

MEASURING THE AGENCY COSTS OF DISPERSED OWNERSHIP: THE CASE OF REPURCHASE INITIATIONS

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Abstract

Empirical investigations of the agency costs of dispersed ownership yield mixed results. A possible explanation for the lack of conclusive evidence is inaccurate measurement of the extent of the problem. We suggest that the extent of the problem be measured as theory suggests: by the wealth that managers commit to their firms. We examine the relative performance of different measures of the agency problem of dispersed ownership in the context of changes in payout policy affected by repurchase initiations. We find that the suggested measure – managerial equity wealth – can explain better than any other measure the market reaction to repurchase initiations. We also find that market reaction to repurchase initiation is smaller for firms with high media coverage than for firms with low media coverage and that repurchases that follow a large rise in stock prices elicit relatively small market reactions. Lastly, we find that market reaction to repurchase announcements decreases with the dividend yield of the firm, which suggests that share repurchases are relatively less important when dividends are used to alleviate the problems of free cash flows. Our results are robust to several modifications of the main test.

Keywords: Agency Costs, Ownership, Managerial Equity Wealth

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We would like to thank Roni Ofer, Orly Sade, Avi Wohl, and seminar participants at the Hebrew University, IDC Herzliya, Tel-Aviv University, and the University of Haifa for helpful comments and suggestions.

1. Introduction

Agency problems of dispersed ownership affect multiple corporate decisions: payout policy, capital structure policy, investment policy, etc. Accordingly, a vast body of research attempts to measure the impact of this problem on payout policies (e.g., Lang and Litzenberger 1989), asset diversification (e.g., Denis, Denis, and Sarin 1997), capital structure (e.g., Kim and Maksimovic 1990, Berger, Ofek, and Yermack 1997), cash holdings (e.g., Lie 2000), and other factors. However, the evidence regarding the impact of managerial agency problems on firm value is mixed. For example, although Lang and Litzenberger (1989) document a significant positive relationship between the extent of managerial over-investment and market reaction to changes in payout policy, Yoon and Starks (1995) do not find the same relationship. Similarly, although Morck, Shleifer, and Vishny (1988) document a U-shaped relationship between managerial fractional ownership of their firm and firm value, McConnell and Servaes (1990) document a humped relationship.

Inaccurate measurement of the extent of this agency problem is one possible explanation for the lack of empirical support for the theory of the agency costs of dispersed ownership. Specifically, theory suggests that managers do not pursue the best interests of shareholders because managers do not bear the full costs or obtain the full benefits of their decisions. In the theoretical analysis (e.g., Ross 1973, Jensen and Meckling 1976), the impact of managerial decisions on their wealth depends on the *total wealth* they commit to the firm. Costs of under-diversification, effort, and benefits of control offset this wealth impact. In other words, in the theoretical analysis of agency problems of dispersed ownership, managers who maximise their utility trade off the *total* impact of their actions on their wealth against the benefits they derive. In the real world, you will never measure the full wealth of a CEO (Becker 2006). However, in empirical tests of this theory, managerial susceptibility to the wealth effects of managers' actions is not measured by the *total value* of their holdings in the firm. Rather, managerial susceptibility is measured by managers' *proportional* holdings in the firm, independent of how much wealth such holdings

represent. In this study, we rectify the measurement problem of prior studies and measure the agency problem of dispersed ownership as theory suggests - by the total wealth that managers commit to their firms.

Some studies of the impact of the agency problem of dispersed ownership use *indirect measures* of the problem, which focus on the *consequences* of the problem, primarily Tobin's Q and various measures of outside shareholder monitoring activity. However, the use of indirect measures of the agency problem of dispersed ownership is also problematic. Consider, for example, the use of Tobin's Q - the ratio of the market value of a firm to the replacement value of its assets. First, Q, which measures overinvestment, is relevant only to the extent that the agency problem of dispersed ownership manifests itself by over-investment. Thus, Q is not suitable for measuring agency problems in firm decisions that are unrelated to over-investment, such as capital structure decisions. Second, the replacement value of firm assets, which is not directly observable, is approximated by the book value of the firm. The difference between book values and replacement values, for example, those due to accounting use of historical costs, introduces noise. The use of historical accounting data may also introduce biases that are related to firm age if agency costs are higher in mature, large firms than in young, small firms. Third, the theoretical Q of interest is the *marginal* Q, whereas empirically the observed Q is the *average* one. The use of the average Q also introduces noise, as well as potential biases. This is because the average Q measures additional factors, such as lack of competition in product markets and availability of investment opportunities, which may be related to firm decisions. Indeed, empirical studies of the relationship between Q and managerial holdings (e.g., Morck, Shleifer, and Vishny 1988, McConnell and Servaes 1990) show that Q is noisily and not monotonically related to managerial stock ownership.

