. Market microstructure properties may potentially be different based on the exchange of primary listing. As reported in Table 3.1, approximately 24% of the firms are NASDAQ listed and about 83% of the firms have traded options. The median firm has a market capitalization of $4.9 billion, has 1.13 million shares traded on a given day and has a share price of more than $38.

In an ASR announcement, a firm buys back 5.7% of their outstanding shares on average. This is lower compared to an open market repurchase program announcement (typically about 6.8%, see Stephens and Weisbach (1998) and others). The dollar amount of an ASR transaction

[39] This choice from 2004 onwards is driven by motivation to pick ASR sample where information disclosure standards were same. In December, 2003, the SEC amended rule 10b-18 requiring all firms to disclose information regarding share repurchase programs in their 10-Q and 10-K filings, thus, making ASRs easier to observe.
[40] The exact announcement date is less critical for BKT2010 because they primarily look at corporate decision to include an ASR in the repurchase program in a logistic regression framework, with many variables sampled at yearly intervals (using COMPUSTAT firm level data). In robustness checks they mention that limiting the study events where they exactly know the announcement dates does not change their results. (See BKT2010)

on average in our sample is $560 million. 27% of the ASR agreements have some mention of a price range or a cap, floor or collar in share price. Typically, the identity of the financial intermediary with whom the firm enters into the ASR agreement is revealed at announcement. In our sample, Goldman Sachs is the investment bank of choice more than 48 (of the 185 where this information is available) times. Sometimes the firm states a motivation for doing the ASR. The most common reason for conducting an ASR is "undervaluation" of firm's shares.

I use COMPUSTAT to collect annual financial data for the firms. I use Center for Research in Security Prices (CRSP) database to get shares outstanding and end of day prices for calculating stock returns. To get intra-day quotes and trade information, I use the NYSE Trades and Quotes (TAQ) database. I construct the National Best Bid Offer (NBBO) book for stocks throughout the day by aggregating quotes from all market centers included in the TAQ database. The quotes give us the bid price, the offer price, number of round lots offered (offer size) or bid (bid size) at the quote price. Trades give us information on trade price, number of shares traded. I match the trades with quotes that exist 5 second before the reported time of quote using Lee and Ready (1991) methodology. I assign sign to a trade using a combination of the tick-test and quote-test methodology as recommended by Lee and Ready (1991).

3.4 Empirical Results

3.4.1 Variables:

Trading Cost Measures:

I use two measures of trading cost and see how they change around ASR announcements. The first measure is the percentage quoted bid-ask spread. It is defined as:

$$Percentage\ quoted\ spread\ = \frac{A_{it} - B_{it}}{M_{it}} \times 100; \qquad Eq.(3.1)$$

where A_{it} is the ask price, B_{it} is the bid price and M_{it} is the quote midpoint, calculated as the average of the bid and ask prices.

Copeland and Galai (1983) argue that the quoted spread reflects expected losses due to asymmetric information, while Stoll (1978) suggests it captures inventory risk that the dealer carries in buying or selling a stock. However, it is not necessary that all transactions take place at the quoted bid or ask price. The second measure, the effective spread, reflects the possibility that orders may occur at a price superior or inferior to the quoted price. Lee (1993) provides evidence of price improvement for NYSE-listed securities on the NYSE, Nasdaq, Instinet, and the regional exchanges. Following Lee, the percentage effective spread is calculated as follows:

$$Percentage\ effective\ spread\ = 2 \times S_{it} \times \frac{(P_{it} - M_{it})}{M_{it}} \times 100; \qquad Eq.(3.2)$$

where S_{it} is the trade direction indicator set equal to +1 for buy orders and -1 for sell orders, constructed using a combination of the tick-test and quote-test methodology as recommended by Lee and Ready (1991), P_{it} is the trade price and M_{it} is the quote midpoint calculated as the ask plus the bid prices, divided by two.

Market Quality Measures:

A publicized short interest can affect liquidity supply. Dealers might be less willing to sell to a buyer in the hope of "squeezing" the short position in hope of getting a better price later on. Dealers may be more aggressive in posting higher depth because they might feel less intimated in dealing with known liquidity buyers rather than trading with informed insiders. To

measure the impact on liquidity, I use the following proxies of market quality. I measure the number of shares quoted (in round lots) at bid price and ask price for a stock and average them across all stocks in our sample. The number of shares quoted at bid is the *Bid Size*. The number of shares quoted at offer price is the *Offer Size* and the *Market Depth* is the bid size plus offer size divided by two.

Trade Measures:

I also measure a few trade related variables. *Volume* is the total daily number of shares of stock traded. *Trade size* is the average trade size calculated by dividing the total daily volume in a stock divided by number of trades in the stock. Literature suggests that institutional investors trade either in very big sized orders or in lots of small sized orders. I classify trades based on Lee and Ready (1991) and assign sign to the traded volume. A buy order is classified with a positive sign and a sell order with a negative sign. *Net Order Flow* is the net signed trade in a stock. I also estimate the average daily intra-day volatility in price of ASR firms. This measure captures the uncertainty in prices in a given day.

Information Asymmetry Measure:

The exact position of an insider in an ASR transaction is a little confusing. The firm, which is typically considered to be the insider, does not participate directly in the buyback but passes the responsibility of buying back shares to the investment bank. As such, the investment bank can be considered to be the party with more information, compared to the usual trader. In analyzing the ASR contracts, it is evident that the investment bank does not take much price risk of the transaction and gets paid the volume weighted transaction price for the shares. Some of the contracts have a provision for a *collar* in trading price. As such, the evidence seems to suggest that the main informational advantage that the investment bank has is the position of

their own net short position which is almost impossible to gauge in the absence of investment bank's exact trading positions. The investment bank might also be interested in providing good execution quality and stay within the price range (collar) sometimes mentioned in the ASR contract, to preserve its own reputation as a good intermediary for ASR transactions (and perhaps get more ASR business).

The investment bank may be buying and selling stock of the firm at the same time because they carry less risk (because of the guarantee of settlement at value weighted buying price from the firm) compared to the usual insider. As such, it may be useful to see how the information asymmetry component of spread changes following an ASR. I use the Lin, Sanger, and Booth (1995), LSB hereafter, model as a basis for examining the adverse selection component of the bid-ask spread and the probability of order persistence. Clarke and Shastri (2000) provide an empirical comparison of various spread decomposition models and identify the LSB model as appropriate for empirical examinations of information asymmetry. As per the LSB model, following regression model can be used to estimate the proportion of the spread due to asymmetric information:

$$Q_{t+1} - Q_t = \lambda z_t + \varepsilon_{t+1}; \qquad Eq(3.3)$$

where Q_t is the natural log of the quote midpoint at time t, z_t is the half effective spread, calculated as the trade direction indicator multiplied by the absolute value of the difference between the log of the trade price and the log of the current midpoint, and ε_{t+1} is the disturbance term. λ represents the proportion of the spread attributable to asymmetric information. I look at asymmetric information component of the spread before and after the ASR announcement. To calculate this, I run a regression using a trading month's data (after matching trades and quotes every day). I compare the information asymmetry one and two trading months before and after

the ASR announcement, starting from 5 days before and after the ASR announcement. For the ASRs in the sample, the average number of days from the announcement of the ASR to the settlement is 131 days, or approximately 4 months. So, to compare the information asymmetry before and after the announcement, I also take the average of asymmetric information component of the spread from trading month -4 to -2 (*before*) and compare it to the average information asymmetry from month +2 to +4 (*after*) data.

3.4.2 Methodology and Results:

I divide the trading period around the ASR into four bins to see the effect of ASR on trading variables leading up to, on the day of, and after the ASR event. The first bin I choose is the window (-25, -6) in trading days where 0 is the ASR announcement. I call this *Base* period. Values in this period are used as a benchmark for comparison. The other event windows I use are (-5, -1), (0, 0), (+1, +5). I call these windows the *Pre-ASR*, *Announcement Day* or AD, and *Post-ASR* period, respectively.

Table 3.2 shows the abnormal returns[41] in each of the period described above. The cumulative abnormal returns are shown in panel A. The abnormal return on the day of announcement of the ASR is significantly positive at 0.31%. The cumulative abnormal return in period the post-ASR period is a positive and significant 1.74%. Panel B shows the three-day and seven-day cumulative abnormal return calculated in the window (-1, +1) and (-3, +3) where 0 is the day of announcement of the ASR. Both these returns are positive and significant.

Table 3.3 reports the average daily *Percentage quoted spread* in periods around ASR transaction announcements. Panel A shows the values and test results related to the entire

[41] Abnormal returns are calculated using market model, with the parameters estimated for a minimum of 100 days and maximum of 255 days, ending 46 days before the ASR event.

sample. I provide data on the average daily value of the percentage quoted spread for each of the mentioned periods relative to the announcement of ASR agreement, namely the *Base* period the *Pre-ASR* period, the Announcement Day, and the *Post-ASR* period, as described earlier. The value of average daily percentage quoted spread decreases in the Pre-ASR period (relative to the Base). The quoted spread then increases a little on the day of the announcement but decreases again in the Post-ASR period. The mean Percentage quoted spread drops between the Pre-ASR and the Post-ASR period by 7.22% and this change is statistically significant. The change in quoted spread Post-ASR is also statistically significant when compared to the Base or to the announcement day spread. Panels B and C break up the result by the primary exchange listing of the firms. Panel B shows the result for the ASR firms listed on NYSE and panel C shows similar results for the Nasdaq listed firms. The differences between Pre-ASR and Post-ASR period are significant for firms listed on each of the exchanges.

Table 3.4 reports the average *Percentage effective spread* for the ASR firms. Panel A shows the results for all firms in sample, panel B shows just the NYSE listed firms and panel C shows the Nasdaq listed firms. The pattern of effective spreads is similar to the earlier reported quoted spreads results. The effective spreads decrease in the Post-ASR period for all firms on average about 14.87%. The decreases are more for NYSE listed firms compared to Nasdaq listed firms.

In summary, the trading costs decrease post ASR announcement. Figure 3.1 shows the average daily trading cost measures up to 25 days before and after the ASR announcement. The trading costs increase a little on the day of the announcement of the ASR but are significantly less in the post-ASR period compared to the pre-ASR period. This decrease in trading costs may be driven by increased competition between the specialist and the investment bank (competing

market maker hypothesis). This decrease might also indicate an increased willingness on the part of the specialist to compete for sell trade volume.

The trading cost measures for ASR firms presented here are lower than the corresponding measures for tender offer repurchases (e.g. see Ahn, Cao and Choe (2001)). Even the decrease in spread percentages is statistically significant but lower than the decreases in tender offers. This relatively small decrease may be due to involvement of a sophisticated financial intermediary who buys shares over some time. Another key difference between tender offers and ASRs is the significant premium offered in tender offer. BKT2010 also reports that firms that include an ASR as a part of their repurchase program tend to have distinctly lower illiquidity and higher institutional ownership. This might also explain why the buyback has some negative effect on spreads but not a huge impact, as the ASR firms are fairly liquid to begin with. Reduction in values of trading cost measures immediately after the ASR event might be due to increased competition to the dealer from the investment bank and would support the competing market maker hypothesis[42]. The decreases in trading costs immediately after the ASR might also support the reduced inventory cost hypothesis whereby the dealer is willing to reduce the cost of immediacy because she is confident of selling the shares to the investment bank.

Table 3.5 reports the means and medians for the average daily available *Bid size* at the National NBBO for the ASR stocks. Panel A shows the mean and median for all the ASR firms in the sample and statistical test for differences in means and medians. On average, the daily bid size increases by more than 25% between the Pre-ASR and the Post-ASR periods and the change is statistically significant. Panels B and C report the values of average daily bid size for the NYSE listed and Nasdaq listed stocks. The bid size increases by more than 20% and 35%

[42] The number of quotes at the NBBO also significantly increases in the post-ASR period compared to the pre-ASR period, indicating more competition for shares.

respectively for these stocks, respectively. Table 3.6 shows the corresponding results for the average daily *Offer size* for the ASR stocks. The changes in offer size between pre and post ASR periods are also statistically significant when considering the entire sample, or when considering the NYSE and Nasdaq listed stocks separately. The changes between the base period and the post-ASR period are also always statistically significant. Changes in bid and offer size between the announcement day and the average value of the post-ASR period are not always significant but that is mainly because of the jump in the bid and offer sizes on the day of the announcement. Table 3.7 shows the corresponding result for the *market depth*. Results in Table 3.7 show the same trend as that in Tables 3.5 and 3.6. Figure 3.2 shows the average daily Bid size, Offer size and Depth from day -25 to day 25. The trend of these market quality measures increasing post ASR announcement is clearly visible in the plot.

In summary, the bid size, the offer size and the market depth all increase on the day of the announcement of the ASR transaction. There is further increase in these measures of market quality following the announcement (in the post-ASR period). The changes are economically as well as statistically significant. These results suggest that the demand for shares of ASR firms (as reflected by bid size) goes up following the ASR announcement; the supply for shares (as reflected by the offer size) goes up following the ASR announcement. The overall market quality, as reflected by the market depth also improves. Interestingly, the percentage improvement in bid size is higher for the Nasdaq listed stocks whereas the percentage improvement in offer size is higher for the NYSE listed stocks. NYSE listed stocks are typically bigger (in asset size) so there may be a size effect that may be important.

Table 3.8 reports the average daily trading volume in the periods around ASR transactions. On average, trading volume jumps 13% between pre and post ASR periods. The

change in average trading volume between post-ASR and pre-ASR periods is not statistically significant but this may be because of already increased volume even before announcement of the ASR transaction. This might indicate some leakage of information or some anticipatory trading. Unfortunately, it is not possible to see if the investment bank starts trading before the announcement of the ASR transaction using TAQ data alone. If this can be established, it will be a significant result with some policy implications. The pattern of increased trading volume before the announcement of the ASR transaction is, curiously, prevalent on NYSE as well as Nasdaq listed stocks.

Table 3.9 shows results for the average trade size. As the data in this Table suggests, the average trade size increases before the announcement of the ASR transaction. Average trade size jumps by more than 6% between pre and post ASR periods. The average trade size on the day of the ASR announcement is approximately 585 round lots of shares. This is significantly higher than the average trade size of about 551 round lots of shares in the base period. Higher trade size is used as an indicator of institutional or informed trading (Lee and Radhakrishnan (2000)). This might suggest increased presence of some informed traders or institutional traders. It should be noted that I also looked at evidence of institutional trading using dollar bins of trades. As per Campbell, Ramadorai and Schwartz (2009) I classified all trades in dollar bins of trades with dollar value of less than $2,000 or greater than $30,000 (as these are the dollar bins where the institutional traders are most active as they split their trades or trade in big sized orders) and counted the number of such trades in the base period, and also before and after the ASR transaction. A t-test (Wilcoxon rank sum test) of difference in means (medians) in number of transactions in these dollar bins during the base period, pre-ASR period or post-ASR period did not prove significant. This, however, does not imply that there is no institutional trading in

these shares around ASR transactions. Institutions may be spreading there trades more evenly than just these two trading bins. Others have talked about the difficulty in finding institutional trades on the TAQ tapes (e.g. see Lee and Radhakrishnan (2000)).

I also look at the net order flow in shares of the firms in the sample around ASR transactions. These results are reported in Table 3.10. The Net order flow value increases (indicating increase in buy orders) on the day of the announcement of the ASR transaction. In the post-ASR period, the net order flow statistic drops (indicating increased selling). The changes in net order flow, however, are not significant when analyzed together or broken down by main listing exchange (NYSE or Nasdaq).

Figure 3.3 shows the daily measures of trading volume, trade size and net order flow. This figure also indicates that the volume jumps a little even before the announcement of the ASR transaction. Together, the order flow, trade size and volume might point to some interesting trading pattern in ASR stocks immediately preceding the ASR announcement. It seems that institutional investors may be doing some trading before the announcement of the ASR. However, with the limited tests performed here, it is very difficult to pick up the identity of these trades. Higher net order flow and increased trading size together is suggestively indicative, at best, of this trend.

Figure 3.4 shows the average daily intra-day price volatility around the ASR announcement. Table 3.11 shows the intra-day price volatility in the relevant periods around ASR announcements. The Table also shows statistical results for comparisons between average price volatility in the relevant period to the average price volatility in the base period. The data suggests that the volatility increases steadily leading up to the ASR announcement and also in the post-ASR period. The differences between the pre-ASR period and the post ASR period are

statistically significant only for the Nasdaq stocks but the volatility steadily inches up in this period. The average volatility change, when compared to the base period, is positive and significant for NYSE listed stocks and also for the full sample. This positive change suggests increased uncertainty about the price leading up ASR and in the post-ASR period.

In summary, the trading cost measures and market quality measures suggest improved liquidity post ASR. This evidence is in line with ASRs improving competition for order flow. Bid and Offer sizes both increasing on announcement of ASR seems to be in line with increased demand and supply of shares after the ASR announcement. Increase in volume and the change in price suggests that the market reacts to ASR announcements.

Overall, the univariate results support the competing market maker hypothesis (increase in bid size, offer size, and depth, along with decrease in quoted and effective spread measures). This evidence also supports the inventory holding cost hypothesis (decrease in quoted and effective spread and increase in volume). Increase in volatility suggests that there may be some merit in information asymmetry hypothesis too. The combined evidence establishes that from the point of view of market microstructure, ASRs are important events that change the trading characteristics of firms that announce this form of buyback. Some multivariate tests may be needed to further delineate the strength of the hypotheses.

BKT2010 explore a variety of reasons why a firm might include an ASR as a part of a repurchase program and find that takeover attempts, signaling considerations after asset sale, and sometimes even capital structure adjustment might be significant reasons for undertaking an ASR. An increase in information asymmetry component of the spread might support the information asymmetry hypothesis. Bagwell (1991) contends that repurchases decrease information asymmetry whereas Glosten and Milgrom (1985) hypothesize that post repurchase

announcement, informed trading increases in the stock of the firm that announces a repurchase. This increased information asymmetry might be arising from uncertainty in the marketplace about the motivation of managers (why are they consolidating control by buying back shares quickly?). To get a sense of how the information asymmetry changes around ASR announcement, I break up the spread into components using LSB decomposition method, as described earlier in the essay. I pool monthly trades and run regressions every month to decompose the spread. This data is presented in Table 3.12. Panel A shows information asymmetry component of the spread one and two trading months (a trading month is assumed to be 22 trading days), before and after, staring 5 days from the ASR announcement. Panels B and C of this Table show similar data for the NYSE and Nasdaq listed stocks in the sample. The information asymmetry component of the spread is significantly higher in the month after the ASR announcement than it is in the month prior to the ASR. The changes in the spread two months before and after the ASR announcement are not statistically significant but still positive.

Table 3.13 shows regression results using three trading months worth of data from trading window (-88, -44) and also in the trading window (+44, +88). These time periods approximate months (-4, -2) and (+2, +4). This choice is driven by the average number of days it takes from announcement of the ASR transaction to the settlement of the forward contract (as shown in Table 3.1, this length is about 131 days i.e. approximately 4 months). The mean and the median information asymmetry component of the spread and also statistical results testing differences between these across the sample are reported. The results suggest that the differences in mean and median for the entire sample are significant. When broken down by the primary exchange listing, the results are still significant. In summary, the information

asymmetry component of the trade increases post ASR. This supports the information asymmetry hypothesis.

3.4.3 Settlement of ASR agreements:

As reported in Table 3.1, the exact settlement date for 90 of the 214 ASR transactions is known. On average, it takes 131 days from announcement to settlement of the ASR transaction. Using settlement date data, I further see how the trading cost measures, and market quality measures change around the settlement date. These data are shown in Figures 3.5 through 3.8. Visually inspecting these plots shows that trading costs, volume and trade size do not change much on the settlement day. Volatility decreases a little but further inspection shows that the change is not statistically significant. These plots seem to suggest that the changes in market microstructure variables are not large at the final settlement of the ASR (compared to closing of tender offer, e.g. see Ahn, Cao and Choe (2001)). These results might suggest that the financial intermediary does not wait till the very end of the settlement period to close out the trading position.

3.4.4 Multivariate test:

Table 3.14 shows the results for the multivariate regression to see if changes in price, volatility or volume drive all of the observed changes in percentage effective spread. The dependent variable, *Log of relative effective spread*, is the difference in logarithm of percentage effective spread in the post-ASR and the pre-ASR period. *Difference relative volume*, is the difference in ratio of volume in post-ASR period to the base period and the ratio of volume in pre-ASR period to the base period. *Log inverse price* is the logarithm of the inverse of average price per share in the post-ASR period divided by inverse of the average price per share in the

pre-ASR period. *Volatility difference* is the difference in average intra-day volatility in the post-ASR period and the pre-ASR period. *Log market capitalization* is the logarithm of the market capitalization of the firm. Size of the firm may affect the spreads as firms with high market capitalization have higher trading volume and hence higher liquidity. It may be expected that the size of the ASR might be a factor in the spreads. I control for this using the fraction of shares outstanding announced to be bought back in the ASR, denoted by *Percentage equity*. There appears to be some difference in market microstructure properties based on the primary exchange listing of a firm (e.g. see Reinganum (1990) etc.). To capture this, I introduce a dummy variable, *Nasdaq*, which takes a value of 1 if Nasdaq is the primary exchange on which the shares of the firm are listed. Arguably, in the presence of market tradable options in the stock of the firm that announces an ASR, the volatility and information asymmetry can also be traded using options. As such the change in effective spreads will probably be expected to have less impact. I introduce a dummy variable, *Options traded*, that takes a value of 1 if the firm has traded options and 0 otherwise. I also use dummy variables to control for the provisions for collars, caps or floors in the ASR agreement and whether the ASR is simultaneously announced with a repurchase program (*Simultaneous ASR*).

In specification 1, I regress the *Log of relative effective spread* variable on the log inverse price, difference relative volume, and the difference volatility variables. The difference in relative volume between post-ASR and pre-ASR period is positively and significantly related to the change in effective spread during this period. This positive sign goes against the prediction of inventory holding cost hypothesis. As per this hypothesis, increase in volume should be related to decrease in spread and so the sign on the variable should have been negative. The change in volatility is also positively and significantly to the change in effective spread. This

result seems to support the information asymmetry hypothesis. These results suggest that after controlling for changes in price, increases in volatility and trading volume explain increases in spreads.