In sum, measures of the agency problem of dispersed ownership used in prior studies appear to be either inconsistent with theory, or noisy, or biased. We examine a measure of the problem that captures the full exposure of managers to the wealth impact of their decisions. Specifically, we measure the extent of the agency problem of dispersed ownership by the dollar value of the wealth that managers commit to their firms - "*managerial equity wealth*". It is worth noting that some studies (e.g., Holderness, Kroszner, and Sheehan, 1999) use managerial equity wealth for other purposes, mainly as a control. We, however, use it as a direct measure of the extent of the agency problem of dispersed ownership, which is proportional to the wealth managers commit to their firm. The measure we use is useful as an additional test and can be less

contaminated by various factors that can drive a firm's Q.

Applying the proposed measure, "*managerial equity wealth*", however, is potentially difficult. One reason is that some managerial holdings are in the form of executive stock options, and a second reason is that by the theory we should also have an estimation of managerial total wealth. To incorporate stock options into this measure, one needs to know the value of the options, as well as their hedge ratios, so that managerial dollar exposure can be calculated. Unfortunately, such data are not readily available. Nonetheless, using this measure without complete option information may still be superior to the use of fractional holdings for two reasons. First, the value of stock options, especially when they are out of the money and multiplied by their hedge ratios, is typically much smaller than the value of the share holdings (see, for example, Fenn and Liang 2001). This is also true in our sample: for 220 firms in our sample (25.7%) that have option award values in COMPUSTAT ExuComp dataset, we estimate the fraction of managerial wealth invested in their firm through options to be approximately 4% of the total wealth committed to the firm by managers. Note that this number should be multiplied by the hedge ratios of the options to obtain the true wealth exposure that the options represent. Thus, the fraction of managerial wealth exposed to firm decisions through options is lower than the estimated 4%. Second, the use of the fractional holding as a measure of the agency problem suffers from the same data issue because one needs the unknown hedge ratio of the options to compute managerial fractional holdings properly - the percentage of stock holdings plus the percentage of option holdings times the hedge ratio of the options. Therefore, managerial equity wealth potentially measures the extent of agency problems of dispersed ownership better than fractional managerial holdings.

To estimate managerial total wealth, one needs to know the value of the manager's other assets, such as other listed securities, unlisted securities, and real estate. Unfortunately, such data are confidential. Nonetheless, using the measure of managerial equity wealth without complete personal wealth information may still be superior to the use of fractional holdings, for the same two reasons described above. First, in the USA, the value of personal wealth is assumed to be typically much smaller than the value of share holdings. Elsila, Kallunki, and Nilsson (2009) have a confidential sample from 1999 to 2005 from the tax authority in Sweden. In their sample, there are 1002 firm-year observations comprising 261 firms and 370 CEOs. The CEOs in Sweden in this sample have a very small stake in their company relative to USA CEOs, as the mean is only 0.4% and the

median 0.04%. Nonetheless, in the Sweden sample, the mean market value of each CEO's holdings in his firm divided by the value of his total wealth (the market value of his holdings in all insider and outsider stocks and the value of his other wealth) is 36.6%, and the median is 23.5%.¹ Because in our sample the CEOs' mean portion in their company is 9.55% and the median 3.20%, we can assume that managerial wealth in the firm is extremely significant relative to managerial total wealth. Second, the use of the fractional holding as a measure of the agency problem suffers from the same data issue as it ignores total personal wealth.

The results reported in Kole (1995) suggest that the proposed measure of the agency problem of dispersed ownership is potentially superior to other measures of the problem.

Kole (1995) examines the empirical evidence regarding the relationship between managerial holdings and Q and suggests that differences across studies in the empirical estimates of this relationship are related to the average firm sizes of the different samples. Firm size is related to the measurement of agency problems of dispersed ownership because it links managerial *fractional* ownership to managerial *total wealth committed*, and as CEO incentives are roughly constant or decline slightly with firm size (Baker and Hall, 2004), we interpret these results to mean that empirical work should follow theory and use managerial equity wealth to measure managerial exposure to the wealth impact of their decisions. As discussed below, we provide an empirical illustration of the superiority of this measure in the case of share repurchases².

Empirical studies of the agency problem of dispersed ownership examine its impact on payout policy, firm diversification, capital structure, and other factors. We use the context of payout policy to examine the relative merits of different measures of the agency problem. Paying cash to shareholders, through either dividends or repurchases, alleviates the agency problem by constraining managerial ability to fund activities that are not in the best interests of shareholders (e.g., Easterbrook 1984, Jensen 1986). This is particularly noticeable in cases of large, lump-sum distributions, which is the reason why we focus on share repurchases. Moreover, our focus on payout policy is especially favourable to finding that Tobin's Q performs well in measuring managerial exposure to agency problems. Tobin's Q performs well because paying out cash inhibits managerial ability to over-invest.

Hence, Tobin's Q, which is an indirect measure of over-investment, is better suited to measure this particular manifestation of the agency problem than other manifestations. Therefore, by focusing on payout policy, we analyse the best case for previously used measures relative to the suggested measure - managerial equity wealth.