In specification 2, I control for size of the firm, the primary exchange listing, and also if tradable options exist for the stock. After introducing controls for all these effects, the results do not change. Firm size, the primary exchange listing, or the availability of traded options in the stock of the firm do not explain changes in spreads around ASR announcements. Changes in volume and volatility significantly explain changes in effective spreads.

In specification 3, I introduce the Percentage or equity variable to control for the size of the ASR, and a dummy variable to control for presence of provision for caps, floors or collars in the price of the ASR transaction. I also include the dummy variable, *Simultaneous ASR*, which take a value of 1 if the ASR is one that is simultaneously announced with a new repurchase program. None of these variables show any significance in explaining the changes in effective spreads between the post-ASR and pre-ASR period. In specification 4, I add to the regression the stated motivations for the ASR, as given by the firms at announcement of the transaction. I find that the adjusted R-squared of the resulting regression increases. When firms announce that they are conducting the ASR for capital structure reasons or when they announce that the firm is doing the ASR to buy back shares issued earlier in a benefit plan, the reduction in spreads is significant(at 5% level).[43]

[43] In results not shown here, I also regress the changes in information asymmetry component of spread in the month post and pre ASR announcement on the reasons mentioned for the ASR (by the firm). None of the reasons are statistically significant in explaining the change in information asymmetry component of spread. Change in volume is negatively and significantly related to change in information asymmetry. BKT2010 find that asset sales, or takeover attempts are significant events in the choice to include an ASR in a repurchase program. However, takeovers attempts or assets ales announcements within 15 days prior to the ASR are not significant in explaining changes in spreads around ASR announcements.

Overall, the changes in volatility and volume seem to be significant in explaining changes in spreads. This result, together with evident increase in volume and decrease in spreads supports the competing marker maker hypothesis and the information asymmetry hypothesis.

3.5 Conclusion:

I study the market microstructure effects on stocks of firms that announce Accelerated Share Repurchases. In an ASR, the firm buys a specified number of shares upfront from an investment bank and enters into a forward contract. The investment bank takes a short position in the shares of the firm upfront and then buys the shares from the open market over some time before settling the forward contract. This relatively new way of buying back shares has interesting characteristics from a market microstructure perspective, namely the involvement of the investment bank and the speed of buyback relative to the usual open market share repurchases. ASRs provide a good sample for studying the effect of quick share buyback on the trading characteristics of the firm.

In a hand collected sample of ASRs, I find that the percentage quoted spreads and the percentage effective spreads decrease around ASR announcements. I find that the quoted bid and offer size, and the market depth increase substantially for a period after the announcement of the ASR. I find that traded volume jumps up on ASR announcements. I also find that trade size increases leading up to the ASR announcement and also remains high in the period immediately after the ASR announcement. The intra-day price volatility goes up in the days leading to the ASR and remains high post ASR announcement. Information asymmetry measure using LSB

decomposition of spread shows a statistically significant increase one month after the ASR announcement as compared to one month before the ASR announcement.

These results support the competing market maker hypothesis, whereby the investment bank competes with the specialist traders in the shares of the firm. As per this hypothesis, I find decrease in effective spreads immediately after an ASR announcement. The rise in market depth, bid size and offer size suggest significantly liquidity improvement in the period immediately following an ASR. Increased information asymmetry supports the information asymmetry hypothesis, whereby the specialist is uncertain who she is trading with – a liquidity trader or a sophisticated participant with a mandate for buying shares quickly. Multivariate results show that changes in volatility are important in explaining the changes in effective spreads.

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APPENDIX A

Common Provisions in ASR Contracts

Based on our review of 119 ASR agreements, we describe below the most common contractual provisions included in the agreements, e.g., see

http://www.sec.gov/Archives/edgar/data/354869/000095015206000339/l18060aexv99w1.htm

Standard provisions of ASR agreements:

- Date on which the intermediary will deliver the initial shares to the firm
- Number of initial shares the intermediary will borrow and deliver
- Price the firm will pay the intermediary for each initial share delivered
- Time period in which intermediary will purchase shares to cover its short position
- Time period over which the settlement price will be calculated
- Define volume weighted average price (VWAP) per share over specified period using only trades that qualify under SEC Rule 10b-18(b), i.e., excluding trades at the opening and during the last 30 minutes of the trading session (or last 10 minutes for liquid stocks) and trades where price exceeds the highest independent bid or the last independent transaction price
- Calculate settlement price as VWAP minus a discount to compensate firm for opportunity cost of full prepayment for initial shares when intermediary actually acquires these shares (closes its short position) over a period of several months
- Define cap or floor, if any, for the settlement amount
- Rights of each party to determine the method of settlement, i.e., cash or shares
- Provisions to reimburse the intermediary for costs incurred if they receive primary shares at settlement, e.g., private placement agreement, discount at resale, etc.
- Stipulations for altering the agreement based on regular and extraordinary dividends, merger announcements, market disruptions, etc.
- Requirement that firm must use the intermediary to repurchase any shares between ASR initiation and settlement
- Statement that firm will not attempt to evade SEC Rule 10b5-1 (insider trading) and will not seek to control or influence the intermediary's purchases or sales

- Statement that the firm will give the intermediary written notice of a distribution of shares relating to Regulation M
- Reference definitions in the 2002 ISDA Equity Derivatives Definitions

Non-Standard provisions of ASR agreements, in approximate order of most frequently observed to least frequently observed:

- Stipulate a maximum or minimum number of shares to be repurchased
- Specify a maximum cost (basis points per annum) that the intermediary is willing to incur to borrow the firm's shares
- Specify a per share brokerage fee to be paid to the intermediary for initial shares
- Specify an up-front fee to be paid to the intermediary
- Define multiple delivery dates for the initial shares
- Define intermediate settlement dates

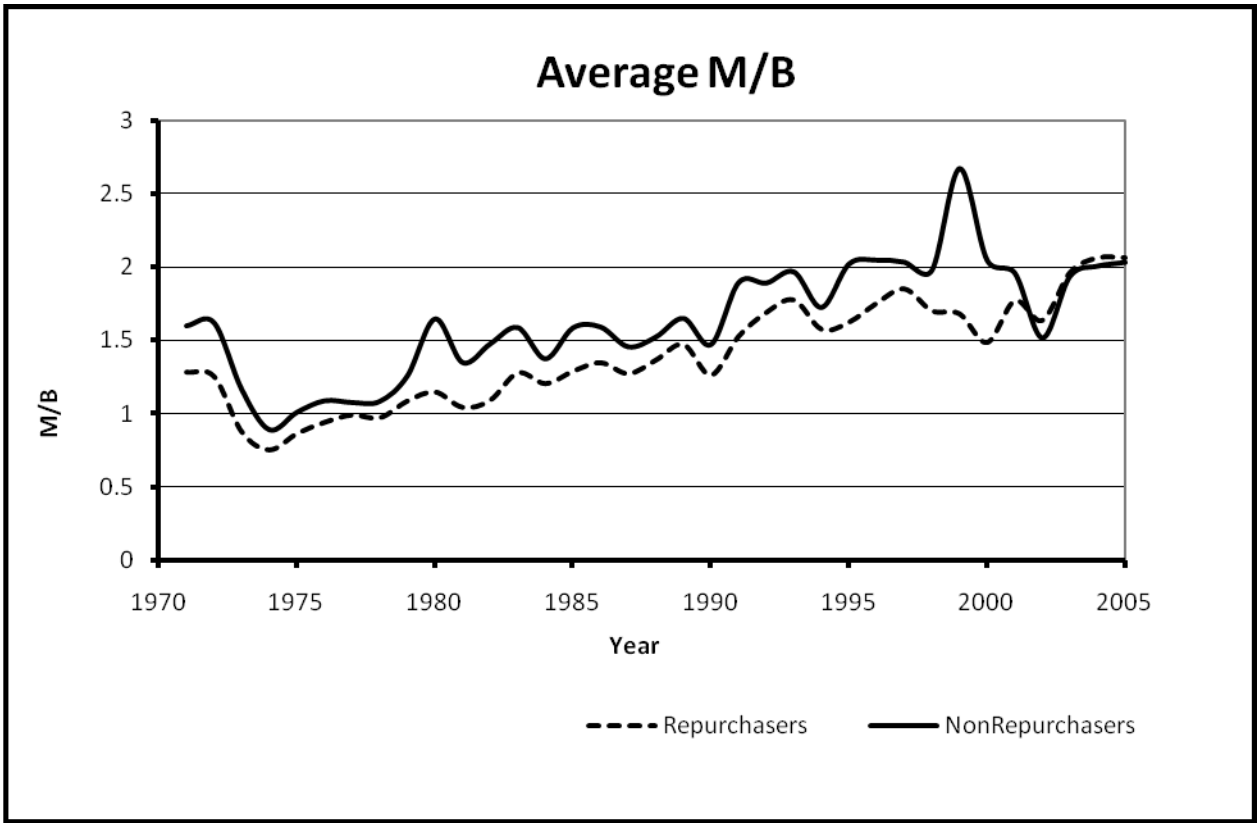
4.0 Figures

Figure 1.1: Market-to-Book ratios of repurchasers and non-repurchasers

Figure 1.1 shows the Market to Book ratio of repurchasers and non-repurchasers. *Repurchasers* are firms that have repurchased (as indicated by Purchase of Common and Preferred Stock (Compustat data item 115) after adjustments to the decrease in Preferred Stock Redemption Value (item 56) from the year before) more than 1% of their market value of equity. *Non-repurchasers* are firms that have repurchased none or less than 1% of their market value of equity for the year. Market Value is defined as market equity at calendar year end (item 24 times item 25). Book Equity is Stockholder's Equity (item 216) minus Preferred Stock (item 10). Market-to-Book (M/B) is Book Assets – Book Equity + Market equity divided by book assets. Average is the equally weighted average M/B for all the firms in the sample for the particular year.

Panel A shows the average M/B for repurchasers (dotted line) and non-repurchasers.(solid line). Horizontal axis is the fiscal year. Panel B shows the Value Weighted, weighted by the book value of equity, M/B for repurchasers (dotted line) and non-repurchasers (solid line). Horizontal axis represents the fiscal year.

Panel A:



Panel B:

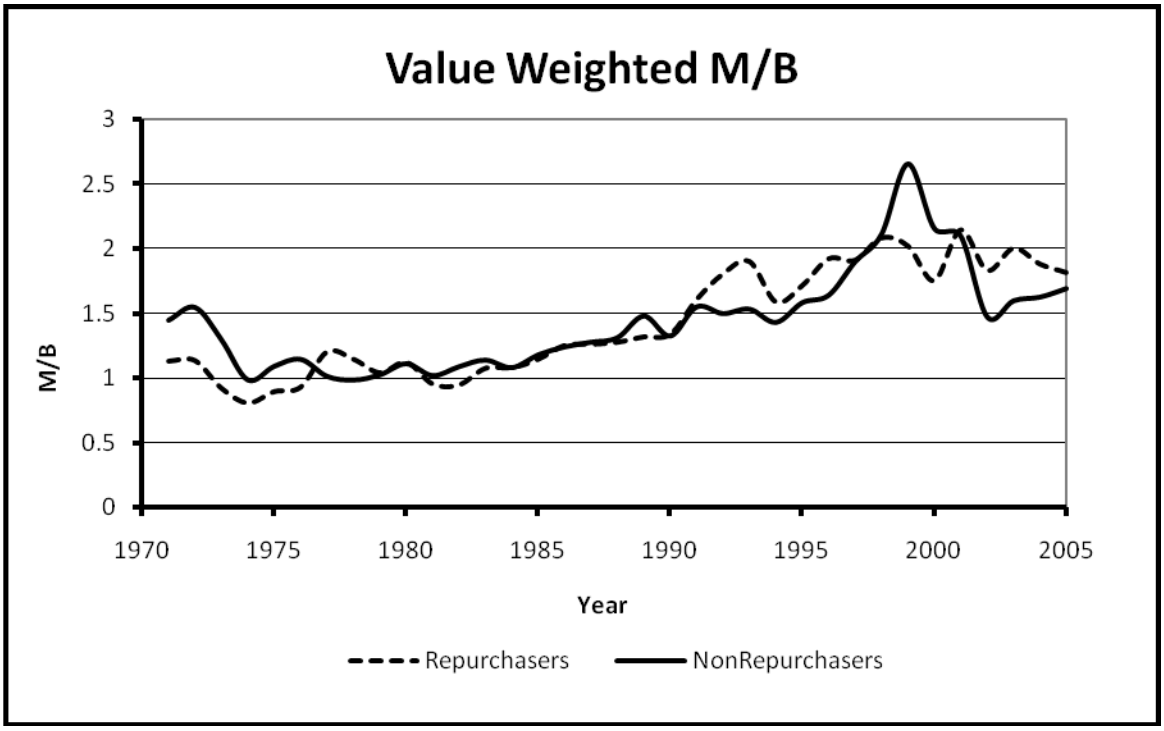

Value Weighted M/B
M/B
3
2.5
2
1.5
1
0.5
0
1970
1975
1980
1985
1990
1995
2000
2005
Year
Repurchasers
NonRepurchasers

Figure 1.2: Repurchase premium

Figure 1.2 shows the Repurchase Premium. Equal Weighted Repurchase Premium is represented by dotted line and the Value Weighted Repurchase Premium is represented by the solid line. Horizontal axis is the fiscal year.

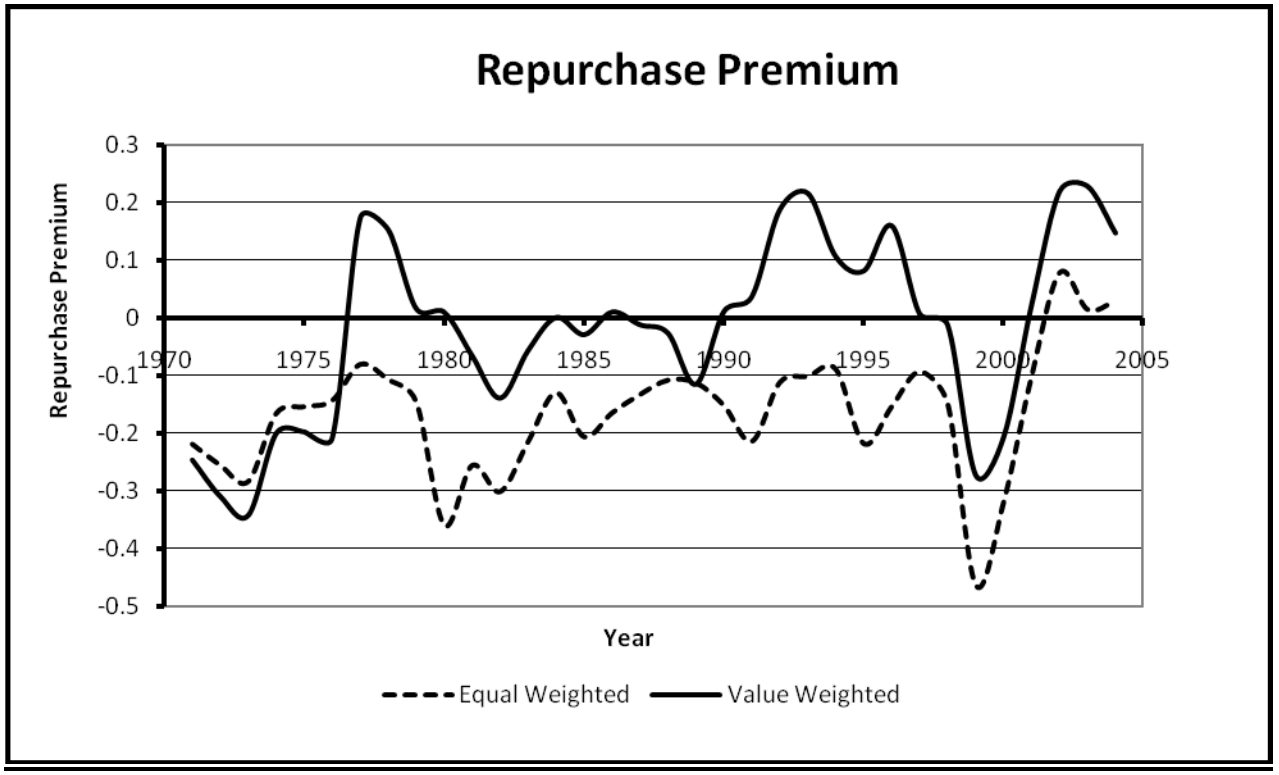


Figure 1.3: Relation between rate of initiation and VW repurchase premium

Figure 1.3 shows the rate of initiation of repurchases and the two year lagged value weighted repurchase premium. The log difference in value weighted market-to-book ratio of repurchases and non-repurchasers is the *VW Rep Premium* (right axis). $Initiate_t$ is the rate of initiation of repurchases in a particular year t. (Left axis). The horizontal axis is years.

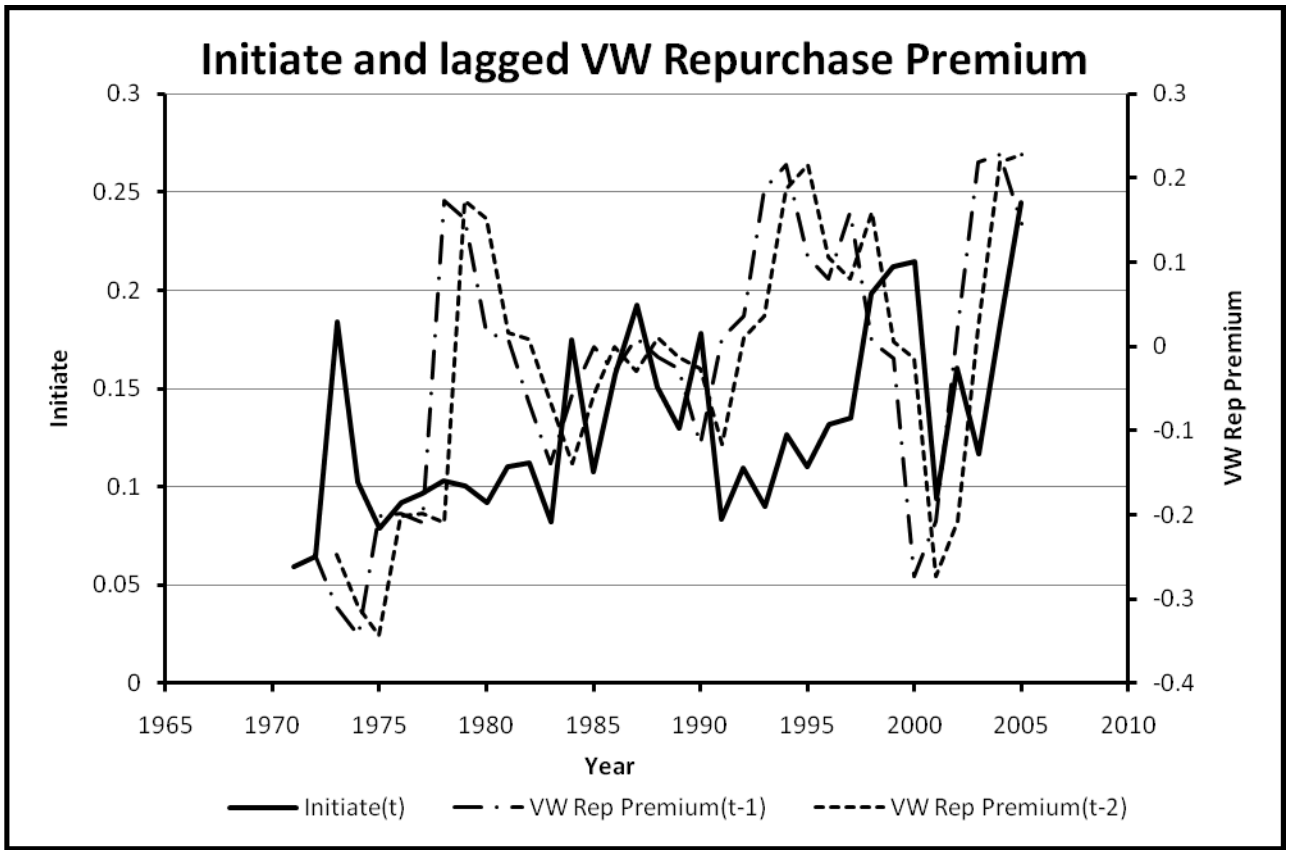


Figure 1.4: Relation between sentiment and VW repurchase premium

SENTIMENT is a "composite index of sentiment that is based on the common variation in six underlying proxies for sentiment: the closed end fund discount, NYSE share turnover, the number and average first day returns on IPOs, the equity share in new issues and the dividend premium" (Baker and Wurgler (2006)). Values of this variable are taken from Baker and Wurgler (2006). VW Rep Premium is the Value Weighted Repurchase Premium. Figure 1.4 shows the variable SENTIMENT and two year lagged values of VW Repurchase Premium. Horizontal axis represents fiscal year

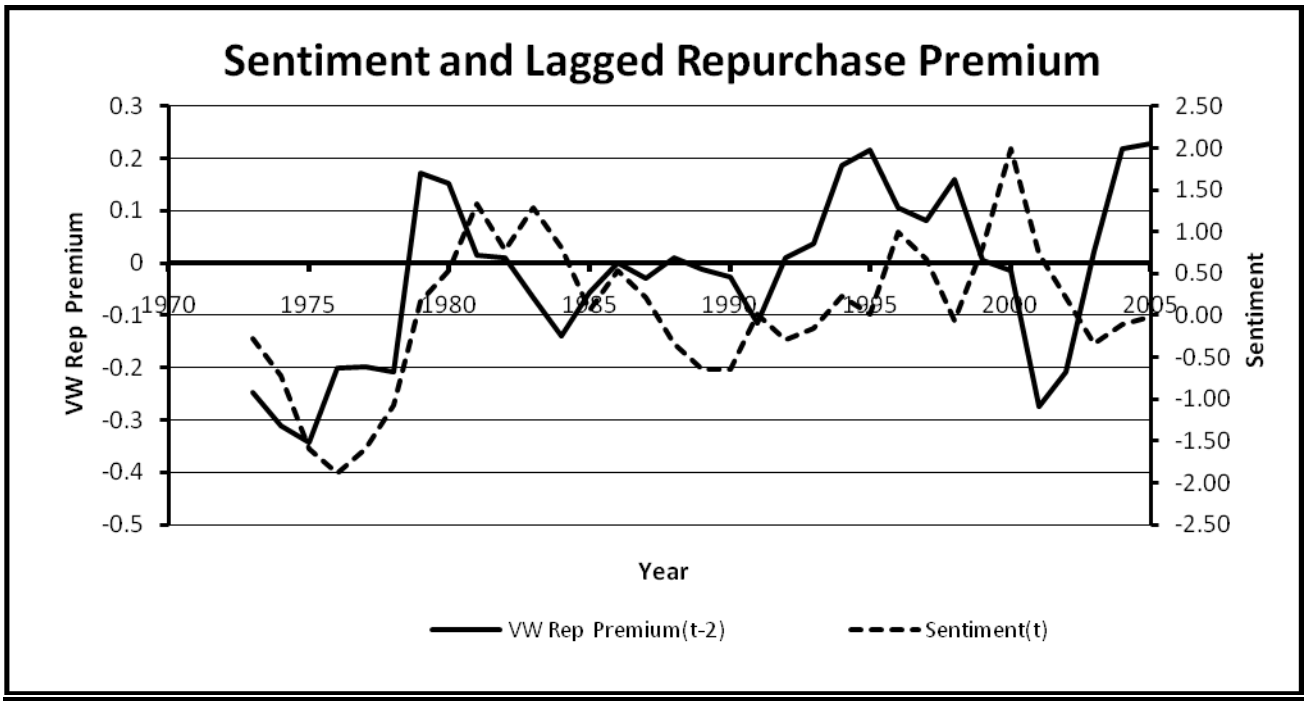


Figure 2.1: Accelerated share repurchase structure and timeline

In an accelerated share repurchase, a firm enters into a contract with an intermediary, typically an investment bank, whereby the intermediary immediately delivers a specified number of the firm's shares in exchange for cash based on an agreed upon price per share (ordinarily the most recent closing price). The intermediary obtains the shares that it delivers to the repurchasing firm by borrowing them, typically from institutions. The intermediary then covers its short position by purchasing shares in the market over a specified time period, normally several months. The ASR contract also includes a provision whereby the repurchasing firm is required to compensate or is entitled to receive compensation from the intermediary in shares or cash. The amount of compensation is based on part or all of the difference between the initial price per share paid to the intermediary and the estimated price per share the firm would have paid for the shares in an open market repurchase (OMR) conducted during the same period over which the intermediary buys the shares to cover its short position. The settlement terms are also structured to compensate the repurchasing firm for the opportunity cost of full prepayment for the initial shares when the intermediary actually acquires these shares (closes its short position) over a period of several months. Note that, absent any contractual caps or floors on the settlement amount, the repurchasing firm bears all of the risk of changes in its stock price between ASR initiation and settlement. Thus, the intermediary essentially acts as the firm's proxy in borrowing the firm's shares and the proceeds the intermediary receives at initiation are a source of financing for the intermediary. In sum, ASRs are repurchases with an associated forward contract that can be settled in cash or shares of the firm.

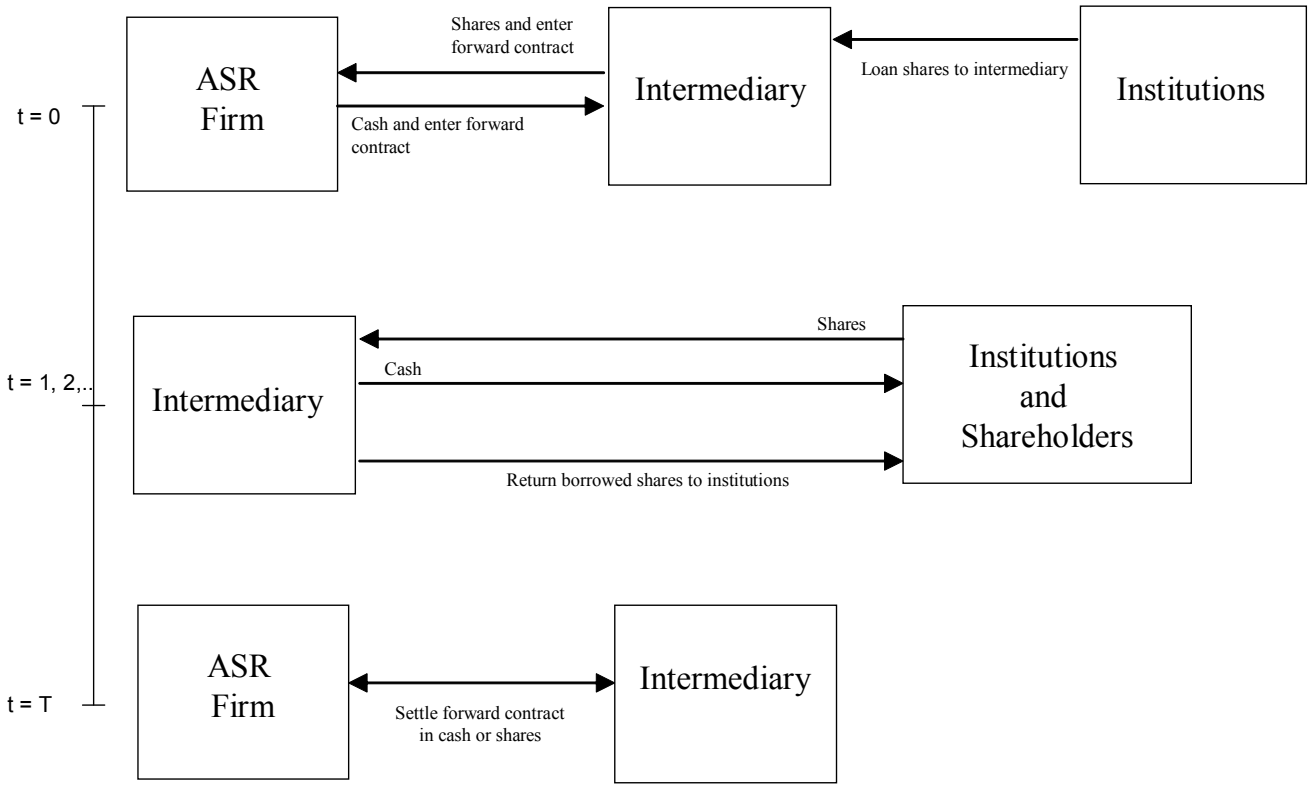


Figure 2.2: Ratio of announced ASRs to repurchase program announcements by year

For each year of the sample period we calculate the ratio of ASR announcements to total repurchase programs announcements.

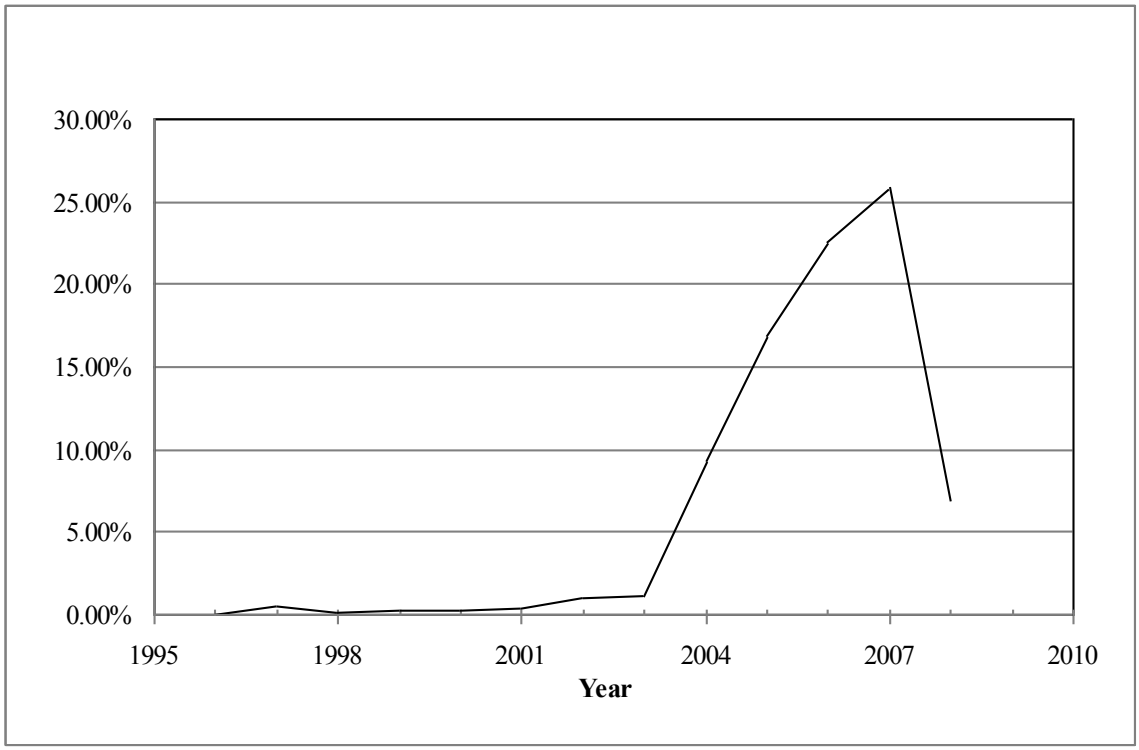


Figure 2.3: The frequency of ASRs and potential alternatives to ASRs by year

For each year of the sample period we report the frequency of announcements of: ASRs, privately negotiated repurchases, fixed-price self-tender offers, Dutch-auction self-tender offers, and large special dividends (defined as greater than five percent of outstanding equity). Data on self-tender offers and privately negotiated repurchases are from SDC and data on special dividends are from CRSP.

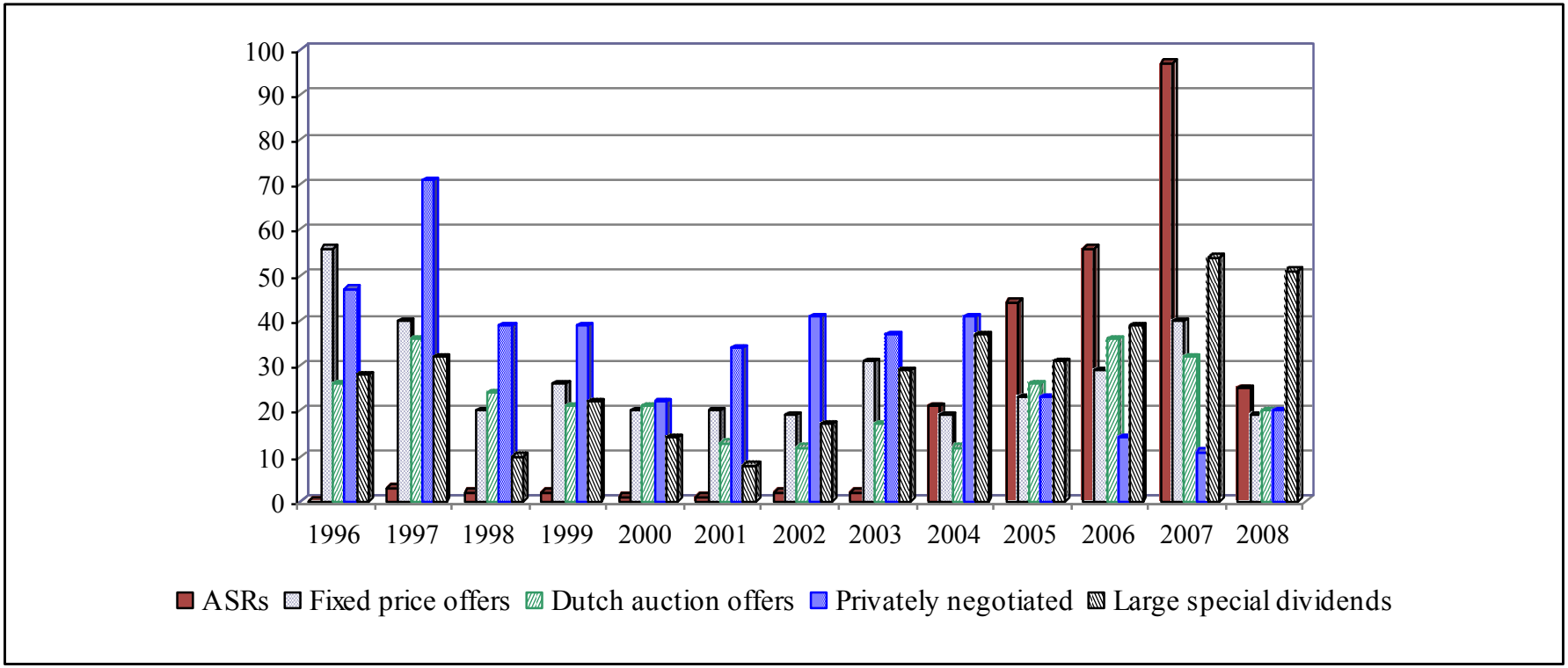


Figure 2.4: The dollar volume of ASRs and potential alternatives to ASRs by year

For each year of the sample period we report the dollar volume of completed: ASRs, privately negotiated repurchases, fixed-price self-tender offers, Dutch-auction self-tender offers, and large special dividends (defined as greater than five percent of outstanding equity). Data on self-tender offers and privately negotiated repurchases are from SDC and data on special dividends are from CRSP.