In sum, we compare the measures of the severity of the agency problem of dispersed ownership that are used in prior studies - managerial fractional share holding and Tobin's Q - with the measure that is consistent with theory - managerial equity wealth. As theory suggests, we expect the agency problem to intensify when managerial equity wealth decreases and an increase in shareholder payout to reduce the problem. Hence, as in prior empirical studies of payout policies, we expect the price impact of an announcement of repurchase initiation by firms with small managerial equity wealth to be higher than in firms with large managerial equity wealth.

As theory suggests, we find a significant negative relationship between management equity wealth and the abnormal return around repurchase initiation announcements in the period 1985-2001. Thus, the smaller the agency problem of dispersed ownership is, the smaller the market reaction to reductions in free cash flows becomes. When we use the measures implemented in prior research - the fractional holdings of management and Tobin's Q - we do not find similar significant relationships. Furthermore, when we include all three measures of the extent of managerial agency problems in a single regression, managerial equity wealth is the only measure that is significantly related to market reactions. We interpret these results as an indication that managerial equity wealth, which is the measure consistent with theory, is the appropriate measure of the extent of agency problems of dispersed ownership. We also find that market reaction to repurchase initiation is smaller for firms with high media coverage than for firms with low media coverage and that repurchases that follow a large rise in stock prices elicit relatively small market reactions. We interpret these results to suggest that share repurchases contribute more to the alleviation of the agency problem of dispersed ownership in firms with relatively high information asymmetry. Lastly, we find that market reaction to repurchase announcements decreases with the dividend yield of the firm, which suggests that share repurchases are relatively less important when dividends are used to alleviate the problems of free cash flows. Our results are robust to several modifications of the measures used in this study.

The remainder of the paper is organised as follows. In Section I, we present the methodology. In Section II, we describe our data, and the empirical results are presented in Section III. In

¹ The net wealth mean is 41.6%, and the median is 30.7%

² Another technical advantage of our approach is that we do not encounter problems with variables that are simultaneously / endogenously determined, as do, for example, Himmelberg, Hubbard, and Palia (1999) and Demsetz and Villalonga (2001), because we compare predetermined managerial ownership to market reactions to subsequent announcements.

Section IV, we report the results of robustness checks, and Section V concludes.

2. Methodology

To summarise prior theoretical analyses of the agency problems of dispersed ownership, we begin with a distilled presentation of the trade-off that managers face. Specifically, in our context, managers consider the impact of their investment decisions on their personal wealth and on benefits they derive from managing large firms - *private benefits of control*.

Consider a firm with investments, denoted by I , that yield future returns with a present value of $V(I)$. $V(I)$ is assumed to be an increasing concave function of investments such that the net present value of the investments (i.e., $V(I) - I$) is uniquely maximised at I^* :

$$V'(I^*) = 1 \quad (1)$$

Note that the invested amount is, by definition, the replacement value of the assets in which the firm invests. Therefore, assuming that $V(I)$ is common knowledge and that markets are efficient, the first-best investment is achieved when the marginal Q - the ratio of the market value of the marginal investment to its replacement cost - equals one.

Managers derive utility from increases in firm value, which equals the net present value of the firm's investments - $V(I) - I$ - through their holdings in the firm. We assume that managers hold a proportion a of the outstanding shares of the firm. Managers also derive utility from private benefits of control - $B(I)$ - which we assume are increasing and concave in firm size. Thus, when selecting the investment plans, managers maximise the following increasing and concave utility function:

$$U\{a[V(I)-I], B(I)\} \quad (2)$$

Consequently, unlike shareholders, managers of firms with dispersed ownership choose to invest until

$$\frac{\partial U}{\partial W} \times \alpha[V'(I^{**}) - 1] + \frac{\partial U}{\partial B} \times B'(I^{**}) = 0 \quad (3)$$

where $W = a[V(I)-I]$ is *managerial equity wealth* - the personal wealth that managers invest in the equity of their firm.

Rearranging the first-order condition yields

$$V'(I^{**}) = 1 - \frac{U_B}{U_W} \times \frac{B'(I^{**})}{\alpha} \quad (4)$$

Therefore, managers choose second-best investment levels that are higher than the first-best investment levels that shareholders desire. Accordingly, the marginal Q is less than unity:

$$I^{**} > I^* \ll Q(I^{**}) < Q(I^*) = 1 \quad (5)$$

As mentioned above, prior studies use either the fractional holdings of managers in the firm's equity - a - or the average Q to proxy for the extent of the agency problem of dispersed ownership. Equation (5) illustrates the underlying intuition for these proxies. Specifically, as a increases, the second-best investment level - I - becomes closer to the first-best level. Similarly, abstracting from measurement issues and assuming an equal relationship between the *marginal* Q - $V'(I)$ - and the *average* Q - $V(I)/I$ - across firms, a decline in the average Q corresponds to an increased deviation of the second-best investment level from the first-best level.