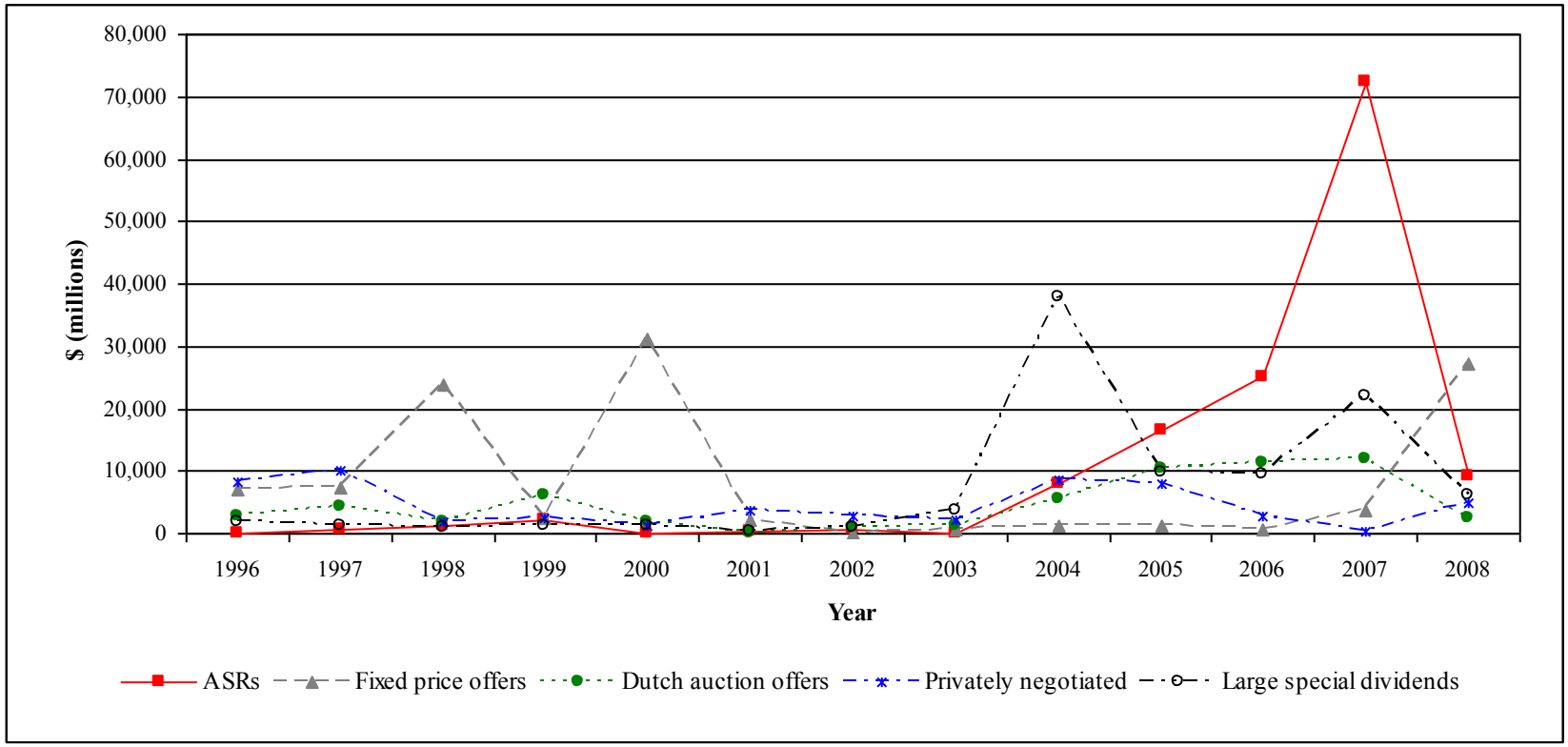


Figure 3.1: Trading cost around announcement of ASRs

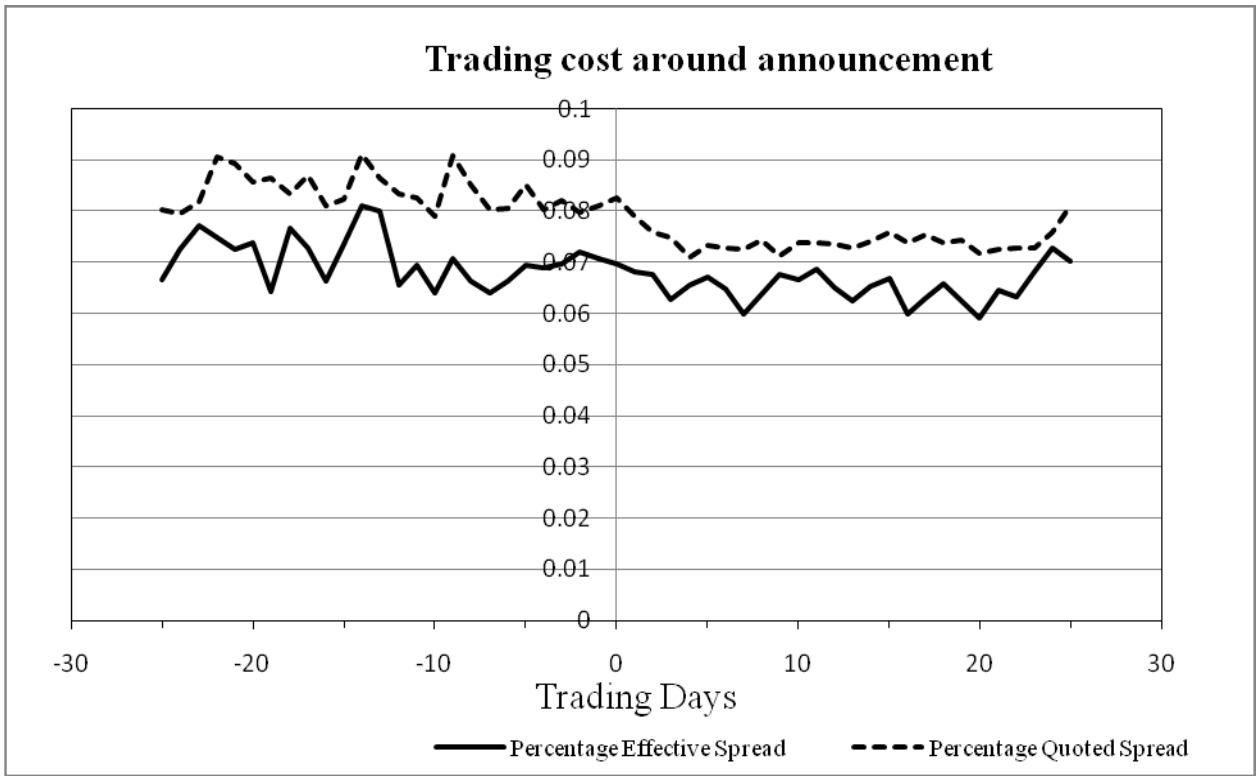


Figure 3.2: Market quality around ASR announcement

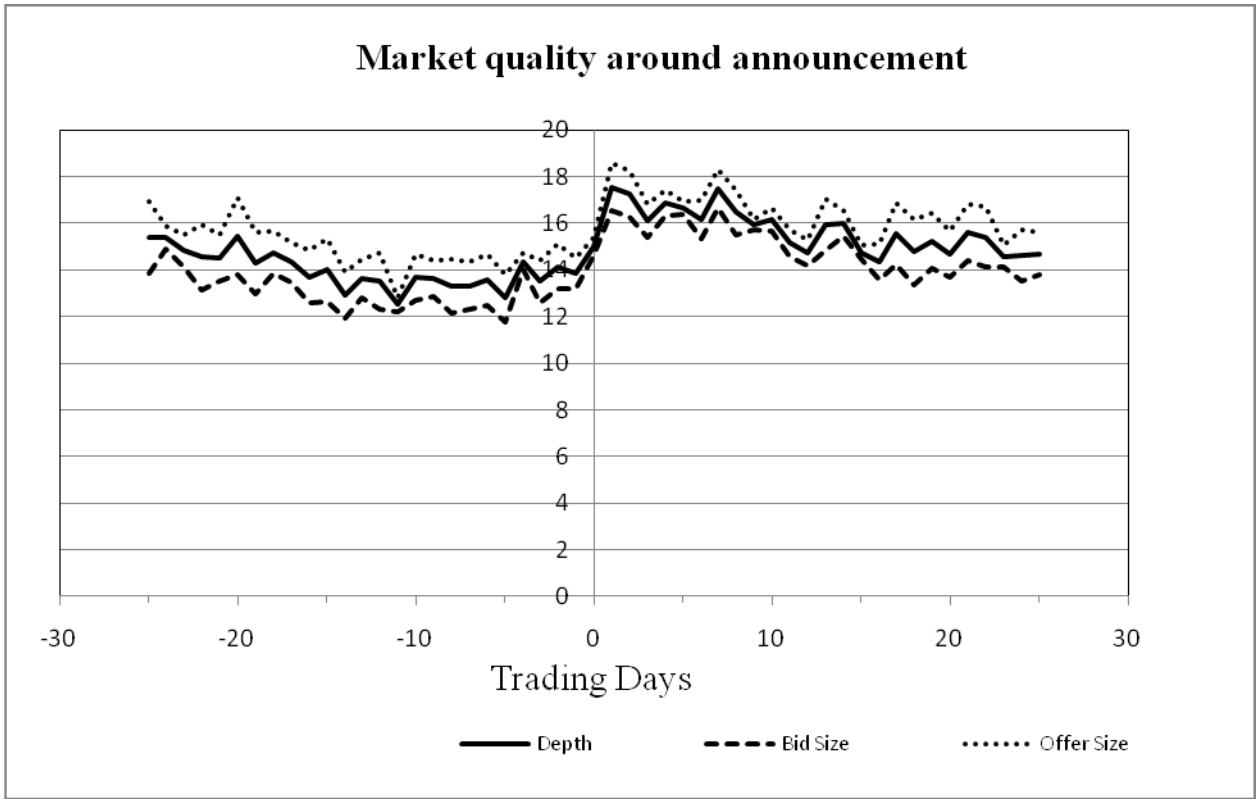


Figure 3.3: Volume, trade size and order flow around ASR announcement

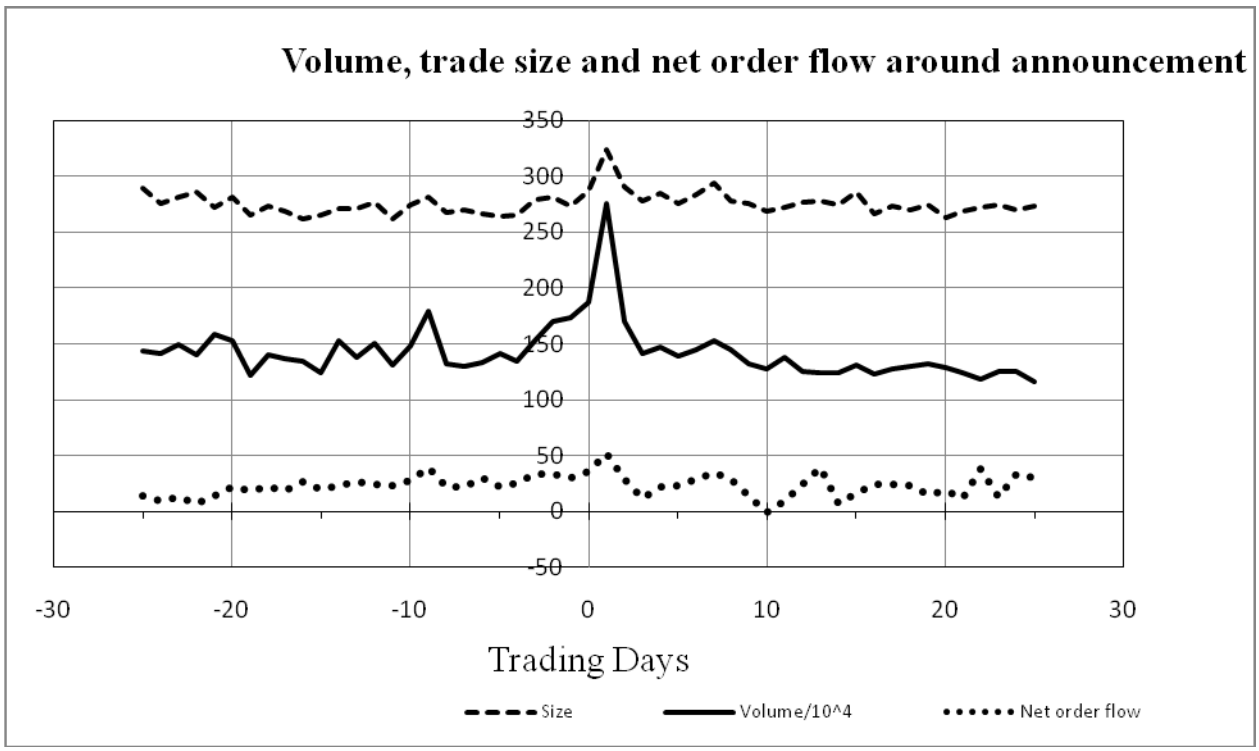


Figure 3.4: Price volatility around ASR announcement

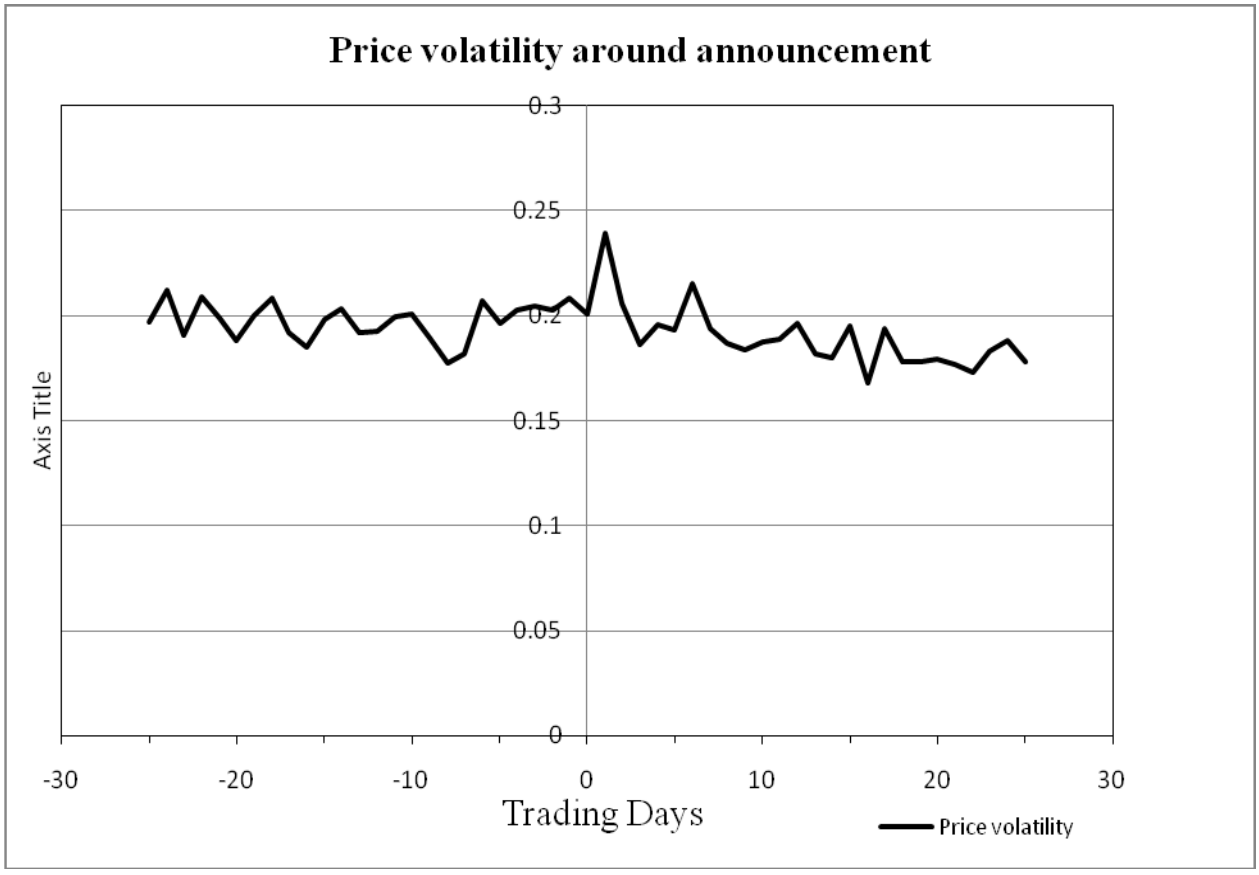


Figure 3.5: Trading cost around ASR settlement

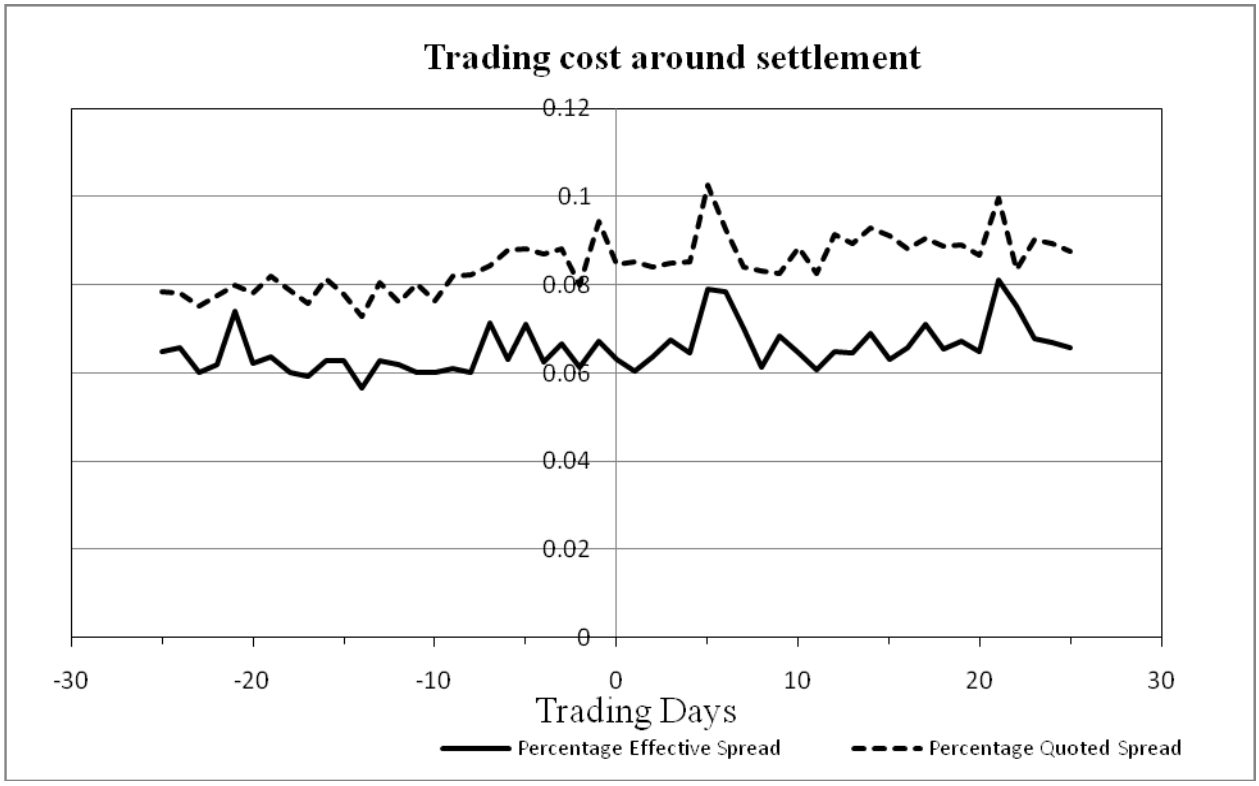


Figure 3.6: Market quality around ASR settlement

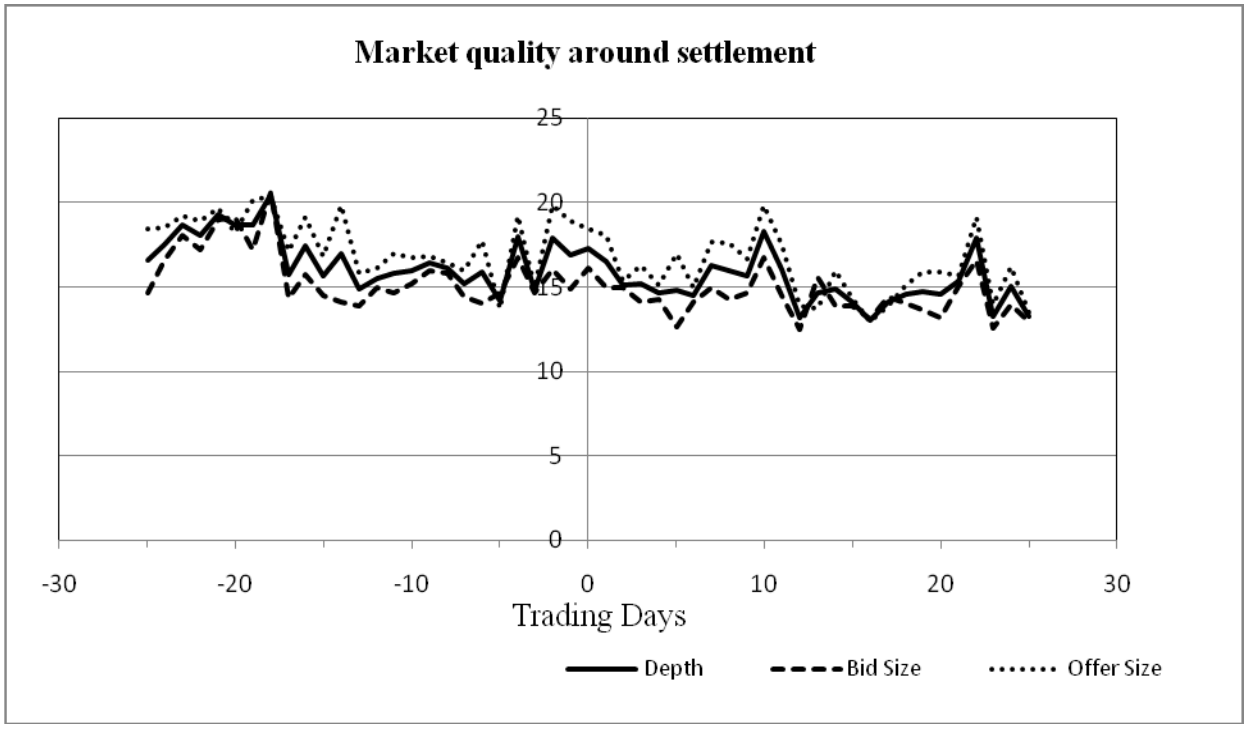


Figure 3.7: Volume, trade size and order flow around settlement

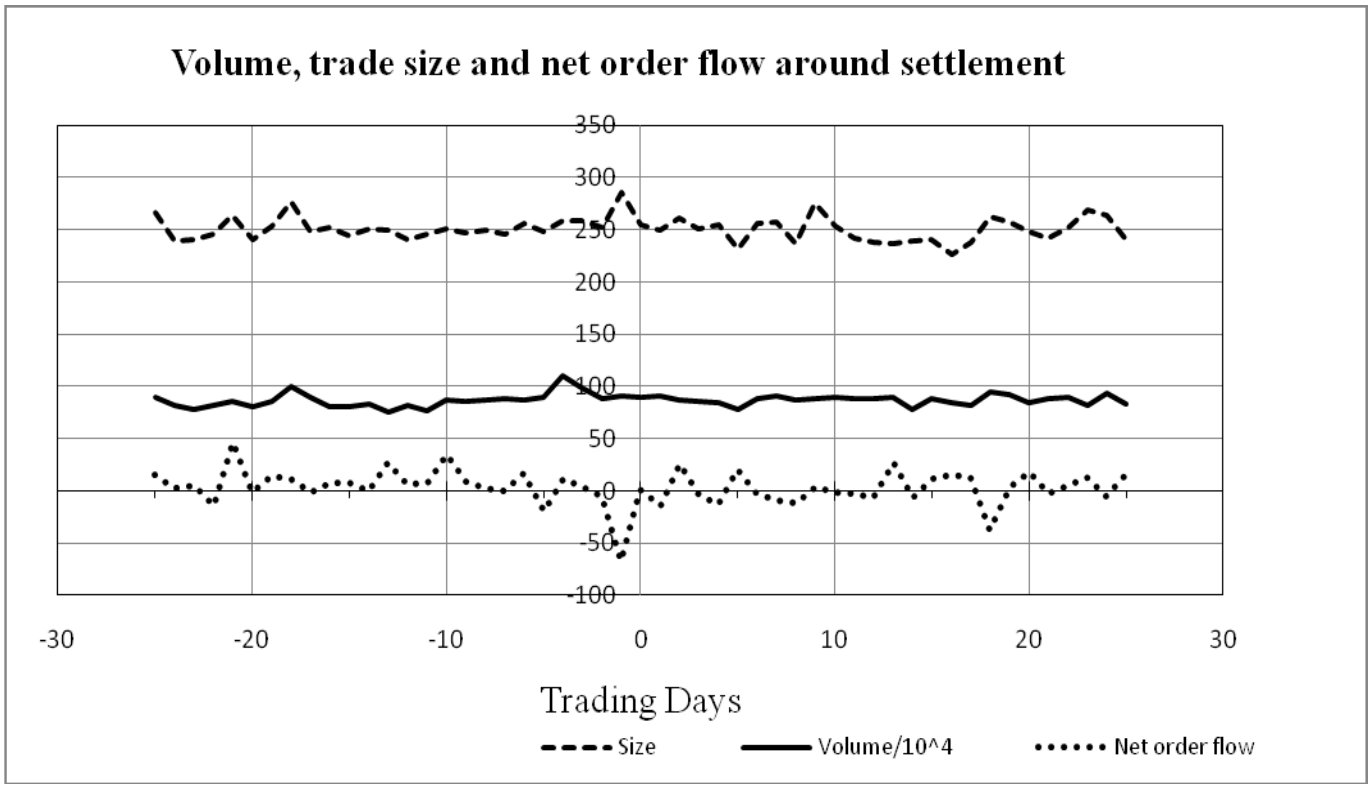
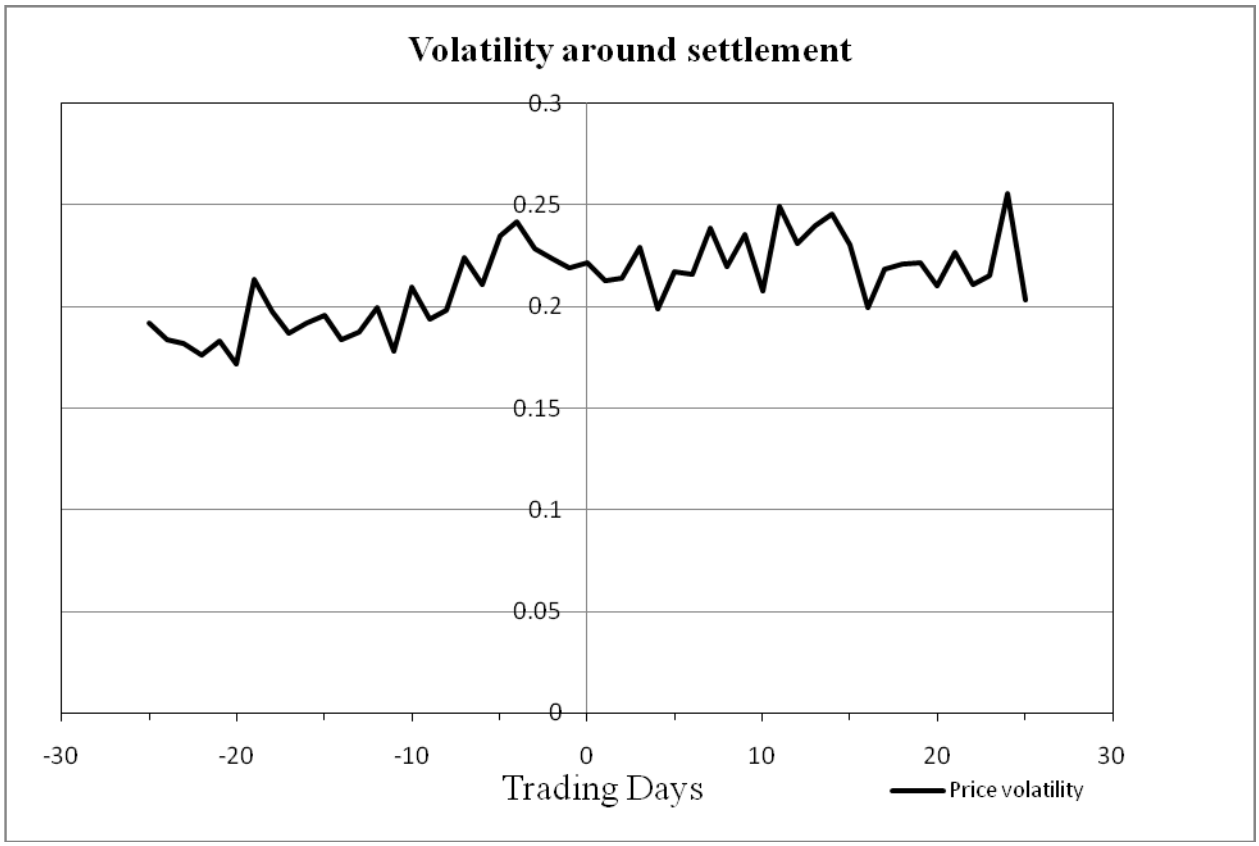


Figure 3.8: Price volatility around ASR settlement



5.0 Tables

Table 1.1: Information about Repurchases

Repurchasers are firms that have repurchased (as indicated by Purchase of Common and Preferred Stock (Compustat Industrial Annual Data Item 115) after adjustments to the decrease in Preferred Stock Redemption Value (data56) from the year before) more than 1% of their market value of equity. *Non-repurchasers* are firms that have repurchased none or less than 1% of their market value of equity for the year. Total indicates the number of firms from amongst the sample for a particular calendar year. *New Repurchasers* are repurchasers that were part of the sample for the previous year but did not repurchase stock in the last year but are repurchasers for the current year. *Old Repurchasers* are repurchasers that repurchased last year too. *List Repurchasers* are repurchasers that are new repurchasers but were not in the sample last year. *Initiate* is the rate for initiation of new repurchasers for the current year. *Continue* refers to the fraction of repurchasers that are old repurchasers and *Listrep* is the fraction of repurchasers that are List Repurchasers. Sample is gathered from the Compustat Industrial Annual Database from 1971- 2005.