Equation (4) also shows the reason why Q and a fail to capture the impact of firm size on managerial incentive to deviate from the first-best level of investment. Specifically, both measures ignore the relative susceptibility of managers to the wealth and control effects of their decisions - U_B / U_W . Indeed, their relative susceptibility depends on the measure that we focus upon - managerial equity wealth - $a[V(I)-I]$. Note that managerial equity wealth combines both proxies used in prior studies, managerial *fractional* holding (a) and *average* Q ($V(I)/I$), into a single measure.

As explained above, we examine market reaction to announcements of changes in payout policies - unanticipated announcements of share repurchases. As prior research shows (e.g., Aharony and Swary 1980, Healy and Palepu 1988, Ikenberry, Lakonishok, and Vermaelen 1995), there is a positive market reaction to announcements of payout increases or initiations and a negative reaction to announcements of payout decreases or curtailment. The positive market reaction to increased payout can be attributed to inside information conveyed by such actions or to changes in leverage and their tax effects, factors for which we control in our tests.

Our focus, however, is on agency explanations for the reaction: the documented relationship between market reaction to changes in payout policy and the severity of the agency problem of dispersed ownership (e.g., Lang and Litztenberger 1989, Yoon and Stark 1995).

We examine a particular form of changes in payout - unanticipated share repurchases, which have become a prominent form of shareholder payout in recent years (e.g., Fama and French 2001 and Grullon and Michaely 2002). Based on prior research, we expect that the price impact of an announcement of unanticipated repurchase initiation by firms with small managerial equity wealth will be higher than in firms with large managerial equity wealth. The intuition is that managers are less subject to agency problems of dispersed ownership when they hold large equity

stakes in their firms than when their equity stake is small.

We consider an announcement of a share repurchase to be unanticipated if it is made by a firm that has had no share repurchases in the four years preceding the announcement. We measure the reaction to announcements of unanticipated share repurchases by the abnormal return (“AR”) on the three trading days surrounding the announcement: the day preceding the announcement, the day the announcement is reported, and the following day. We choose the event windows to capture the market reaction as the information may leak. We measure AR as the difference between the stock returns around the announcement and the concurrent return of the S&P 500 index.

We compare three measures of the severity of the agency problem of dispersed ownership. The first two measures are those used in prior research: managerial fractional holdings in the equity of their firm (“%OWN”) and Tobin’s Q (“Q”). The third measure is the one suggested by theory but not used heretofore - managerial equity wealth (“MEW”). %OWN is measured by the number of shares held by management as a percentage of total shares outstanding at the end of the preceding fiscal year, as reported in the last proxy statement preceding the repurchase announcement³. Q is measured by the market value of equity plus book value of debt divided by the book value of equity and debt as of the year end preceding the repurchase announcement. MEW is measured by the dollar value of shares held by management - %OWN times the market value of the equity at the end of the month preceding the repurchase announcement.

In our analysis, we control for additional potential determinants of the market reaction to unanticipated announcements of share repurchases. Specifically, we control for monitoring by outside shareholders, information asymmetry and market timing, tax effects, leverage, and pre-announcement payout policy.

Large shareholder monitoring is measured by the percentage of the firm’s equity that is held by block-holders (“BLOCK”). We define block-holders (“BLOCK”) as the percentage of common shares owned by beneficial owners that are not directors or executive officers. We expect firms with higher percentage of block holdings to suffer less from agency problems of dispersed ownership (e.g., Shleifer and Vishny 1986).

We measure the extent of information asymmetry by media coverage and by managerial incentive to time the market. We expect smaller

market reaction to repurchase announcements when information is less asymmetric than when asymmetry is large. Media coverage (“COVER”) is measured by the number of news items in the Dow Jones Newswire in the year preceding the announcement and is a measure of public interest in the firm and hence an inverse measure of information asymmetry. Because the number of media items rises significantly over time, media coverage is included in our analysis as a dummy variable - “ICOVER”. Icover takes a value of “1” if the number of media items is above the median number of reports per firm in the announcement year and “0” otherwise. Managerial incentive to time the market in repurchase announcements is measured by the above-market return on the stock in the 12-month period preceding the announcement (“TIMING”). Prior studies use prior stock performance to measure the extent of undervaluation (See for example Stephens & Weisbach, 1998). Stock markets tend to react more positively to share repurchase announcements when the shares are more undervalued, i.e., poor prior stock performance. Thus, prior returns should be negatively related to announcement returns. The evidence presented in this paper is consistent with this argument.

The impact of the differential taxation of dividends and share repurchases is measured by the ratio of the maximal capital gains tax to the marginal ordinary income tax (“TAX”). We expect that share repurchase announcements are made when the tax advantage of share repurchases over dividends is high to entail a more positive market reaction than share repurchases done when the tax advantage is low (e.g., Elton and Gruber 1970).

The pre-announcement payout policy of an announcing firm is measured by a dummy variable (“IDIV”) that takes a value of “1” when the firm paid cash dividends in the year preceding the announcement and “0” otherwise. Because paying dividends is an alternative means of alleviating the agency problem of dispersed ownership, we expect smaller market reactions to repurchase announcements in firms that pay dividends regularly than in firms that do not.

Agency problems of dispersed ownership can also be mitigated by financing the firm with a large fraction of debt, the service of which reduces free cash flows. Thus, we also control for cross-sectional differences in firm leverage, which is measured by the ratio of total debt to total assets (“LEVERAGE”). Note that by including LEVERAGE in the test equation we also control for the extent to which repurchase announcements entail a move to an optimal capital structure by increasing leverage.

We compare the three measures of the extent of agency problems of dispersed ownership - %OWN, Q, and MEW - using cross-sectional

³ We examine the two definitions of “management” that are reported in proxies: “All directors and executive officers” and “CEO”. Because there is little difference in the results, we detail the results for “All directors and officers” and defer the results for the CEO only to the diagnostic checks.

regressions of market reaction to announcements of repurchases on these measures and the control variables. We examine each measure of the extent of agency problems, both separately and jointly, using the following regression model equation:

$$AR_1 = \beta_0 + \beta_1 \text{Measures}(s)_i + \beta_2 \text{BLOCK}_i + \beta_3 \text{I}_{\text{cover},i} + \beta_4 \text{TIMING}_i + \beta_5 \text{TAX}_i + \beta_6 \text{I}_{\text{div},i} + \beta_7 \text{LEVERAGE}_i + \varepsilon_i \quad (6)$$

where Measure(s)_i is either one of the measures of the extent of the agency problems of dispersed ownership - %OWN, Q, and MEW - or all three measures together.

In addition to the main analysis, we conduct a number of robustness checks. First, we examine our definition of “management”. In our main analysis, we consider all directors and executive officers as the “management” of the firm and compute MEW and %OWN for the group as a whole. We verify the validity of this definition of management by re-estimating the regressions with “management” restricted to the CEO (“CEO”). We also examine several modifications to the control variables, add a control for the fraction of the outstanding shares to be repurchased (“%REP”), and examine variations on the form in which the measures of the agency problem enter the estimated equation.

3. Data

Our sample consists of firms that initiated share repurchases during the period 1985-2001. We identify potential share repurchases as an increase in the number of treasury stocks reported in the COMPUSTAT files (data item 87). Note that our selection criterion excludes repurchases in which the repurchased shares are delivered to managers who exercise their options, as the number of shares outstanding does not change in such cases. This exclusion is motivated by the confusion of two effects in these cases - a reduction in cash and a simultaneous increase in managerial shareholdings - which makes it difficult to interpret market reactions.

We find 11,887 repurchases in the period 1985-2001: 6,955 repurchases in the Dow Jones Newswire (1982 through 1996) and 4,932 repurchases in the Bloomberg system (1997 through 2001).

We define a repurchase as an initial repurchase when it is the first repurchase after four consecutive years with no repurchases. In these cases, we consider the announcement of the repurchase to be unanticipated. All other repurchases are dropped from our sample. We further exclude all financial firms (four digit SIC code 6xxx) from our sample.

For each remaining initial repurchase, we search for the initial announcement of the repurchase, going back up to two years from the

repurchase year. We exclude from the sample all repurchases that are driven by non-cash-management reasons. These include repurchases of odd-lot holdings and repurchases that are part of a legal process, such as reorganisation, court settlement of claims, and fulfilment of contract provisions. We also exclude repurchases of shares between a parent company and a subsidiary, repurchases of preferred shares, and repurchases from a single identifiable person, all of which we consider to be driven by non-cash-management reasons. Lastly, we exclude from our sample all repurchases contaminated by other events. These include repurchases announced in the month following September 11, 2001, and announcements of repurchases that are made jointly with earning announcements⁴.

Our sample of unanticipated, initial announcements of share repurchases consists of 890 announcements in the period 1985-2001. In Table 1, we report the distribution of our sample of initial repurchase announcements over the sample period. Similar to Fama and French (2001), Sarig (2004), and others, Table 1 shows that the number of initial repurchases has materially increased since the mid-1990s. Note that this increase in repurchase initiations follows an *increase* in stock prices and just precedes the stock price declines of 2000 and 2001. This “reverse timing” sheds doubt on the ability of managers to time the market in their repurchases and on the market-timing motive for initiating share repurchases. The finding suggests that other motives, such as controlling the agency costs of dispersed ownership, are more important in managerial repurchase decisions.

We collect management holdings of stock in their firms from the last proxy statements filed before each announcement of an initial share repurchase. These proxy statements are obtained from the Thomson Financial database (1985-1994) and the Edgar database (1995-2001). All market values are taken from the CRSP files and all financial statements data are taken from the COMPUSTAT files.

In Table 2, we provide descriptive statistics as well as correlations of the variables we use. The average abnormal return (AR) to the announcement is 3.14%, which is consistent with prior findings (e.g., Ikenberry, Lakonishok, and Vermaelen 1995) and greater than the abnormal return to announcements of dividends suggested by theory (e.g., Ofer and Thakor 1987). The average managerial equity holding (MEW) is approximately \$74 million (median \$22 million). This figure is in line with Denis, Denis, and Sarin (1997), who document average managerial holdings of \$66 million, and Holderness, Kroszner, and Sheehan

⁴ Not reported in the paper, we examine the price impact of these repurchase announcements and find significantly different results for them than for the remaining sample.