	Repurchasers				Non Repurchasers	Payment Rates		
Year	Total	New	Old	List	Total	Initiate	Continue	Listrep
1971	194	136	-	58	2601	5.91%	-	11.22%
1972	251	154	51	46	2888	6.43%	27.42%	8.52%
1973	649	469	118	62	2638	18.38%	50.43%	16.76%
1974	559	239	264	56	2657	10.26%	44.44%	17.50%
1975	432	191	197	44	2693	7.88%	39.48%	15.88%
1976	423	225	147	51	2790	9.20%	37.31%	14.25%
1977	474	243	173	58	2747	9.64%	46.51%	18.95%
1978	528	250	199	79	2849	10.29%	46.28%	16.88%
1979	531	249	222	60	2960	10.06%	47.23%	12.27%
1980	521	230	216	75	3009	9.17%	46.06%	15.82%
1981	559	259	196	104	3126	11.04%	43.75%	15.25%
1982	577	298	216	63	2759	11.23%	48.76%	14.65%
1983	449	180	175	94	3112	8.18%	36.38%	11.84%
1984	693	422	164	107	2880	17.51%	46.20%	16.09%
1985	561	239	228	94	2732	10.77%	42.30%	16.32%
1986	611	273	193	145	2720	15.70%	47.30%	17.04%
1987	827	421	257	149	2111	19.28%	64.09%	18.40%
1988	647	230	315	102	2182	15.04%	48.99%	16.69%
1989	529	215	238	76	2132	12.95%	47.50%	13.57%
1990	634	290	253	91	1971	17.81%	58.84%	16.11%
1991	376	125	162	89	2219	8.32%	32.53%	14.13%
1992	410	182	138	90	2439	10.94%	46.15%	11.26%
1993	397	170	132	95	2679	9.00%	39.76%	11.03%
1994	510	247	155	108	2834	12.66%	46.83%	12.20%
1995	551	232	206	113	2913	11.01%	50.00%	11.96%
1996	685	276	263	146	3021	13.20%	59.64%	13.53%
1997	727	288	326	113	2850	13.52%	60.48%	13.47%
1998	961	427	393	140	2301	19.82%	69.19%	19.07%
1999	1001	350	488	162	2091	21.22%	65.77%	21.74%
2000	921	291	508	122	1910	21.46%	68.56%	18.74%
2001	534	137	323	74	1783	9.38%	48.14%	15.71%
2002	570	222	263	85	1842	16.08%	59.64%	13.32%
2003	538	169	277	92	2015	11.66%	56.65%	14.74%
2004	598	243	277	78	2104	18.37%	59.44%	12.70%
2005	651	247	353	51	1648	24.49%	74.95%	12.26%
Mean	573.69	251.97	237.82	90.63	2520.17	13.08%	50.21%	14.85%
SD	173.25	83.49	97.49	31.66	424.39	4.73%	10.87%	2.83%

Table 1.2: Repurchase Premium

Year is fiscal year. *M/B* is Market-to-Book ratio. *EW* indicates equally weighted, *VW* indicates Value Weighted (by the book equity). EW (VW) Repurchase Premium is the Log of EW (VW) M/B for repurchasers minus log of EW (VW) M/B for non-repurchasers. Repurchasers and Non-Repurchasers are classified as in Table 1.1.

	Repurchaser		Non-Repurchaser		Repurchase Premium	
Year	EW M/B	VW M/B	EW M/B	VW M/B	EW	VW
1971	1.2822	1.1275	1.5962	1.4434	-0.2190	-0.2470
1972	1.2520	1.1317	1.6166	1.5432	-0.2556	-0.3101
1973	0.8753	0.9180	1.1622	1.2934	-0.2835	-0.3428
1974	0.7516	0.8035	0.8872	0.9822	-0.1658	-0.2009
1975	0.8626	0.8916	1.0064	1.0871	-0.1541	-0.1983
1976	0.9395	0.9264	1.0846	1.1418	-0.1436	-0.2091
1977	0.9895	1.2000	1.0730	1.0098	-0.0810	0.1726
1978	0.9704	1.1430	1.0804	0.9816	-0.1074	0.1523
1979	1.0847	1.0370	1.2545	1.0208	-0.1454	0.0157
1980	1.1468	1.1184	1.6427	1.1080	-0.3594	0.0094
1981	1.0419	0.9507	1.3458	1.0156	-0.2559	-0.0661
1982	1.0899	0.9436	1.4732	1.0850	-0.3014	-0.1396
1983	1.2773	1.0724	1.5838	1.1355	-0.2151	-0.0572
1984	1.2040	1.0767	1.3713	1.0766	-0.1301	0.0001
1985	1.2878	1.1421	1.5830	1.1764	-0.2064	-0.0296
1986	1.3463	1.2499	1.5878	1.2379	-0.1650	0.0096
1987	1.2716	1.2583	1.4528	1.2741	-0.1332	-0.0125
1988	1.3637	1.2737	1.5196	1.3085	-0.1082	-0.0270
1989	1.4707	1.3154	1.6466	1.4766	-0.1129	-0.1156
1990	1.2615	1.3357	1.4690	1.3218	-0.1522	0.0105
1991	1.5263	1.6048	1.8913	1.5473	-0.2144	0.0365
1992	1.6878	1.8033	1.8880	1.4951	-0.1121	0.1874
1993	1.7743	1.8979	1.9640	1.5299	-0.1016	0.2155
1994	1.5745	1.5860	1.7218	1.4272	-0.0894	0.1055
1995	1.6226	1.7130	2.0185	1.5797	-0.2183	0.0810
1996	1.7526	1.9196	2.0442	1.6372	-0.1539	0.1592
1997	1.8498	1.9079	2.0304	1.8962	-0.0931	0.0062
1998	1.7005	2.0801	1.9750	2.1083	-0.1497	-0.0134
1999	1.6794	2.0181	2.6687	2.6527	-0.4631	-0.2734
2000	1.4845	1.7510	2.0430	2.1538	-0.3193	-0.2070
2001	1.7688	2.1428	1.9563	2.0945	-0.1007	0.0228
2002	1.6359	1.8303	1.5139	1.4705	0.0775	0.2189
2003	1.9616	2.0011	1.9343	1.5938	0.0140	0.2276
2004	2.0615	1.8783	2.0035	1.6224	0.0286	0.1465
2005	2.0621	1.8131	2.0287	1.6886	0.0163	0.0711
Mean	1.3975	1.4247	1.6320	1.4348	-0.1593	-0.0172
SD	0.3551	0.4148	0.3864	0.3873	0.1103	0.1585

Table 1.3: Announcement Returns

Year is fiscal year. N is the number of firms that made a share repurchase announcement, as indicated in SDC database, which could be matched to a Compustat firm in the same fiscal year for existence, irrespective of whether it bought back any shares at all. Total Firms is the total number of firms in the Compustat sample for the fiscal year. Fraction is N divided by Total Firms. This represents the fraction of firms from the Compustat sample that announced a share buyback in the year. *Market Adjusted Returns* are returns for 3 days surrounding the repurchase announcement, from day -1 to day +1, relative to the announcement adjusted by market returns. CRSP value weighted market index is used as the appropriate proxy for market return. Announcement dates are gathered from SDC database. The SDC database has repurchase announcements from 1981 onwards. *AR* is the adjusted announcement return for a particular year. It is obtained for by dividing the Market Adjusted Return of a firm by the product of square root of three times the standard deviation of excess return, calculated using data from 120 calendar days before the announcement to 5 trading days prior to the announcement of repurchase program. Data from individual firms that announce repurchases in the same year are averaged to get the standardized announcement return for the year. AR_t represents this average across all firms that announced share buybacks in year t.

Year	N	Total Firms	Fraction	Market Adjusted Returns	AR_t
1981	5	3685	0.14%	3.33%	0.3225
1982	15	3336	0.45%	2.32%	0.3076
1983	71	3561	1.99%	2.39%	0.6141
1984	249	3573	6.97%	2.08%	0.4231
1985	115	3293	3.49%	2.72%	0.4268
1986	123	3331	3.69%	1.04%	0.4672
1987	427	2938	14.53%	0.34%	0.1182
1988	146	2829	5.16%	1.11%	0.2615
1989	291	2661	10.94%	1.77%	0.4869
1990	407	2605	15.62%	2.21%	0.4165
1991	168	2595	6.47%	2.46%	0.4267
1992	248	2849	8.70%	1.27%	0.4403
1993	263	3076	8.55%	2.08%	0.6029
1994	369	3344	11.03%	1.89%	0.7232
1995	394	3463	11.38%	1.84%	0.8048
1996	494	3706	13.33%	2.12%	0.6790
1997	479	3577	13.39%	2.40%	0.5545
1998	739	3261	22.66%	2.33%	0.4100
1999	523	3091	16.92%	2.01%	0.3800
2000	298	2830	10.53%	1.85%	0.2952
2001	209	2317	9.02%	1.35%	0.1598
2002	167	2412	6.92%	1.22%	0.1469
2003	180	2553	7.05%	2.04%	0.3521
2004	247	2702	9.14%	1.16%	0.4152
2005	278	2299	12.09%	1.40%	0.4501
Mean	287.50	3035.48	9.21%	1.87%	0.4274
SD	166.86	435.77	5.21%	0.64%	0.1715

Table 1.4: Repurchase Premium Proxies

EW Repurchase Premium and *VW Repurchase Premium* are equally weighted and value weighted repurchase premium, as described in Table 1.2. *AR* is the standardized announcement return for firms that announced share buyback in a given year, as described in Table 1.3. $r^{B}_{t+1} - r^{NB}_{t+1}$ is the difference in returns on a value weighted portfolio of repurchasers and non-repurchasers in the year t+1. $R^{B}_{t+1,\ t+3} - R^{NB}_{t+1,\ t+3}$ is the difference in returns on a value weighted portfolio of repurchasers and non-repurchasers from year t+1 to year t+3.

	Repurchase Premium				
Year	EW	VW	AR	$r^{B}_{t+1} - r^{NB}_{t+1}$	$R^{B}_{t+1,\ t+3} - R^{NB}_{t+1,\ t+3}$
1971	-0.2190	-0.2470	-	-2.72%	-6.39%
1972	-0.2556	-0.3101	-	-5.97%	15.50%
1973	-0.2835	-0.3428	-	3.22%	43.30%
1974	-0.1658	-0.2009	-	14.26%	22.61%
1975	-0.1541	-0.1983	-	12.58%	10.16%
1976	-0.1436	-0.2091	-	9.43%	5.54%
1977	-0.0810	0.1726	-	2.68%	-40.86%
1978	-0.1074	0.1523	-	-27.63%	-0.34%
1979	-0.1454	0.0157	-	3.28%	11.64%
1980	-0.3594	0.0094	-	-4.06%	18.94%
1981	-0.2559	-0.0661	0.3225	7.39%	4.95%
1982	-0.3014	-0.1396	0.3076	-3.01%	0.62%
1983	-0.2151	-0.0572	0.6141	10.85%	1.06%
1984	-0.1301	0.0001	0.4231	5.20%	-5.34%
1985	-0.2064	-0.0296	0.4268	-4.32%	-3.50%
1986	-0.1650	0.0096	0.4672	-4.85%	-13.65%
1987	-0.1332	-0.0125	0.1182	0.47%	-2.74%
1988	-0.1082	-0.0270	0.2615	-8.12%	3.14%
1989	-0.1129	-0.1156	0.4869	1.17%	-5.17%
1990	-0.1522	0.0105	0.4165	2.07%	-1.97%
1991	-0.2144	0.0365	0.4267	1.37%	-10.69%
1992	-0.1121	0.1874	0.4403	-5.30%	14.44%
1993	-0.1016	0.2155	0.6029	1.92%	4.08%
1994	-0.0894	0.1055	0.7232	14.34%	-0.96%
1995	-0.2183	0.0810	0.8048	2.45%	-2.78%
1996	-0.1539	0.1592	0.6790	-0.43%	-15.77%
1997	-0.0931	0.0062	0.5545	6.36%	-7.96%
1998	-0.1497	-0.0134	0.4100	-21.14%	11.95%
1999	-0.4631	-0.2734	0.3800	25.58%	21.06%
2000	-0.3193	-0.2070	0.2952	15.58%	3.91%
2001	-0.1007	0.0228	0.1598	-2.17%	-86.62%
2002	0.0775	0.2189	0.1469	-7.62%	-10.10%
2003	0.0140	0.2276	0.3521	-7.96%	-15.36%
2004	0.0286	0.1465	0.4152	-8.21%	-7.05%
2005	0.0163	0.0711	0.4501	-10.90%	6.03%
Mean	-0.1593	-0.0172	0.4274	0.45%	-1.09%
SD	0.1103	0.1585	0.1715	0.1023	0.2059

Table1.5: Correlations

Proxies are as defined in Table 1.4. Correlations between al the proxies are shown here. p-values of significance of correlations are included in parentheses. * indicates significance at 10% level, ** indicates significance at 5% level and *** indicates significance at 1% level

	Repurchase Premium			Future Returns	
	EW	VW	AR	$r^{B}_{t+1} - r^{NB}_{t+1}$	$R^{B}_{t+1, t+3} - R^{NB}_{t+1, t+3}$
EW Rep Premium	1				
VW Rep Premium	0.6721***	1			
	(0.0000)				
AR	0.1847	0.4299**	1		
	(0.3877)	(0.0360)			
$r^{B}_{t+1} - r^{NB}_{t+1}$	-0.3289*	-0.3771**	-0.0037	1	
	(0.0537)	(0.0255)	(0.9865)		
$R^{B}_{t+1, t+3} - R^{NB}_{t+1, t+3}$	-0.3588**	-0.3960**	0.2921	0.1446	1
	(0.0343)	(0.0185)	(0.1660)	(0.4073)	

Table 1.6: Regression Results

Dependent variable in panel A is, *Initiate* $_t$. It is the rate of initiation of repurchases in a particular year t. Dependent variable in panel B is *Continue* $_t$ It is the rate of continuation of repurchases in a particular year t. Dependent variable in panel C is *Fraction* $_t$. It is as defined in Table 1.3. *VW Rep Premium*$_t$ is the value weighted repurchase premium in year t. *VW Rep Premium*$_{t-1}$ is the repurchase premium in year t -1. *VW Rep Premium*$_{t-2}$ is the repurchase premium in year t -2. *EW Rep Premium*$_t$ is the equal weighted repurchase premium in year t. *EW Rep Premium*$_{t-1}$ is the equal weighted repurchase premium in year t -1. *EW Rep Premium*$_{t-2}$ is the equal weighted repurchase premium in year t -2. AR_t, AR_{t-1} and AR_{t-2} represent the standardized announcement return for repurchases in year t, t-1 and t -2 respectively. p-values are included in parentheses. * indicates significance at 10% level, ** indicates significance at 5% level and *** indicates significance at 1% level.

Panel A: Initiate$_t$

Specification	(1)	(2)	(3)	(4)	(5)	(6)
EW Rep Premium	0.16106					
	(0.212)					
EW Rep Premium$_{t-1}$		0.20390				
		(0.127)				
EW Rep Premium$_{t-2}$			0.30108**			
			(0.029)			
VW Rep Premium				0.03262		
				(0.7190)		
VW Rep Premium$_{t-1}$					0.08794	
					(0.332)	
VW Rep Premium$_{t-2}$						0.17904**
						(0.047)
Constant	0.16495***	0.17519***	0.19527***	0.13986***	0.14339***	0.14844***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	35	34	33	35	34	33
R-squared	0.04685	0.07139	0.14403	0.00397	0.02940	0.12110

Panel B: $Continue_t$

Specification	(1)	(2)	(3)	(4)	(5)	(6)
EW Rep Premium	0.23832					
	(0.268)					
EW Rep $Premium_{t-1}$		0.22343				
		(0.209)				
EW Rep $Premium_{t-2}$			0.31279*			
			(0.073)			
VW Rep Premium				0.24468		
				(0.1099)		
VW Rep $Premium_{t-1}$					0.18153	
					(0.126)	
VW Rep $Premium_{t-2}$						0.27174**
						(0.014)
Constant	0.52567***	0.53880***	0.56223***	0.49191***	0.50564***	0.51570***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	35	34	33	35	34	33
R-squared	0.03702	0.04889	0.09990	0.08051	0.07144	0.17927

Panel C: $Fraction_t$

Specification	(1)	(2)	(3)
AR	0.02116		
	(0.737)		
AR_{t-1}		0.11942**	
		(0.035)	
AR_{t-2}			0.07832
			(0.159)
Constant	0.08672***	0.04836*	0.06965**
	(0.007)	(0.062)	(0.011)
Observations	24	23	22
R-squared	0.00524	0.19542	0.09677

Table 1.7: Multivariate Regression Results

All panels show results of OLS regressions. Dependent variable in panel A is $Initiate_t$, in panel B is $Continue_t$ and in panel C is $Fraction_t$. *VW Rep Premium*$_{t-2}$ is the repurchase premium in year t -2. *VW NonrepM/B*$_{t-2}$ is the Value Weighted Market-to-Book ratio for non-repurchasing firms in year t -2. *VW Rep M/B*$_{t-2}$ is the Value Weighted Market-to-Book ratio for repurchasing firms in year t -2. *SP500*$_{t-2}$ is the value of the S&P 500 Index level on the first day of trading in the year t-1. Free cash flow (*FCF*) is calculated by subtracting the sum of depreciation (Compustat data item 14), tax payments (item 16), interest expense (item 15), dividends (sum of items 19 and 21) and repurchases (item 115) from gross operating income (item 13) and scaling the difference by total assets. Value weighted free cash flow is calculated using book value of equity as weights. *Nonrep FCF* $_{t-2}$ is the value weighted free cash flow of non repurchasing firms in year t-2. *Rep FCF* $_{t-2}$ is the value weighted free cash flow of repurchasing firms in year t-2. *Stock Premium* is calculated by subtracting average monthly return on U.S. treasury with one year maturity for the year from one year return on S&P 500 market index. Stock Premium$_{t-2}$ is the stock premium in year t-2. *Rep/P*$_{t-2}$ is the ratio of the repurchase amount of firm divided by market equity of the firm in year t-2. *Tax*$_{t-2}$ is the ratio of after tax income from a dollar in capital gains to a dollar in dividends in the year t-2. *Year*$_{t-2}$ is the calendar year, two years before the year t. *After82* is a binary variable that takes value 1 if the year is after 1982 and 0 otherwise. *After86* is a binary variable that takes value 1 if the calendar year is after 1986 and 0 otherwise. After01 is a binary variable that takes value 1 if the calendar year is after 2001 and 0 otherwise. *After03* is a binary variable that takes value 1 if the calendar year is after 2003 and 0 otherwise. $Initiate_t$, $Continue_t$ and $Fraction_t$, are as defined in Table 1.6. p-values are included in parentheses. * indicates significance at 10% level, ** indicates significance at 5% level and *** indicates significance at 1% level.