(1999), who document an average value of \$73 million. Importantly, these figures suggest that managerial equity holdings are a significant component of their wealth and not a small fraction of a diversified portfolio. Hence, managerial decisions materially affect their personal wealth and, consequently, their actions, which is the effect we try to capture with *MEW* as a measure of the agency problems of dispersed ownership.

The averages of the other variables used in our study are also consistent with those reported by prior studies. For example, the average percentage holding of management (*%OWN*) is 22.4%, which is consistent with Holderness, Kroszner, and Sheehan (1999), who document average fractional holdings of 21.1%. The average *Q* is 1.5, which is consistent with Cho (1998), who documents an average *Q* of 1.23 for Fortune 500 manufacturing firms in 1991. The average fraction of outstanding shares that is repurchased (*%REP*) is approximately 7%, similar to the average fractional repurchase of 6.6% reported by Ikenberry, Lakonishok, and Vermaelen (1995).

The average number of news items regarding our sample firms is approximately 58 per year (median 20). Although we do not break this number down into annual averages, we observe that there is a substantial increase in this number during our sample period. Therefore, to avoid a bias and to make sure that this variable does not capture time trends, we replace this variable by a normalised variable - *I_{COVER}*. *I_{COVER}* is a dummy variable that takes a value of "1" when the number of news items is above the median number of news items across all firms in a given year and "0" otherwise.

The average ratio of capital gains tax to ordinary income tax - *TAX* - is approximately 58% (median 50%). The ratio varies quite a bit over time: *TAX* varies from 40% (i.e., capital gains tax is only 40% of dividend tax) to 100% (i.e., equal taxation of capital gains and dividends).

The correlation matrix does not indicate that any of the variables are too highly correlated with each other to cause a problem of multicollinearity. Note that there is a positive correlation between prior measures of the agency problem of dispersed ownership - *%OWN* and *Q* - and the measure suggested by theory and tested here - *MEW*. This correlation, even though it is statistically significant, is far from being close to unity - to perfect correlation. Thus, firm size does not appear to be homogeneously distributed across the sample. This result is in line with Kole's (1995) findings that some of the differences between studies of the relation of *Q* and managerial fractional ownership of firm stock are due to size differences between samples. This result also suggests that measuring the extent of agency problem of dispersed ownership by managerial equity holdings - *MEW* - may help reveal the importance of these problems.

4. Empirical Results

In this section, we present the results of our analysis, mainly regarding the relationship between market reactions to announcements of repurchase initiation - *AR* - and measures of the extent of agency costs of dispersed ownership. Before getting into these regressions, however, we report the relations between the measures themselves.

Some of the empirical evidence regarding the impact of managerial share holdings on firm value concerns the question of whether the relationship between value and holdings is linear, humped, or U-shaped. To date, the evidence is based on examining the relationship between *fractional* stock ownership - *%OWN* - and *Q* and yields mixed conclusions. For example, Morck, Schleifer, and Vishny (1988) show that *Q* is related to *%OWN* in a U-shaped manner, whereas McConnell and Servaes (1990) document a humped relationship. We use the fact that we collect data about fractional ownership - *%OWN* - as well as the value of managerial stock ownership - *MEW* - to examine their relative ability to explain the cross-sectional distribution of *Q* and the shape of the relationship between *Q* and managerial stock ownership.

The correlation coefficients reported in Table 2 suggest that, in our sample, managerial stock ownership is significantly, positively correlated to *Q* only when measured by the value of managerial holdings - *MEW*. As reported in Table 3, this correlation also holds true in regression estimates that include quadratic terms. Specifically, *Q* is insignificantly related to the fractional ownership of managers in the stock of their firms but is significantly positively correlated to the value of these holdings. Moreover, the relationship between *Q* and the value of managerial equity stake appears to be *linear* and not quadratic. This result is different from prior findings of either a U-shaped or a hump-shaped relationship between *Q* and managerial *fractional* equity stake.

A possible explanation for the difference between our results and prior results is related to Kole's (1995) finding that prior evidence regarding this relationship depends on firm size. To wit, assuming that firm value linearly depends on the *value* of managerial stock ownership, a non-linear relation may appear to exist whenever firm size and managerial *fractional* stock ownership are correlated in a sample. For example, if managers of large firms hold smaller equity fractions than managers of small firms, a hump-shaped relationship between *Q* and fractional managerial stock ownership will emerge because low-percentage but high-value holdings will be associated with high *Q*s.