Panel A: $Initiate_t$

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VW Rep Premium$_{t-2}$	0.16287*	0.15521*	0.18958**	0.18022**	0.13470*	0.21750**	0.14804**	0.15035**	0.17824*	0.19828**	0.16396*	0.21082**
	(0.059)	(0.072)	(0.025)	(0.039)	(0.095)	(0.039)	(0.036)	(0.025)	(0.065)	(0.034)	(0.057)	(0.047)
VW Nonrep M/B$_{t-2}$	0.06849**	0.05785	0.06456*	0.03193	-0.04049	-0.00669						
	(0.049)	(0.108)	(0.062)	(0.647)	(0.561)	(0.911)						
VW Nonrep FCF$_{t-2}$		2.33085	3.16563	2.44814	3.02553	6.49577**		3.20271	4.01389*	1.97761	3.31960	6.62946**
		(0.309)	(0.155)	(0.348)	(0.208)	(0.020)		(0.182)	(0.091)	(0.417)	(0.154)	(0.022)
Tax$_{t-2}$			0.14606**	0.13866*	0.10954	0.03390			0.13565*	0.12709*	0.11657*	0.03732
			(0.044)	(0.063)	(0.109)	(0.576)			(0.075)	(0.080)	(0.080)	(0.548)
SP500$_{t-2}$				0.00004	0.00008	0.00020				0.00008*	0.00006	0.00018**
				(0.592)	(0.254)	(0.111)				(0.054)	(0.170)	(0.042)
Stock Premium$_{t-2}$					0.21198**	0.23380***					0.18867**	0.23328***
					(0.016)	(0.001)					(0.019)	(0.001)
Year$_{t-2}$						-0.02087***						-0.02081***
						(0.009)						(0.007)
After82						0.19641***						0.19659***
						(0.007)						(0.007)
After86						0.06522						0.06681
						(0.148)						(0.143)
After01						0.05278						0.05574
						(0.318)						(0.230)
After03						0.20292***						0.20258***
						(0.001)						(0.000)
Rep/Price$_{t-2}$							-0.64778	-0.30755	-0.41898	0.68738	0.50872	-0.13419
							(0.459)	(0.731)	(0.628)	(0.489)	(0.577)	(0.839)
Constant	0.05032	0.01834	-0.19752	-0.14440	-0.03814	41.17417***	0.17974***	0.09843	-0.08846	-0.12813	-0.12530	41.04424***
	(0.319)	(0.756)	(0.101)	(0.354)	(0.795)	(0.009)	(0.000)	(0.191)	(0.479)	(0.290)	(0.260)	(0.007)
Observations	33	33	33	33	33	33	33	33	33	33	33	33
Adjusted R-squared	0.17784	0.17981	0.26684	0.24789	0.37723	0.72265	0.07974	0.10576	0.17457	0.25545	0.37657	0.72303

Panel B: $Continue_t$

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
VW Rep $Premium_{t-2}$	0.09295*	0.08181**	0.09457**	0.22792*	0.24179**	0.41777**	0.19782*	0.11007**	0.11966**	0.19904**	0.16180*	0.24955**
	(0.056)	(0.023)	(0.013)	(0.052)	(0.020)	(0.021)	(0.091)	(0.012)	(0.026)	(0.043)	(0.074)	(0.043)
VW Rep M/B_{t-2}	0.14563***	0.10860*	0.08478	-0.10163	-0.18636	-0.24239						
	(0.001)	(0.080)	(0.138)	(0.368)	(0.175)	(0.156)						
VW Rep FCF_{t-2}		1.43077	3.21706*	3.38050*	4.15847***	4.32232**		3.72029***	5.17993***	2.76265*	2.96646**	2.44947
		(0.427)	(0.079)	(0.055)	(0.010)	(0.028)		(0.009)	(0.001)	(0.083)	(0.044)	(0.162)
Tax_{t-2}			0.19989**	0.15986**	0.13387*	0.14984*			0.21863**	0.16561**	0.15305**	0.15191
			(0.015)	(0.047)	(0.057)	(0.094)			(0.010)	(0.037)	(0.036)	(0.120)
$SP500_{t-2}$				0.00017*	0.00020**	0.00037**				0.00012**	0.00010**	0.00018
				(0.066)	(0.013)	(0.028)				(0.017)	(0.032)	(0.186)
Stock $Premium_{t-2}$					0.21917***	0.19299**					0.17868**	0.17642*
					(0.005)	(0.030)					(0.019)	(0.062)
$Year_{t-2}$						-0.01211						-0.00813
						(0.204)						(0.415)
After82						0.03919						0.01147
						(0.631)						(0.895)
After86						0.09933*						0.06546
						(0.099)						(0.315)
After01						0.01932						0.03238
						(0.769)						(0.648)
After03						0.00639						0.02873
						(0.930)						(0.710)
$Rep/Price_{t-2}$							-1.54452	-0.30307	-0.13449	0.99893	0.85212	0.60534
							(0.138)	(0.768)	(0.885)	(0.303)	(0.338)	(0.542)
Constant	0.30751***	0.32039***	0.04531	0.28273	0.39302**	24.34552	0.59034***	0.42619***	0.09376	0.12058	0.14307	16.23116
	(0.000)	(0.000)	(0.707)	(0.105)	(0.015)	(0.197)	(0.000)	(0.000)	(0.504)	(0.351)	(0.231)	(0.411)
Observations	33	33	33	33	33	33	33	33	33	33	33	33
Adjusted R-squared	0.40938	0.40241	0.50056	0.54397	0.65399	0.63606	0.18752	0.33678	0.45944	0.54820	0.62200	0.57295

Panel C: $Fraction_t$

Specification	(1)	(2)	(3)	(4)
AR_{t-1}	0.11746**	0.13709***	0.09502	0.13056
	(0.035)	(0.007)	(0.102)	(0.102)
Tax_{t-1}	-0.06228	-0.05470	-0.06934	0.02732
	(0.183)	(0.182)	(0.142)	(0.697)
$SP500_{t-1}$		0.00005**	0.00006	0.00008
		(0.014)	(0.262)	(0.321)
Stock $Premium_{t-1}$			0.09364	0.07754
			(0.172)	(0.301)
$Year_{t-1}$			-0.00095	-0.00610
			(0.783)	(0.420)
After86				0.10129**
				(0.028)
After01				0.03640
				(0.559)
After03				-0.02637
				(0.540)
Constant	0.12924*	0.07814	1.99399	12.02896
	(0.055)	(0.196)	(0.771)	(0.423)
Observations	23	23	23	23
Adjusted R-squared	0.19179	0.38663	0.40321	0.52917

Table 1.8: Regression Results

Panels A and B show OLS regression results. Dependent variable in both panels is $CHOOSEREP_t$. Free cash flow (FCF) is calculated by subtracting the sum of depreciation (Compustat data item 14), tax payments (item 16), interest expense (item 15), dividends (sum of items 19 and 21) and repurchases (item 115) from gross operating income (item 13) and scaling the difference by total assets. Value weighted free cash flow is calculated using book value of equity as weights. $VW\ Rep\ Premium_{t-2}$ is the repurchase premium in year t -2. $VW\ BW\ Div\ Premium_{t-1}$ is taken from Baker and Wurgler (2004) till 2000. Values for 2001-2005 are calculated following procedure described in the original paper. $VW\ Div\ M/B_{t-2}$ is the Value Weighted Market-to-Book ratio for dividend paying firms in year t -2. $SP500_{t-2}$ is the value of the S&P 500 Index level on the first day of trading in the year t-1. $Div\ FCF_{t-2}$ is the value weighted free cash flow of dividend paying firms in year t-2. $Stock\ Premium_t$ is calculated by subtracting average monthly return on U.S. treasury with one year maturity for the year from one year return on S&P 500 market index. Tax_{t-2} is the ratio of after tax income from a dollar in capital gains to a dollar in dividend income in the year t-2. $Year_{t-2}$ is the calendar year, two years before the year t. *After82* is a binary variable that takes value 1 if the year is after 1982 and 0 otherwise. *After86* is a binary variable that takes value 1 if the calendar year is after 1986 and 0 otherwise. After01 is a binary variable that takes value 1 if the calendar year is after 2001 and 0 otherwise. *After03* is a binary variable that takes value 1 if the calendar year is after 2003 and 0 otherwise. $CHOOSEREP_t$ is the ratio of repurchasers among dividend payers who also paid dividends in the previous year. p-values are included in parentheses. * indicates significance at 10% level, ** indicates significance at 5% level and *** indicates significance at 1% level.

Panel A: $CHOOSEREP_t$

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VW Rep Premium$_{t-2}$	0.20046**	0.21818**	0.15441**	0.12723*	0.14429*	0.12842**	0.17296*
	(0.049)	(0.039)	(0.034)	(0.051)	(0.081)	(0.037)	(0.063)
Tax$_{t-2}$		0.06539	0.09943*	0.08117	0.16492**	0.15451**	0.20300***
		(0.449)	(0.098)	(0.130)	(0.017)	(0.026)	(0.001)
SP500$_{t-2}$			0.00016***	0.00014***	0.00019**	0.00028**	0.00020*
			(0.000)	(0.000)	(0.045)	(0.033)	(0.063)
Stock Premium$_{t-2}$				0.17919***	0.08398	0.08769	0.11807**
				(0.006)	(0.194)	(0.177)	(0.035)
Year$_{t-2}$					-0.00607	-0.00733	-0.01500**
					(0.376)	(0.295)	(0.022)
After82					0.01429	0.01337	0.14670**
					(0.799)	(0.811)	(0.024)
After86					0.11879***	0.13570***	0.14449***
					(0.009)	(0.006)	(0.001)
After01					-0.07327	-0.08972*	-0.08533*
					(0.149)	(0.095)	(0.057)
After03					0.07118	0.07911	0.05201
					(0.195)	(0.155)	(0.261)
VW Div M/B$_{t-2}$						-0.08864	-0.00816
						(0.310)	(0.913)
VW Div FCF$_{t-2}$							8.41844***
							(0.003)
Constant	0.24638***	0.16161	0.04617	0.07133	11.93661	14.52437	29.35231**
	(0.000)	(0.158)	(0.559)	(0.317)	(0.380)	(0.295)	(0.023)
Observations	33	33	33	33	33	33	33
Adjusted R-squared	0.09052	0.07827	0.57555	0.66502	0.74301	0.74392	0.82603

Panel B: $CHOOSEREP_t$

Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VW BW Div Premium$_{t-1}$	-0.21973**	-0.23719**	-0.02362	0.00713	0.00190	-0.00757	-0.03864
	(0.029)	(0.021)	(0.748)	(0.923)	(0.980)	(0.922)	(0.623)
Tax_{t-1}		-0.08175	0.00387	0.03673	0.22088***	0.24109***	0.28317***
		(0.346)	(0.947)	(0.541)	(0.009)	(0.006)	(0.003)
$SP500_{t-1}$			0.00017***	0.00017***	0.00019***	0.00010	0.00004
			(0.000)	(0.000)	(0.002)	(0.376)	(0.756)
Stock Premium$_{t-1}$				0.10703*	0.02852	0.00949	0.01314
				(0.099)	(0.665)	(0.890)	(0.845)
$Year_{t-1}$					-0.00829*	-0.00661	-0.00837
					(0.086)	(0.194)	(0.106)
After82					0.00947	0.00011	0.03464
					(0.826)	(0.998)	(0.484)
After86					0.18332***	0.17248***	0.18434***
					(0.002)	(0.004)	(0.002)
After01					-0.02286	-0.02966	-0.04727
					(0.637)	(0.545)	(0.342)
After03					0.04201	0.06596	0.05848
					(0.454)	(0.286)	(0.333)
VW Div M/B$_{t-1}$						0.09291	0.13211
						(0.339)	(0.185)
VW Div FCF$_{t-1}$							3.66945
							(0.157)
Constant	0.22199***	0.32736***	0.14899*	0.11326	16.23057*	12.79959	16.10126
	(0.000)	(0.006)	(0.068)	(0.163)	(0.089)	(0.205)	(0.116)
Observations	34	34	34	34	34	34	34
Adjusted R-squared	0.11363	0.11135	0.61096	0.63931	0.74405	0.74353	0.75631

Table 1.9: Logit Analysis

Panel A shows results of logit regression on the choice to repurchase stock. The dependent variable in panel A takes a value of 1 if the firm is classified as a repurchaser for a particular year and 0 otherwise. Panel B shows results of logit regression on the choice to pay a dividend. The dependent variable in panel B takes a value of 1 if the firm pays a dividend in a particular year and 0 otherwise. *Repurchasers* are firms that have repurchased (as indicated by Purchase of Common and Preferred Stock (Compustat data item 115) after adjustments to the decrease in Preferred Stock Redemption Value (item 56) from the year before) more than 1% of their market value of equity. *Non-repurchasers* are firms that have repurchased none or less than 1% of their market value of equity for the year. Market Value is defined as market equity at calendar year end (item 24 times item 25). Book Equity is Stockholder's Equity (item 216) minus Preferred Stock (item 10). Market-to-Book is Book Assets – Book Equity + Market equity divided by book assets. M/B is Market-to-Book ratio. EW indicates equally weighted for all the firms in the sample for the particular year. VW indicates Value Weighted (by the book equity). Log of Market-to-Book for repurchasers minus log of Market-to-Book for non-repurchasers is the repurchase premium. For this part, the sample firm consists of all firms that have either repurchased stock or have issued dividends in any year, within the sample period. For these firms, all firm years between 1971 and 2005 are included for the firm level analysis.

Div yield is the ratio of dividend amount to the stock price of the stock. *Rep yield* is the ratio of dollars spent on repurchases to the stock price. *Market cap* is the market value of the firm (in million U.S. $). *Debt* is the value of long term debt (Compustat data item 9), scaled by book value of assets (Compustat data item 6) of the firm, at end of year t-1. *Cash* is the value of cash and cash equivalents (item 1) held by firm, scaled by book value of assets (item 6). *Return on assets* is the value of operating income of the firm (item 13) scaled by book value of assets (item 6),. *FCF* is the free cash flow, calculated by subtracting the sum of depreciation (item 14), tax payments (item 16), interest expense (item 15), dividends (sum of items 19 and 21) and repurchases (item 115) from gross operating income (item 13) and scaling the difference by total assets (item 6). *Std. dev FCF* is the standard deviation in FCF calculated using last three years of FCF values. *M/B* is the Market to Book ratio. *Return* is the yearly return on stock from year t-1 to year t. *VW Rep Premium*$_{t-2}$ is the value weighted (VW) repurchase premium in year t -2 . *VW Div Premium* $_{t-1}$ is the VW dividend premium in year t-1. *Diff. Premium*$_{t-1}$ is the calculated value of VW Rep Premium minus the VW Div Premium in year t-1. *Industry Dummies* are a set of dummy variables, one for every 2 digit SIC codes. Coefficients of these industry dummy variables are not shown in regression. All financial values are calculated at end of fiscal year t-1, unless otherwise specified. p-values are included in parentheses. * indicates significance at 10% level, ** indicates significance at 5% level and *** indicates significance at 1% level.

Panel A: Repurchase decision

Specification	(1)	(2)	(3)	(4)	(5)
Div yield	0.00054	0.00140	0.00072	0.00071	0.00035
	(0.766)	(0.408)	(0.688)	(0.689)	(0.851)
Rep yield	39.94908***	40.02858***	39.91632***	40.06741***	39.91938***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market cap	0.00001***	0.00001***	0.00001***	0.00002***	0.00001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt	-0.76838***	-0.77707***	-0.76854***	-0.76955***	-0.76083***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash	0.53944***	0.55700***	0.53190***	0.54917***	0.52276***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Return on assets	0.85243***	0.70216***	0.80296***	0.79970***	0.86110***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FCF	1.94950***	2.39824***	2.13920***	2.15194***	2.15426***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Std. dev FCF	-0.16187	-0.09864	-0.23333	-0.04135	-0.28911
	(0.704)	(0.818)	(0.588)	(0.922)	(0.504)
M/B	-0.10914***	-0.11672***	-0.11327***	-0.11707***	-0.12064***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Return	-0.64595***	-0.65164***	-0.65529***	-0.66121***	-0.65919***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
VW Rep Premium$_{t-2}$	0.73716***		0.55705***		
	(0.000)		(0.000)		
VW Div Premium$_{t-1}$		-0.93712***	-0.48636***		
		(0.000)	(0.000)		
Diff. Premium$_{t-1}$				0.49140***	
				(0.000)	
Diff. Premium$_{t-2}$					0.62657***
					(0.000)
Industry Dummies	YES	YES	YES	YES	YES
Constant	-2.49461**	-2.72238**	-2.59092**	-2.59058**	-2.62099**
	(0.033)	(0.019)	(0.026)	(0.026)	(0.025)
Observations	72527	74779	72527	74779	72527
Pseudo R-Squared	0.304	0.304	0.304	0.303	0.305

Panel B: Dividend Decision

Specification	(1)	(2)	(3)	(4)	(5)
Rep yield	0.43999***	0.49806***	0.46536***	0.47328***	0.45876***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
Market cap	0.00015***	0.00014***	0.00014***	0.00015***	0.00015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt	-1.16127***	-1.16371***	-1.16418***	-1.16825***	-1.17379***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash	-1.61615***	-1.57933***	-1.59280***	-1.56971***	-1.57086***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	8.28932***	8.69979***	8.39160***	8.52534***	8.28910***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FCF	-15.00810***	-15.91580***	-15.34371***	-15.51674***	-15.35280***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Std. dev FCF	-12.22819***	-12.23396***	-12.01806***	-12.27271***	-11.87229***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
M/B	-0.24088***	-0.23993***	-0.23530***	-0.23978***	-0.22239***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Return	-0.01176	-0.00763	-0.00878	-0.00624	-0.00799
	(0.171)	(0.256)	(0.242)	(0.296)	(0.259)
VW Rep Premium$_{t-2}$	-0.97815***		-0.69779***		
	(0.000)		(0.000)		
VW Div Premium$_{t-1}$		1.15537***	0.73553***		
		(0.000)	(0.000)		
Diff. Premium$_{t-1}$				-0.69614***	
				(0.000)	
Diff. Premium$_{t-2}$					-0.91214***
					(0.000)
Industry Dummies	YES	YES	YES	YES	YES
Constant	-1.18762	1.76894*	-1.07465	1.71808	-1.00871
	(0.171)	(0.094)	(0.220)	(0.104)	(0.246)
Observations	72538	74790	72538	74790	72538
Pseudo R-Squared	0.179	0.178	0.180	0.178	0.182

Table 1.10: Accounting for Mimicking Repurchases

Results here represent coefficients of a logit regression on the choice to repurchase shares in a given year. Dependent variable takes a value of 1 if a firm is classified as a repurchaser and 0 otherwise. . *Wave* is the number of firms in the same 3 digit SIC code that have bought back shares in the last year, excluding the firm itself. *Conc* is a dummy variable that takes a value 1 if the Herfindahl index for the firm's industry is in the top 20^{th} percentile of Herfindahl index for the fiscal year and 0 otherwise. All the other variables are same as in Table 1.9. Coefficients of industry dummy variables are not shown in regression. p-values are included in parentheses. * indicates significance at 10% level, ** indicates significance at 5% level and *** indicates significance at 1% level.

Specification	(1)	(2)	(3)	(4)	(5)
Div yield	0.00125	0.00041	0.00006	0.00003	-0.00041
	(0.462)	(0.821)	(0.973)	(0.985)	(0.830)
Rep yield	40.14569***	39.99788***	39.86371***	40.17162***	40.13844***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Market cap	0.00001***	0.00001***	0.00001***	0.00002***	0.00001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Debt	-0.78682***	-0.77720***	-0.76661***	-0.77392***	-0.76070***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Cash	0.56436***	0.53917***	0.52300***	0.53015***	0.51698***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ROA	0.76389***	0.82651***	0.87773***	0.82219***	0.85467***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FCF	0.11671	-0.07819	-0.30529	-0.05407	-0.26771
	(0.780)	(0.854)	(0.481)	(0.899)	(0.536)
Std. dev FCF	2.02709***	2.08575***	2.10461***	2.07706***	2.10512***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
M/B	-0.10252***	-0.11735***	-0.12038***	-0.11739***	-0.11927***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Return	-0.62664***	-0.66416***	-0.66184***	-0.66455***	-0.66339***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wave	0.00010	-0.00120	-0.00397	-0.00078	-0.00335
	(0.966)	(0.628)	(0.111)	(0.752)	(0.179)
Conc	-0.30669***	-0.29811***	-0.30704***	-0.26538***	-0.28363***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Wave*Conc	0.02672***	0.02593***	0.02710***	0.01522***	0.01586***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Diff. Premium$_{t-1}$		0.48174***		0.41288***	
		(0.000)		(0.000)	
Diff. Premium$_{t-2}$			0.62057***		0.52269***
			(0.000)		(0.000)
Wave*Conc*Diff. Premium$_{t-1}$				0.08010***	
				(0.000)	
Wave*Conc*Diff. Premium$_{t-2}$					0.09896***
					(0.000)
Industry Dummies	YES	YES	YES	YES	YES
Constant	-2.56567**	-2.30363***	-2.61820**	-2.29671***	-2.25321***
	(0.028)	(0.002)	(0.025)	(0.002)	(0.003)
Observations	74767	74767	72515	74767	72515
Pseudo R-Squared	0.302	0.304	0.305	0.305	0.307

Table 2.1: Frequency of ASRs by year and transaction characteristics

The sample includes 256 accelerated share repurchase (ASR) transactions announced between 1996 and 2008. Details of the transactions were obtained from SEC filings and searches of newswires archived by Factiva. Panel A reports the frequency of announced ASRs by year. Panel B reports the size of the ASRs in terms of dollars allocated to repurchase shares, the percentage of outstanding equity repurchased in the ASR, and the percentage of the shares in the program repurchased via ASR. Percentage price difference is the difference between the price paid

to the intermediary under the ASR agreement and the closing price on the day prior to the ASR agreement divided by the prior day's price. Also reported are days to settlement, the size of the settlement in dollars paid by the intermediary to the firm or by the firm to the intermediary, and the frequency the settlement is paid in cash. The frequencies with which the ASR agreements include caps and or floors are also reported. Panel C reports the frequencies that firms stated particular motivations (not mutually exclusive) for undertaking ASRs. Panel D reports the frequency with which investment banks were identified as serving as intermediaries for the ASR transactions in the sample.