Next, we examine the relationship between market reactions to unanticipated share repurchase announcements and the three measures of the extent

of the agency costs of dispersed ownership - *MEW*, *%OWN*, and *Q*. In estimating this relationship, we control for block holdings (*BLOCK*), media coverage of the announcing firm (*ICOVER*), managerial incentives to time the market (*TIMING*), relative taxation of share repurchase and dividends (*TAX*), the use of alternative means to alleviate the agency problem, i.e., payment of dividends (*I_{DIV}*), and the ratio of the total debt to total assets (*LEVERAGE*). The estimated equation is

$$AR_1 = \beta_0 + \beta_1 \text{Measures}(s)_i + \beta_2 \text{BLOCK}_i + \beta_3 \text{ICOVER}_{i,t} + \beta_4 \text{TIMING}_i + \beta_5 \text{TAX}_i + \beta_6 \text{I}_{div,i} + \beta_7 \text{LEVERAGE}_i + \varepsilon_i$$

where Measure(s)t is either one of the measures of the extent of the agency costs of dispersed ownership - *MEW*, *%OWN*, and *Q* - or all three measures together. Table 4 presents the regression results: Model I with *MEW*, Model II with *%OWN*, Model III with *Q*, and Model IV with all three measures.

The estimated coefficients of the control variables do not provide support for all of the postulated reasons for initiating share repurchases. Specifically, *BLOCK* is insignificantly related to market reaction to share repurchase announcements in all models. The insignificant coefficient of *BLOCK*, which is even in the opposite direction than expected, suggests that monitoring by large shareholders does not reduce the value of share repurchases as a means of alleviating agency problems of dispersed ownership. *TAX* is weakly related to market reactions to share repurchase announcements in two models and unrelated in two models. Thus, it appears that there is no significantly more favourable market reaction to repurchase announcements when the relative tax penalty of dividends is high than when it is low. The insignificant coefficient of *LEVERAGE* suggests that investor reaction to repurchase initiations is not driven by capital structure considerations or by agency problems between shareholders and bondholders.

On the other hand, some postulated determinants of market reaction to repurchase announcements are significantly present in the data. First, when information asymmetry is low, as proxied by media coverage of the firm - *ICOVER* - investor reactions to repurchase announcements are less positive than when asymmetry is high. Second, the significant coefficient of *TIMING* suggests that investors react more favourably to repurchase announcements that follow declines in stock prices than those that follow rises. This behaviour presumably reflects investor perception that such repurchases reflect insider views that the shares are undervalued. Lastly, there is a lower market reaction to repurchase announcements by dividend-paying firms than to announcements by non-payers.

This behaviour is observed presumably because dividend payment alleviates the same problem that share repurchases alleviate.

We find a significant relationship between managerial equity wealth and the abnormal return around repurchase initiation announcements in the period 1985-2001. As presented in Table 10, we find a lower (but positive) market reaction to repurchase announcements by the upper management equity wealth firms than to announcements by the lower management equity wealth firms. We find weaker, less significant results for the measures used by prior research - the fractional holdings of management and Tobin's *Q*. The main aspect of interest in the regression results of Models I through IV is the comparison between the three measures of the agency problem of diverse ownership. The results demonstrate the superiority of the measure that is based on the wealth committed by managers to their firm - *MEW* - over the measures used by prior research - *%OWN* and *Q*. Specifically, in the separate estimates of Models I through III, *MEW* is most significantly correlated to market reactions to repurchase announcements, as observed both in the t-statistics of the respective coefficients and the *R* of the regressions. Moreover, the coefficient of *%OWN* is in the opposite direction to the one predicted by theory, albeit in an insignificant way. In Model IV, in which the three measures are jointly included in the estimated equation, we find that only the coefficient of *MEW* is significantly different from zero, and in the predicted direction. The measures used by prior studies lose their ability to explain market reactions to share repurchase announcements when *MEW* is included in the regression. Thus, our results suggest that the extent of the agency problem of diverse ownership is best measured by a theoretically founded characteristic: the wealth managers commit to their firm - *MEW*. A possible explanation for the failure of *%OWN* is that buybacks can be a signal of value. The literature that considers buybacks as a signal predicts the opposite trend of that predicted by the agency literature. The signal is stronger if managers have more to lose from false signalling; as managers generally do not participate in a repurchase, they have more to lose from buying shares back at an inflated price. Some empirical evidence is consistent with this view (Vermaelen 1981, Comment and Jarrell 1991). It is therefore possible that both effects are at work, which may explain why percentage ownership *%OWN* does not affect the stock price response.

Because some of the empirical evidence regarding the agency costs of diverse ownership suggests that these relations are not linear, we re-estimate the regression models I, II, and IV with quadratic terms for both *%OWN* and *MEW*. The results are presented in Table 5. We find these

results to be supportive of our main hypothesis - that accounting for the total wealth committed by managers to their firms, through *MEW*, properly measures the extent of agency problems of diverse ownership, as theory suggests, and that the relationship is linear.