Panel A: ASR transactions by year

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
ASRs	0	3	2	2	1	1	2	2	21	44	56	97	25

Panel B: ASR transaction characteristics

	N	Mean	Median	Minimum	Maximum
Amount ($mill)	256	530.55	250.00	10.69	12,500.00
Percentage of equity	256	5.27%	3.48%	0.26%	44.13%
Percentage of announced program	256	58.03%	50.70%	5.00%	100.00%
Percentage price difference	93	0.13%	0.00%	-9.49%	11.21%
Days to settlement	178	139.97	131.00	5.00	372.00
Settlement paid by intermediary ($mill)	103	54.17	22.00	0.00	914.71
Settlement paid by firm ($mill)	71	33.51	11.90	0.00	523.00
Cash settlement	174	0.42	0.00	0.00	1.00
Agreements with collars, caps or floors	256	0.24	0.00	0.00	1.00

Panel C: Stated motivation

	Number of ASRs	Percentage of ASRs
Undervaluation	79	30.86%
Capital structure adjustment	24	9.38%
Cash from sale of assets/division/equity	21	8.20%
Buy back shares issued in benefit plan	8	3.13%
Return cash to shareholders	13	5.08%
Buy back shares related to conversion	8	3.13%
Buy back shares issued in an acquisition	4	1.56%
No stated motivation	125	48.83%

Panel D: Intermediaries

	Number of ASRs	Percentage of ASRs
Goldman Sachs	52.33	20.44%
Bank of America	21.33	8.33%
J.P. Morgan	20.67	8.07%
Merrill Lynch	15.50	6.05%
Lehman Brothers	15.33	5.99%
Credit Suisse	14.50	5.66%
UBS	14.00	5.47%
Citibank	12.83	5.01%
Others	24.50	9.57%
No information	65.00	25.39%

Table 2.2: Characteristics of firms by ASR election

		N	Programs without ASRs	N	Programs with ASRs	Difference
Short-sale constrained	[Mean]	1,228	0.049	205	0.000	0.049***
	[Median]		0.000		0.000	0.000***
Std. dev. returns		1,168	0.021	205	0.015	0.006***
			0.019		0.014	0.005***
Ln(Illiquidity)		1,168	-6.071	205	-8.123	2.070***
			-6.635		-8.275	1.640***
Assets		1,158	16,961	199	29,555	-13,449**
			1,532		7,870	-6,338***
Ln(Assets)		1,158	7.417	199	9.022	-1.605***
			7.334		8.971	-1.637***
Cash/assets		1,158	0.173	199	0.124	0.049***
			0.097		0.058	0.039***
Free cash flow		1,151	0.055	196	0.049	0.006
			0.044		0.038	0.006
Std. dev. free cash flow		1,158	0.039	202	0.023	0.016***
			0.019		0.011	0.008***
High-hedge		1,158	0.187	202	0.119	0.068**
			0.000		0.000	0.000**
Low-Hedge		1,158	0.170	202	0.183	-0.013
			0.000		0.000	0.000
Program percentage of equity		1,168	0.073	205	0.103	-0.030***
			0.058		0.079	-0.021***
Prior stock performance		1,168	-0.043	205	-0.001	-0.042***
			-0.027		0.004	-0.031***
Ln(Market-to-book)		1,151	0.444	197	0.379	0.055
			0.420		0.312	0.108
M/B firm		1,151	0.053	197	0.059	-0.006
			0.023		0.034	-0.010
M/B sector		1,151	0.002	197	0.001	0.001
			0.001		-0.001	0.002
M/B long-run		1,151	0.389	197	0.319	0.070
			0.463		0.329	0.134***
Asset sale		1,168	0.103	205	0.239	-0.136***
			0.000		0.000	0.000***
Takeover		1,168	0.024	205	0.078	-0.054***
			0.000		0.000	0.000***
Leverage		1,154	0.174	201	0.202	-0.028**
			0.136		0.192	-0.056***
Leverage difference		1,148	0.040	199	0.010	0.030**
			0.066		0.009	0.057***
EPS bonus		1,166	0.449	205	0.566	-0.117***
			0.000		1.000	-1.000***
Chairman of the board		1,165	0.557	205	0.634	-0.077***
			1.000		1.000	0.000***
Voluntary turnover		1,168	0.077	205	0.141	-0.064**
			0.000		0.000	0.000**

Table 2.2: Characteristics of firms by ASR election (continued)

The initial sample includes 256 accelerated share repurchase (ASR) transactions announced between 1996 and 2008. We match each ASR with the repurchase program that is simultaneous with or immediately precedes the ASR announcement. Repurchase program announcement data are obtained from the Securities Data Corporation and searches of Factiva. For those firms that conduct multiple ASRs within a repurchase program, we only include the first ASR in the program in the analysis below. We limit the analysis below to ASRs announced in 2004 or later. Short-sale constrained is a dummy variable that takes a value of one if the imputed interest rate on borrowing the firms shares (calculated as in Diether and Werner (2008)) for the calendar month prior to the announcement exceeds the 90th percentile of all firms on the same exchange over the 2002 to 2008 period. We limit the analysis to programs that are not short sale constrained. Standard deviation of returns is calculated over a period of 255 trading days prior to the repurchase announcement and ending 46 trading days prior to the repurchase announcement, where day 0 is the date on which the repurchase program is announced or the day the ASR is announced if the program included an ASR (and the ASR was not announced simultaneously with the program). Illiquidity is the Amihud (2002) measure of illiquidity defined as the absolute percentage price change per dollar of daily trading volume, or the daily price impact of the order flow measured over the period of 255 trading days prior to the repurchase announcement and ending 46 days prior to the repurchase announcement. Assets is book value of total assets (Compustat item 6). Cash/assets is the ratio of cash and short term securities (item 1) to total assets. Free cash flow is gross operating income (item 13) minus the sum of depreciation (item 14), tax payments (item 16), interest expense (item 15) and dividends (sum of items 19 and 21) scaled by total assets. Standard deviation of free cash flow is calculated over the five year period preceding the repurchase or ASR announcement. High-hedge takes a value of one if a firm's correlation between cash flow and median industry (3-digit SIC code) R&D expenditures is less than -0.2 and zero otherwise. Low-hedge takes a value one if the firm's correlation between cash flow and median industry (3-digit SIC code) R&D expenditures is greater than 0.2 and zero otherwise. Program percentage of equity is the percentage of outstanding equity that the program authorizes for repurchase. Prior stock performance is the cumulative abnormal return over the period starting 44 trading days prior to the announcement and ending four days prior to the announcement. Market to book is the ratio of market value of assets (common shares outstanding (item 25) times calendar year closing price (item 24) plus total assets (item 6) minus common equity (item 60) minus deferred taxes (item 74)) to book value of assets (item 6). M/B firm, sector, and long-run are as in Rhodes-Kropf et al. (2005). Asset sale is a dummy variable that takes a value of one if a firm completed an asset sale in the six months prior to the announcement of the repurchase program or ASR. Takeover is a dummy variable that takes a value of one if a firm was the target of a takeover attempt in the six months preceding the announcement of its repurchase program or ASR. Leverage is long term debt (item 9) plus debt in current liabilities (item 34) divided by total assets. Leverage difference is defined as a firm's target leverage minus its actual leverage. Target leverage is estimated as in Hovakimian et al. (2001). EPS bonus is a dummy variable that takes a value of one if earnings per share is explicitly mentioned in the firm's proxy statement as one of the determinants for the bonus plan of the chief executive office (CEO) and zero otherwise. Chairman of the board is a dummy variable that takes a value of 1 if the CEO of the firm is also the chairman of the board of directors and zero otherwise. The indicator variable Voluntary turnover is equal to one if the CEO is at least 60 years old based on the proxy statement preceding the program announcement and is no longer the CEO at the time of the first proxy statement at least one year after the program announcement. Significance of differences in means (medians) is assessed using a *t*-test (Wilcoxon rank sum test). ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

Table 2.3: Choice of ASR and quantity of shares repurchased

Specifications (1) and (2) report the results of logit regressions where the dependent variable takes a value of one if a firm included an ASR in its repurchase program and zero otherwise. Specification (3) reports the results of a logit regression where the dependent variable takes a value of one if a firm announces an ASR simultaneously with a repurchase program announcement and zero if a program is not associated with an ASR. Specification (4) reports the results of a Tobit regression where the dependent variable is the fraction of the authorized repurchase that is completed via ASR. Independent variables are as defined in Table 2.2. Industry classifications are in accordance with the twelve groupings identified on Kenneth French's website. The coefficients on the independent variables are reported along with their p-values in brackets. Reported p-values are based on robust standard errors. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

Specification	(1)	(2)	(3)	(4)
Regression	Logit	Logit	Logit	Tobit
Dependent Variable	ASR	ASR	Simultaneous ASR	Percentage of announced program
Std. dev. returns	-108.901***	-108.977***	-99.408***	-49.228***
	[0.000]	[0.000]	[0.005]	[0.000]
Ln(Illiquidity)	-0.556***	-0.560***	-0.893***	-0.220***
	[0.000]	[0.000]	[0.000]	[0.000]
Ln(Assets)	-0.388**	-0.402**	-0.823***	-0.147**
	[0.046]	[0.040]	[0.006]	[0.015]
Cash/assets	-0.469	-0.487	1.544	-0.150
	[0.600]	[0.589]	[0.197]	[0.679]
Free cash flow	-0.226	-0.112	0.287	-0.084
	[0.875]	[0.939]	[0.943]	[0.926]
Std. dev. free cash flow	2.107	2.120	-9.772	1.073
	[0.595]	[0.595]	[0.178]	[0.202]
High-hedge	-0.395	-0.413	-0.376	-0.225
	[0.276]	[0.255]	[0.516]	[0.180]
Low-hedge	0.119	0.109	-0.186	0.047
	[0.738]	[0.761]	[0.738]	[0.766]
Program percentage equity	6.885***	6.808***	8.338***	2.046***
	[0.000]	[0.000]	[0.006]	[0.001]
Prior stock performance	3.599***	3.592***	4.743***	1.506***
	[0.000]	[0.000]	[0.002]	[0.001]
Ln(Market-to-book)	-1.016***		-2.103***	-0.403***
	[0.000]		[0.000]	[0.001]
M/B firm		-1.024***		
		[0.010]		
M/B sector		-1.485		
		[0.128]		
M/B long-run		-1.036***		
		[0.000]		
Asset sale	0.432*	0.449*	0.533	0.201*
	[0.078]	[0.069]	[0.231]	[0.063]
Takeover	1.191***	1.176***	1.853***	0.419**
	[0.002]	[0.002]	[0.001]	[0.023]
Leverage difference	1.080*	1.032	2.752**	0.375
	[0.091]	[0.119]	[0.027]	[0.194]
EPS bonus	-0.023	-0.024	-0.101	-0.045
	[0.905]	[0.899]	[0.767]	[0.591]
Chairman of the board	-0.140	-0.137	-0.401	-0.068
	[0.484]	[0.495]	[0.238]	[0.428]
Voluntary turnover	0.440	0.444	0.531	0.171
	[0.118]	[0.114]	[0.255]	[0.176]
Constant	-1.474	-1.413	-1.297	-0.558
	[0.129]	[0.143]	[0.489]	[0.193]
Industry & Year controls	Yes	Yes	Yes	Yes
Observations	1,319	1,319	1,121	1,319
Pseudo R-Squared	0.253	0.255	0.303	0.210

Table 2.4: Predicted and observed frequencies of ASRs

Panel A tabulates the yearly predicted and observed frequencies of ASRs as a percentage of repurchase program announcements. The probability of an ASR is estimated from the logit analysis in specification (1) of Table 2.3 using the 2004 to 2007 subsample. If the predicted probability is above the threshold probability that yields the observed number of ASRs within the subsample (33.13%), then we define the observation as a predicted ASR. If the probability is below the threshold, then an ASR is not predicted. The probability of an ASR for the out-of-sample observations in 2008 is also calculated based on the in-sample coefficient estimates. The same threshold probability is applied to the out-of-sample observations. Panel B divides the out-of-sample observations in 2008 into terciles based on the estimated probability of an ASR. The first column of the panel tabulates the number of programs without an ASR within each tercile and the second column tabulates the number of programs with an ASR. The p-value from a Pearson chi-square test that the proportion of ASR firms is the same in each tercile is listed at the bottom of the panel. *** denotes significance at the 0.01 percent level.

Panel A: Yearly predicted and observed frequencies of ASRs

Year	Predicted Percentage ASR	Observed Percentage ASR
2004	6.06%	10.61%
2005	15.25%	16.10%
2006	19.42%	18.18%
2007	22.97%	20.64%
Out of sample		
2008	12.71%	6.35%

Panel B: Observed ASRs by estimated probability tercile

	ASR = 0	ASR = 1
Lowest 3rd	98	1
Middle 3rd	97	3
Highest 3rd	85	15
p-value		*0.000****

Table 2.5: Abnormal returns at ASR and repurchase program announcement

The table reports three-day (-1 to +1) cumulative abnormal returns for ASR and share repurchase program announcements. The ASR sample includes 256 ASRs announced between 1996 and 2008. Of these, 243 ASRs were announced between 2004 and 2008. ASRs announced between 2004 and 2008 are further subdivided into ASRs that are announced subsequent to a repurchase program announcement and ASRs that are announced simultaneously with a repurchase program announcement. Difference III – VI denotes the difference in abnormal returns between programs associated with simultaneous ASRs and programs not associated with ASRs. Difference V – VI denotes the difference in abnormal returns between programs associated with subsequent ASRs and programs not associated with ASRs. Significance of tests that mean (median) abnormal returns are different from zero are assessed using a *t*-test (Wilcoxon signed rank test). Significance of the number of positive versus number of negative is assessed using a sign test. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

Three- day abnormal return

	Mean	Median	N	Positive, Negative
All ASRs (1996-2008)	1.43***	0.95***	256	182, 74***
2004-2008				
I. ASRs (2004-2008)	1.42***	0.95***	243	171, 72***
II. Subsequent ASR (2004-2008)	1.34***	0.93***	184	129, 55***
III. Simultaneous ASR (2004-2008)	1.70**	2.01***	59	42, 17***
IV. All programs (2004-2008)	1.39***	1.05***	1,337	867, 470***
V. Programs associated with subsequent ASR (2004-2008)	0.80**	0.28	151	86, 65
VI. Programs not associated with any ASR (2004-2008)	1.46***	1.21***	1,129	741, 388***
Difference III - VI	0.25	0.80		
Difference V - VI	-0.65	-0.93**		

Table 2.6: OLS regressions of abnormal returns and logit regression of ASR election

Specification	(1)	(2)	(3)	(4)	(5)
Regression	OLS	OLS	Logit	OLS	OLS
Dependent Variable	CAR3	CAR3	Subsequent ASR	CAR3	Combined CAR3
Percentage of equity	0.271***	0.260***			
	[0.008]	[0.008]			
Program CAR3			-5.984***		
			[0.010]		
Simultaneous ASR				-0.004	
				[0.587]	
ASR					0.002
					[0.632]
Std. dev. returns	-0.129	-0.226	-108.491***	-0.331	-0.258
	[0.879]	[0.794]	[0.000]	[0.357]	[0.463]
Ln(Illiquidity)	-0.002	-0.003	-0.507***	0.000	0.000
	[0.417]	[0.273]	[0.008]	[0.835]	[0.805]
Ln(Assets)	-0.002	-0.003	-0.318	0.000	-0.001
	[0.587]	[0.285]	[0.166]	[0.886]	[0.809]
Cash/assets	0.013	0.013	-1.572	0.003	-0.001
	[0.677]	[0.653]	[0.162]	[0.842]	[0.950]
Free cash flow	0.152	0.152	-2.137	-0.053	-0.047
	[0.220]	[0.232]	[0.397]	[0.243]	[0.294]
Std. dev. free cash flow	-0.052	-0.052	4.570*	0.010	-0.006
	[0.215]	[0.206]	[0.056]	[0.760]	[0.837]
High-hedge	0.001	0.001	-0.329	-0.008	-0.007
	[0.927]	[0.944]	[0.458]	[0.193]	[0.263]
Low-hedge	0.008	0.010	0.268	-0.011*	-0.009
	[0.602]	[0.490]	[0.541]	[0.095]	[0.172]
Program percentage equity	-0.095	-0.084	4.844**	0.097**	0.141***
	[0.177]	[0.177]	[0.016]	[0.020]	[0.001]
Prior stock performance	-0.063*	-0.068*	2.918***	-0.036**	-0.030*
	[0.095]	[0.058]	[0.005]	[0.039]	[0.070]
Ln(Market-to-book)	0.009		-0.704**	-0.002	0.000
	[0.292]		[0.025]	[0.777]	[0.991]
M/B firm		0.023			
		[0.111]			
M/B sector		-0.023			
		[0.457]			
M/B long-run		0.005			
		[0.583]			
Asset sale	-0.003	-0.001	0.431	0.001	-0.001
	[0.612]	[0.799]	[0.119]	[0.871]	[0.874]
Takeover	-0.025**	-0.031***	1.082**	-0.017	-0.004
	[0.020]	[0.008]	[0.015]	[0.158]	[0.734]
Leverage difference	-0.016	-0.017	0.466	0.024*	0.022*
	[0.447]	[0.449]	[0.513]	[0.061]	[0.065]
EPS bonus	0.007	0.007	-0.083	-0.006	-0.005
	[0.211]	[0.169]	[0.699]	[0.114]	[0.141]
Chairman of the board	0.004	0.004	-0.014	0.002	0.002
	[0.439]	[0.357]	[0.952]	[0.663]	[0.495]
Voluntary turnover	-0.004	-0.005	0.365	0.000	0.006
	[0.648]	[0.566]	[0.237]	[0.954]	[0.344]
Constant	0.007	0.022	-2.082*	0.019	0.024
	[0.888]	[0.651]	[0.058]	[0.277]	[0.138]
Industry & Year controls	Yes	Yes	Yes	Yes	Yes
Observations	238	238	1,189	1,132	1,272
Adjusted R-squared	0.105	0.114		0.027	0.028
Pseudo R-Squared			0.241		

Table 2.6: OLS regressions of abnormal returns and logit regression of ASR election (continued)

Specifications (1) and (2) report the results of OLS regressions where the dependent variable is the three-day cumulative abnormal return at ASR announcement. The analysis includes all ASR announcements between 1996 and 2008. Percentage of equity is the percentage of outstanding equity repurchased in the ASR. Specification (3) reports the results of a logit regression where the dependent variable takes a value of one if a firm announced an ASR subsequent to announcing a repurchase program and zero for programs not associated with an ASR. We limit the analysis in specifications (3), (4), and (5) to programs and ASRs announced in 2004 or later. Program CAR3 is the three-day cumulative abnormal return at the announcement of the repurchase program. Specification (4) reports results of an OLS regression where the dependent variable is the three-day cumulative abnormal return at the program announcement. Simultaneous ASR is an indicator variable equal to one if an ASR is announced at the same time as the program announcement and zero otherwise. The sample for this test excludes programs that include a subsequent ASR. Specification (5) reports results of an OLS regression where the dependent variable is defined as follows. For programs not associated with an ASR, the dependent variable in the regression, Combined CAR3, is the abnormal return at the program announcement. For programs associated with an ASR, the dependent variable is the sum of the abnormal returns at the program announcement and the abnormal returns for any subsequent ASRs conducted within the program. The indicator variable ASR is equal to one for a program that is associated with a simultaneous or subsequent ASR and zero otherwise. Industry classifications are in accordance with the twelve groupings identified on Kenneth French's website. The coefficients on the independent variables are reported along with their p-values in brackets. Reported p-values are based on robust standard errors. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

Table 3.1: ASR firms

Panel A reports some stock characteristics of firms that announce ASR transactions between 2004 and 2008. Price per share, Shares outstanding, Market Capitalization and Share volume are averaged over day (-25, -6) relative to the announcement of the first ASR transaction in a repurchase program where the ASR announcement date is unambiguously identifiable. Price per share is the average end of day price for the sample of 214 firms that announce ASRs as part of their repurchase program between 2004 and 2008. Shares outstanding is the number of shares outstanding. Market Capitalization is shares outstanding times the closing price. Share volume is average number of shares traded in a day. Nasdaq dummy is a dummy variable that takes a value of 1 if the primary exchange listing (as given in the Center for Research in Security Prices database) of the stock is the Nasdaq stock exchange. The only other primary exchange for the sample firms is the New York Stock Exchange. Options traded is a dummy that takes a value of 1 if there are traded options on the stock of the firm. Panel B reports dollar amount of ASR transactions, percentage of outstanding equity in the announcement, days till the settlement of the ASR transaction, number of ASR agreements that have some component of caps or floors or collars in trading price, percentage of the repurchase program in an ASR transaction and also the number of ASR transactions where the repurchase program is simultaneously announced with the ASR transaction. Panel C reports the identity of the financial intermediaries involved in the announced ASRs with the frequency of appearance. Panel D reports the stated motivations given by the firms while announcing the ASR transaction (not mutually exclusive).

Panel A: ASR firms

	N	Mean	Median	Minimum	Maximum
Price per share ($)	214	41.61	38.98	4.35	116.30
Shares outstanding (in 1,000,000)	214	160.19	157.30	6.79	939221.00
Market Capitalization (in $100,000,000)	214	11.40	4.94	0.00	146.41
Share Volume (in 1,000)	214	2273.24	1133.78	0.51	27447.99
Nasdaq dummy	214	0.24	0.00	0.00	1.00
Options traded	214	0.83	1.00	0.00	1.00

Panel B: ASR Transactions

	N	Mean	Median	Minimum	Maximum
Amount (in $1,000,000)	214	560.83	250.00	15.00	12500.00
Percent of equity	214	5.69%	4.13%	0.26%	44.13%
Days to settlement	90	135.12	131.00	5.00	372.00
Agreement with collars, caps or floors	214	0.27	0.00	0.00	1.00
Percentage of program	214	60.08%	54.36%	5.00%	100.00%
Simultaneous ASR	214	0.26	0.00	0.00	1.00

Panel C: Intermediaries

	N
Goldman Sachs	48.33
JP Morgan	20.67
Bank of America	20.33
Lehman Brothers	15.33
Merill Lynch	15.00
Credit Suisse	13.50
UBS	13.00
Citibank	11.83
Morgan Stanley	10.50
Others	11.50
No Information	34.00
	214.00

Panel D: Stated Motivation

	N
Undervaluation	76
Capital structure adjustment	23
Cash from sale of assets/division/equity	18
Buy back shares issued in benefit plan	7
Return cash to shareholders	13
Buy back shares related to conversion	5
Buy back shares issued in an acquisition	2
No stated motivation	95

Table 3.2: Abnormal Returns

Panel A shows mean and median cumulative abnormal returns for the Base period (trading day (-25, -6)), pre-ASR period (trading day (-5, -1)), Announcement day of the ASR (trading day (0,0)) and post-ASR period (trading day (+1, +5)). Parameters for market model were estimated using Eventus software with period of estimation ending 46 days before the event day and an estimation length of a minimum of 100 days and a maximum of 255 days. Panel B shows the cumulative abnormal return for the periods commonly used in literature. Three-day refers to the period (-1, +1) and seven-day refers to the period (-3, +3) relative to the announcement of the ASR. Significance of tests that mean (median) abnormal returns are different from zero are assessed using a t-test (Wilcoxon signed rank sum test). Significance of the number of positive versus number of negative is assessed using a sign test. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

Panel A: Abnormal Returns

			Announcement	
	Base	Pre	Day (AD)	Post
Mean	0.02%	0.48%*	0.30%**	1.46%***
Median	-0.18%	0.16%	0.22%**	1.10%***

Panel B: Announcement Abnormal Returns

	Mean	Median
Three-day abnormal return	1.41%***	0.93%***
Seven-day abnormal return	1.98%***	1.54%***

Table 3.3: Percentage quoted spread

This table shows the average daily percentage quoted spread and tests for difference across periods for firms that announced an ASR as a part of their repurchase program. Percentage quoted spread is the difference between bid and ask price (ask price – bid price) of a stock expresses as a percentage of the quoted mid-point (calculated as the bid price plus ask price divided by 2). The best available quote and ask price, across all market centers reported on Trades and Quoted (TAQ) database are calculated. This National Best Bid Offer (NBBO) is matched with trades file on TAQ database with a 5 second delay (using Lee and Ready (1991)). The periods Base, Announcement Day (AD), pre-ASR and post ASR are as described in Table 3.2. The null hypothesis that that average in post-ASR period is equal to the average in other periods is tested. p values for t-Test and sign test are reported. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Panel A reports the statistics for the entire sample. Panel B reports the statistics for the stocks that have NYSE as the primary exchange listing. Panel C reports the statistics for the stocks that have Nasdaq as the primary exchange listing.

Percentage quoted spread

Panel A: All ASRs

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	0.0853	0.0821	0.0835	0.0761
Median	0.0706	0.0704	0.0661	0.0663

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0035***	0.0000***	31.84%
Ho: Base = Post-ASR	0.0001***	0.0004***	36.82%
Ho: AD = Post-ASR	0.0024***	0.0341**	42.29%

Panel B: NYSE listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	0.0757	0.0739	0.0750	0.0675
Median	0.0623	0.0631	0.0598	0.0579

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0029***	0.0000***	30.41%
Ho: Base = Post-ASR	0.0486**	0.0061***	37.84%
Ho: AD = Post-ASR	0.0036***	0.0021***	43.92%

Panel C: NASDAQ listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	0.1119	0.1048	0.1072	0.1004
Median	0.0888	0.0913	0.0879	0.0803

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0651*	0.0534**	35.85%
Ho: Base = Post-ASR	0.0228**	0.027**	33.96%
Ho: AD = Post-ASR	0.1173	0.0984*	37.74%

Table 3.4: Percentage effective spread

This table shows the average daily percentage effective spread and tests for difference across periods for firms that announced an ASR as a part of their repurchase program. Percentage effective spread is calculated as 2 x S_{it} x (P_{it} – M_{it})/M_{it} x 100; where Sit is the trade direction indicator set equal to +1 for buy orders and -1 for sell orders, constructed using a combination of the tick-test and quote-test methodology as recommended by Lee and Ready (1991) and M_{it} is the quote midpoint calculated as the ask plus the bid, divided by two. The best available bid and ask price, across all market centers reported on Trades and Quoted (TAQ) database are calculated. This National Best Bid Offer (NBBO) is matched with trades file on TAQ database with a 5 second delay (using Lee and Ready (1991)). The periods Base, Announcement Day (AD), pre-ASR and post ASR are as described in Table 3.2. The null hypothesis that that average in post-ASR period is equal to the average in other periods is tested. p values for t-Test and sign test are reported. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Panel A reports the statistics for the entire sample. Panel B reports the statistics for the stocks that have NYSE as the primary exchange listing. Panel C reports the statistics for the stocks that have Nasdaq as the primary exchange listing.

Percentage effective spread

Panel A: All ASRs

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	0.0727	0.0689	0.0709	0.0587
Median	0.0499	0.0511	0.0483	0.0376

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0226**	0.0000***	16.59%
Ho: Base = Post-ASR	0.0067***	0.0000***	20.64%
Ho: AD = Post-ASR	0.0001***	0.0000***	22.20%

Panel B: NYSE listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	0.0689	0.0652	0.0680	0.0568
Median	0.0484	0.0485	0.0463	0.0351

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0816*	0.0000***	10.14%
Ho: Base = Post-ASR	0.0001***	0.0000***	6.76%
Ho: AD = Post-ASR	0.0038***	0.0000***	14.86%

Panel C: NASDAQ listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	0.0835	0.0791	0.0789	0.0640
Median	0.0644	0.0633	0.0567	0.0442

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0021***	0.0004***	16.01%
Ho: Base = Post-ASR	0.0052***	0.0002***	13.91%
Ho: AD = Post-ASR	0.0033***	0.0101**	16.96%

Table 3.5: Bid Size

This table shows the average daily bid size for the best bid in the National Best Bid Offer (NBBO) quote calculated using data from all reporting market centers in Trades and Quotes (TAQ) database. NBBO is matched to trades using Lee and Ready (1991) methodology utilizing a 5 second delay in reporting of trade. The periods Base, Announcement Day (AD), pre-ASR and post ASR are as described in Table 3.2. The null hypothesis that that average in post-ASR period is equal to the average in other periods is tested. p values for t-Test and sign test are reported. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Panel A reports the statistics for the entire sample. Panel B reports the statistics for the stocks that have NYSE as the primary exchange listing. Panel C reports the statistics for the stocks that have Nasdaq as the primary exchange listing.

Panel B reports the similar statistics for average daily offer size at the NBBO quote. Panel C reports the similar statistics for the market depth. Market Depth is calculated as the average of bid size and offer size.

Bid Size

Panel A: All ASRs

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	13.0296	13.2053	14.9607	16.5332
Median	6.8985	6.9084	6.7395	7.1874

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0270**	0.0109**	59.20%
Ho: Base = Post-ASR	0.0502*	0.0332**	57.21%
Ho: AD = Post-ASR	0.0756*	0.0109**	59.20%

Panel B: NYSE listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	11.6932	11.8954	12.4810	14.2977
Median	7.0029	7.0921	6.7866	7.1685

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0603*	0.0852*	54.73%
Ho: Base = Post-ASR	0.0769*	0.0820*	54.05%
Ho: AD = Post-ASR	0.1517	0.0840*	57.43%

Panel C: NASDAQ listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	16.7363	16.8633	21.8851	22.7756
Median	6.1219	5.9309	6.0159	7.3987

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0580*	0.0022***	71.70%
Ho: Base = Post-ASR	0.0917*	0.0270**	66.04%
Ho: AD = Post-ASR	0.1087	0.0534*	64.15%

Table 3.6: Offer Size

This table shows the average daily offer size for the best bid in the National Best Bid Offer (NBBO) quote calculated using data from all reporting market centers in Trades and Quotes (TAQ) database. NBBO is matched to trades using Lee and Ready (1991) methodology utilizing a 5 second delay in reporting of trade. The periods Base, Announcement Day (AD), pre-ASR and post ASR are as described in Table 3.2. The null hypothesis that that average in post-ASR period is equal to the average in other periods is tested. p values for t-Test and sign test are reported. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Panel A reports the statistics for the entire sample. Panel B reports the statistics for the stocks that have NYSE as the primary exchange listing. Panel C reports the statistics for the stocks that have Nasdaq as the primary exchange listing.

Panel C reports the similar statistics for the market depth. Market Depth is calculated as the average of bid size and offer size.

Offer Size

Panel A: All ASRs

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	15.1606	14.8164	15.7458	18.0156
Median	8.0831	8.0462	8.0673	8.4650

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0153**	0.0030***	60.70%
Ho: Base = Post-ASR	0.0401**	0.0017***	60.70%
Ho: AD = Post-ASR	0.0553*	0.0205**	55.72%

Panel B: NYSE listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	14.0508	13.9290	14.9180	17.3120
Median	8.0996	8.5330	8.3118	8.6068

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0478*	0.0261**	59.46%
Ho: Base = Post-ASR	0.0541*	0.0101**	60.14%
Ho: AD = Post-ASR	0.1002	0.0274**	55.41%

Panel C: NASDAQ listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	18.0386	17.2945	18.5572	19.9805
Median	6.4399	6.8392	6.9581	7.2125

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0399**	0.0534*	64.15%
Ho: Base = Post-ASR	0.0452**	0.0984*	62.26%
Ho: AD = Post-ASR	0.0864*	0.1101	56.60%

Table 3.7: Depth

This table shows the average daily market depth for the best bid in the National Best Bid Offer (NBBO) quote calculated using data from all reporting market centers in Trades and Quotes (TAQ) database. NBBO is matched to trades using Lee and Ready (1991) methodology utilizing a 5 second delay in reporting of trade. Depth is average of the bid size and the offer size. The periods Base, Announcement Day (AD), pre-ASR and post ASR are as described in Table 3.2. The null hypothesis that that average in post-ASR period is equal to the average in other periods is tested. p values for t-Test and sign test are reported. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Panel A reports the statistics for the entire sample. Panel B reports the statistics for the stocks that have NYSE as the primary exchange listing. Panel C reports the statistics for the stocks that have Nasdaq as the primary exchange listing.

Depth

Panel A: All ASRs

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	14.0151	14.0909	15.3532	17.2744
Median	7.5030	7.6373	7.6674	7.8661

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0164**	0.0000***	64.68%
Ho: Base = Post-ASR	0.0379**	0.0332**	57.21%
Ho: AD = Post-ASR	0.0805*	0.0664*	56.72%

Panel B: NYSE listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	12.8720	12.9122	13.6995	15.8048
Median	7.7811	7.9867	7.8460	8.0431

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0714*	0.0065***	61.49%
Ho: Base = Post-ASR	0.0523*	0.09438*	54.73%
Ho: AD = Post-ASR	0.0706*	0.0874*	55.41%

Panel C: NASDAQ listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	17.4875	17.0789	19.9711	21.3781
Median	6.3708	6.2688	6.5413	7.4420

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0481*	0.0008***	73.58%
Ho: Base = Post-ASR	0.0923*	0.0534*	64.15%
Ho: AD = Post-ASR	0.1579	0.0690*	60.38%

Table 3.8: Trading volume

This table shows the average daily trading volume for firms that announce ASRs. The periods Base, Announcement Day (AD), pre-ASR and post ASR are as described in Table 3.2. The null hypothesis that that average in post-ASR period is equal to the average in other periods is tested. p values for t-Test and sign test are reported. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Panel A reports the statistics for the entire sample. Panel B reports the statistics for the stocks that have NYSE as the primary exchange listing. Panel C reports the statistics for the stocks that have Nasdaq as the primary exchange listing.

Volume

Panel A: All ASRs

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	1,430,885.00	1,593,001.00	1,921,482.00	1,793,190.00
Median	342,170.60	352,000.00	381,100.00	367,660.00

	t-test	Sign-Test	% Positive
Ho: Pre-ASR = Post-ASR	0.4798	0.0163**	58.71%
Ho: Base = Post-ASR	0.0981*	0.0069***	59.20%
Ho: AD = Post-ASR	0.6828	0.5708	50.95%
Ho: AD = Base	0.0203**	0.0220**	57.74%

Panel B: NYSE listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	1,775,224.00	2,018,805.00	2,423,186.00	2,247,623.00
Median	447,694.90	452,823.00	495,100.00	479,700.00

	t-test	Sign-Test	% Positive
Ho: Pre-ASR = Post-ASR	0.2761	0.2174	55.41%
Ho: Base = Post-ASR	0.1070	0.0161**	59.46%
Ho: AD = Post-ASR	0.6841	0.0595*	57.62%
Ho: AD = Base	0.0230**	0.0792*	58.35%

Panel C: NASDAQ listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	475,832.90	403,965.30	520,496.30	524,208.50
Median	181,713.10	179,969.20	178,639.00	174,424.20

	t-test	Sign-Test	% Positive
Ho: Pre-ASR = Post-ASR	0.0056***	0.0127**	67.92%
Ho: Base = Post-ASR	0.2456	0.2717	58.49%
Ho: AD = Post-ASR	0.4717	0.2717	58.49%
Ho: AD = Base	0.0189**	0.0845*	60.38%

Table 3.9: Trade Size

This table shows the average daily trade size of transactions for firms that announce ASRs. The periods Base, Announcement Day (AD), pre-ASR and post ASR are as described in Table 3.2. The null hypothesis that that average in post-ASR period is equal to the average in other periods is tested. p values for t-Test and sign test are reported. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Panel A reports the statistics for the entire sample. Panel B reports the statistics for the stocks that have NYSE as the primary exchange listing. Panel C reports the statistics for the stocks that have Nasdaq as the primary exchange listing.

Trade Size

Panel A: All ASRs

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	551.0050	555.3399	585.3904	591.6803
Median	376.6112	373.2248	390.1175	385.9741

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0890*	0.0768*	56.72%
Ho: Base = Post-ASR	0.1116	0.1642	53.76%
Ho: AD = Post-ASR	0.3941	0.5727	52.24%
Ho: AD = Base	0.0493**	0.5708	52.74%

Panel B: NYSE listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	567.3909	580.5003	614.6881	615.8384
Median	379.7154	385.3041	406.7659	396.8549

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0615*	0.1051	59.26%
Ho: Base = Post-ASR	0.4495	0.2040	52.03%
Ho: AD = Post-ASR	0.4852	0.2053	51.35%
Ho: AD = Base	0.0354**	0.4792	61.30%

Panel C: NASDAQ listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	505.5573	485.0807	503.5780	524.2197
Median	364.9626	352.8336	360.9070	374.6742

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.0151**	0.1831	54.72%
Ho: Base = Post-ASR	0.2120	0.5188	54.94%
Ho: AD = Post-ASR	0.1597	0.5831	52.72%
Ho: AD = Base	0.0510*	0.9916	50.00%

Table 3.10: Net Order Flow

This table shows the average daily net order flow. Net order flow is the average daily signed traded. Trades are signed as buys or sells with buys getting a positive value and sells getting a negative value. Buys and sells are identified using Lee and Ready (1991). Net trading volume is the net order flow. The periods Base, Announcement Day (AD), pre-ASR and post ASR are as described in Table 3.2. The null hypothesis that that average in post-ASR period is equal to the average in other periods is tested. p values for t-Test and sign test are reported. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Panel A reports the statistics for the entire sample. Panel B reports the statistics for the stocks that have NYSE as the primary exchange listing. Panel C reports the statistics for the stocks that have Nasdaq as the primary exchange listing.

Net Order Flow

Panel A: All ASRs

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	25.5479	30.2838	38.0909	28.6974
Median	8.5655	10.0296	14.3140	14.6618

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.8237	0.7779	48.76%
Ho: Base = Post-ASR	0.7234	0.8873	50.65%
Ho: AD = Post-ASR	0.0698*	0.1362	56.25%

Panel B: NYSE listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	37.1170	40.0560	52.3567	40.5612
Median	16.8380	16.7373	18.4260	15.7934

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.9496	0.8053	48.65%
Ho: Base = Post-ASR	0.3768	0.2819	44.59%
Ho: AD = Post-ASR	0.1554	0.9345	49.32%

Panel C: NASDAQ listed

	Base	Pre-ASR	Announcement Day (AD)	Post-ASR
Mean	-6.5397	2.9954	-1.7458	-4.4320
Median	-1.1108	-13.9201	-4.6296	13.9767

	t-test	Rank sum test	% Positive
Ho: Pre-ASR = Post-ASR	0.5904	0.4101	43.40%
Ho: Base = Post-ASR	0.4354	0.0984*	62.26%
Ho: AD = Post-ASR	0.5516	0.7838	52.83%

Table 3.11: Volatility

This table shows the average daily intra-day price volatility calculated using trade data in TAQ database. The periods Base, Announcement Day (AD), pre-ASR and post ASR are as described in Table 3.2. The null hypothesis that that average in post-ASR period is equal to the average in other periods is tested. p values for t-Test and sign test are reported. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Panel A reports the statistics for the entire sample. Panel B reports the statistics for the stocks that have NYSE as the primary exchange listing. Panel C reports the statistics for the stocks that have Nasdaq as the primary exchange listing.

Volatility

All ASRs

	Base	Pre	Announcement Day (AD)	Post
Mean	0.1738	0.1979	0.1984	0.2063
Median	0.1435	0.1590	0.1596	0.1677

	t-test	Sign-Test	% Positive
Ho: Pre-ASR = Post-ASR	0.2667	0.1779	55.24%
Ho: Base = Post-ASR	0.0021***	0.0234**	58.73%
Ho: AD = Post-ASR	0.0000***	0.0011***	61.69%
Ho: AD = Base	0.0123**	0.3722	53.26%

NYSE listed:

	Base	Pre	Announcement Day (AD)	Post
Mean	0.1822	0.2115	0.2146	0.2165
Median	0.1531	0.1624	0.1689	0.1730

	t-test	Sign-Test	% Positive
Ho: Pre-ASR = Post-ASR	0.5877	0.9345	50.68%
Ho: Base = Post-ASR	0.0037***	0.0142**	60.68%
Ho: AD = Post-ASR	0.0001***	0.0022***	62.84%
Ho: AD = Base	0.0105**	0.8053	51.35%

NASDAQ listed:

	Base	Pre	Announcement Day (AD)	Post
Mean	0.1501	0.1598	0.1530	0.1777
Median	0.1292	0.1438	0.1497	0.1511

	t-test	Sign-Test	% Positive
Ho: Pre-ASR = Post-ASR	0.0483**	0.0838*	57.17%
Ho: Base = Post-ASR	0.3186	0.5831	54.72%
Ho: AD = Post-ASR	0.0071***	0.2717	58.49%
Ho: AD = Base	0.8043	0.1690	55.62%

Table 3.12: Information Asymmetry

This table shows the information asymmetry component of spread decomposed using Lin, Sanger and Booth (1993). Month $_{-2}$, Month $_{-1}$, Month $_{+1}$ and Month $_{+2}$ represent periods (-50,-28), (-27,-5), (+5, +27) and (+28,+50) respectively. A month is assumed to be 22 trading days and the months are measured leaving a trading period of 5 days around the ASR announcement. The null hypothesis that average in Month $_{-2}$ is equal to the average in Month $_{+2}$, the average in Month $_{-1}$ is equal to the average in Month $_{+1}$ are tested p values for t-Test and sign test are reported. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Panel A reports the statistics for the entire sample. Panel B reports the statistics for the stocks that have NYSE as the primary exchange listing. Panel C reports the statistics for the stocks that have Nasdaq as the primary exchange listing.

Information asymmetry component of spread

Panel A: All ASRs

	Month $_{-2}$	Month $_{-1}$	Month $_{+1}$	Month $_{+2}$
Mean	0.3878	0.3946	0.4344	0.4228
Median	0.3383	0.3653	0.3901	0.3707

	t-test	Rank sum test	% Positive
Ho: Month $_{-2}$ = Month $_{+2}$	0.8956	0.0238**	58.21%
Ho: Month $_{-1}$ = Month $_{+1}$	0.0172**	0.0024***	61.19%

Panel B: NYSE listed

	Month $_{-2}$	Month $_{-1}$	Month $_{+1}$	Month $_{+2}$
Mean	0.3660	0.3871	0.4198	0.4210
Median	0.3359	0.3491	0.3672	0.3576

	t-test	Rank sum test	% Positive
Ho: Month $_{-2}$ = Month $_{+2}$	0.0596*	0.0131**	59.46%
Ho: Month $_{-1}$ = Month $_{+1}$	0.042**	0.0245**	58.78%

Panel C: NASDAQ listed

	Month $_{-2}$	Month $_{-1}$	Month $_{+1}$	Month $_{+2}$
Mean	0.4490	0.4158	0.4758	0.4277
Median	0.3902	0.4181	0.4852	0.4249

	t-test	Rank sum test	% Positive
Ho: Month $_{-2}$ = Month $_{+2}$	0.2347	0.5831	54.72%
Ho: Month $_{-1}$ = Month $_{+1}$	0.0495*	0.0127**	67.92%

Table 3.13: Information asymmetry before and after the ASR announcement

This table shows the information asymmetry component of spread decomposed using Lin, Sanger and Booth (1993). Before and After represent the period (-88, -44) and (+44, +88) respectively. A month is assumed to be 22 trading days. As such, the period *Before* represents the information asymmetry component of spread using data from month (-4, -2) and *After* represents the information asymmetry component of spread using data from month (+2,+4). The null hypothesis that average in the *Before* period is equal to the average in *After* period is tested. p values for t-Test and sign test are reported. ***, **, and * denote significance at the 0.01, 0.05, and 0.10 level, respectively. Panel A reports the statistics for the entire sample. Panel B reports the statistics for the stocks that have NYSE as the primary exchange listing. Panel C reports the statistics for the stocks that have Nasdaq as the primary exchange listing.

Information Asymmetry before and after the ASR

Panel A: All ASRs

	Before	After
Mean	0.4046	0.4220
Median	0.3685	0.4282

	t-test	Rank sum test	% Positive
Ho: Before = After	0.0287**	0.0002***	63.18%

Panel B: NYSE listed

	Before	After
Mean	0.3992	0.4089
Median	0.3609	0.3999

	t-test	Rank sum test	% Positive
Ho: Before = After	0.0213**	0.0168**	60.14%

Panel C: NASDAQ listed

	Before	After
Mean	0.4200	0.4590
Median	0.3983	0.4955

	t-test	Rank sum test	% Positive
Ho: Before = After	0.0205**	0.0022***	71.70%

Table 3.14 Regression results

This table shows results of OLS regression. The dependent variable is the log difference in percentage effective spread in the post-ASR period and the pre-ASR period. Log inverse price is the log difference in inverse of price (1/price) per share of the firm in the post-ASR period and the pre-ASR period. Difference relative volume is the difference in traded share volume in post-ASR period and pre-ASR period, both calculated relative to the base period. Difference volatility is the difference in volatility between post-ASR and pre-ASR period. The base, pre and post ASR period are as defined in Table 3.2. Percentage of equity is the percentage of outstanding equity repurchased in the ASR. Undervaluation, return cash to shareholders, buy back shares issued in an acquisition, buy back shares related to conversion, buy back shares issued in benefit plan, cash from sale of assets/division/equity, capital structure adjustment are dummy variables reflecting the stated motivations (not mutually exclusive) for undertaking ASRs. If the firm stated a particular motivation for the ASR at announcement, then the corresponding variable takes a value of one and zero otherwise. Nasdaq dummy; options traded; agreements with collars, caps or floors; simultaneous ASR; are as defined in Table 3.1.

Specification	(1)	(2)	(3)	(4)
Log inverse price	0.550	0.662	0.449	0.391
	(0.373)	(0.294)	(0.498)	(0.555)
Difference relative volume	0.030**	0.030**	0.030**	0.030**
	(0.014)	(0.015)	(0.015)	(0.018)
Difference volatility	0.369***	0.374***	0.372***	0.372***
	(0.006)	(0.005)	(0.006)	(0.006)
Log market capitalization		0.013	0.016	0.013
		(0.480)	(0.411)	(0.491)
Nasdaq dummy		-0.017	-0.015	-0.021
		(0.728)	(0.770)	(0.675)
Options traded		0.071	0.065	0.063
		(0.205)	(0.251)	(0.263)
Percentage of equity			0.197	-0.019
			(0.653)	(0.967)
Agreement with collars, caps or floors			0.051	0.069
			(0.306)	(0.176)
Simultaneous ASR			-0.046	-0.048
			(0.344)	(0.343)
Undervaluation				0.009
				(0.842)
Return cash to shareholders				0.085
				(0.342)
Buy back shares issued in a takeover				-0.061
				(0.768)
Buy back shares related to conversion				0.110
				(0.433)
Buy back shares issued in benefit plan				-0.241**
				(0.035)
Cash from sale of assets/division/equity				-0.067
				(0.379)
Capital structure adjustment				-0.140**
				(0.044)
Constant	-0.049**	-0.306	-0.352	-0.284
	(0.030)	(0.283)	(0.236)	(0.348)
Observations	214	214	214	214
Adjusted R-squared	0.150	0.163	0.171	0.216