However, more research is clearly needed to better understand the function of share repurchase in mitigating agency costs. Our analysis is only a first step in this direction by describing and analysing the market reaction to repurchases. As argued by the free cash flow hypothesis, the agency costs associated with share repurchase are strongly related with free cash flow of the payout firms. This relationship arises because when there is plentiful unused cash flow, share repurchase reduces agency costs by returning shareholders the free cash flow that would otherwise be wasted by managers to pursue their own private interests at the expense of shareholders. However, the function of share repurchase in mitigating agency costs may have little effect when there is little free cash flow available. In this case, few funds are available for managers to waste or to cause value-decreasing investments. Thus, from the perspective of agency costs, further research is needed to determine whether the effect of managerial ownership on market reactions to share repurchase depends on the amount of free cash flow. In addition, prior studies also suggest the relation may also depend on growth opportunity (see, for example, Lang, Stulz, and Walking 1991).

5. Robustness

In this section, we examine the robustness of our results to several modifications of the main test equation and the definitions of the variables. Some of these modifications do not affect the results at all and are of little importance for our main results. Therefore, we do not detail the results of these modifications.

- In the main analysis, we define a repurchase as unexpected if it is announced after four consecutive years without repurchases. Using three or four years to define the unexpected repurchases does not affect our sample of initial repurchases.
- In the main analysis, we do not distinguish between types of repurchase - open market or tender offers. Including a dummy variable to indicate tender offers does not affect the results, as there are only 11 cases of tender offers in our sample.
- In approximately, 15% of the repurchase announcements, the announcing firm intends to use the repurchased shares for future employee stock plans. Adding a dummy variable for these cases does not affect our main results, although we find that the abnormal returns are smaller in these cases than in other cases.

In the main empirical examination, we consider all directors and executive officers to be part of "management" and accordingly measure the wealth they commit to their firms - *MEW* - and their fractional holdings - %OWN. This definition implicitly assumes that all directors and executive officers are involved in the management of their firms. The data allow us to conduct a robustness test in which we restrict the definition of "management" to the CEO alone. This modification allows us to examine the possibility that some of the directors are not involved in actual decision-making, which means that they are not subject to agency problems. Accordingly, we define the fractional holdings of the CEO as %CEO and the value of the holdings as CEO and re-estimate Models I, II, and IV with the respective replacements.

In Table 5, we re-estimate the regression models I, II, and IV with quadratic terms for both %OWN and *MEW*. Because %OWN can be stable, the squared term of %OWN alone may result in a high-correlation problem in the regression, and the same problem can materialise with *MEW*. We re-estimate the regression models I, II, and IV with only quadratic terms for both %OWN and *MEW*, and we obtain similar results.

Table 6 presents the estimated coefficients of the redefined Models I, II, and IV. The coefficients of the control variables change only slightly in their point estimates from the original estimates, although the significance of these coefficients does change significantly. More importantly, when the measurement of managerial equity holdings is restricted to the CEO alone, its correlation with the market reaction to unexpected repurchase announcements diminishes and loses its significance in all models. We interpret these results as suggesting that all members of a firm's management team - CEO, CFO, etc. - should be considered when measuring the extent of the agency problem of dispersed ownership.

Next, we examine the measurement of *Q*. Similar to prior research, in the main analysis, we measure Tobin's *Q* in a continuous fashion - *Q*. Theoretical analysis of the agency problem suggests that an agency problem exists when *Q* is less than one. Thus, it is possible that the appropriate way to measure the existence of an agency problem of dispersed ownership is by a dummy variable - $I_{Q < 1}$ - that takes a value of "1" when *Q* is less than 1.0 and "0" otherwise. However, because the book value of assets is a noisy measure of the replacement cost of the asset, it is possible that a continuous measure of *Q*, which is the predominant way of measuring Tobin's *Q* in prior research, is indeed a better measure of the existence of an agency problem. To examine this question, we re-estimate Models III and IV using $I_{Q < J}$ instead of *Q* in the test equation.

Table 7 reports the estimated coefficients for Models III and IV with Q replaced by IQ<J. Comparing the results in Table 4 to those in Table 7, we observe that the coefficients of the control variables change only slightly in their point estimates, although the significance of these coefficients does change significantly. More importantly, we observe that IQ<I is more significantly correlated with market reaction to announcements of share repurchases than Q. We interpret this result as indicating that when measuring the agency problem of dispersed ownership by its consequence - over-investment - it is the existence of over-investment (indicated by a Q that is less than one) that matters, not the intensity of the over-investment.

Next, we continue to check the robustness of our results by examining different specifications for the control variables (reported in Table 8) and by including additional controls (reported in Table 9). Because our main result is that MEW better explains investor reaction to unanticipated share repurchases, we conduct our robustness checks by modifying our main test equation - Model IV of Table 4. We carry the same robustness tests using the regressions with the individual measures, Models I, II, and III, but report only the results of the overall model because we obtain similar results.

First, we address the measure of information asymmetry. In our main analysis, we use the variable ICOVER to indicate whether news coverage of a firm is above the median of media coverage in the same year. In the robustness check, we replace this indicator variable with the actual number of news items regarding each firm in the year preceding its repurchase announcement ("NEWS"). The estimated coefficients are reported in the first column of Table 8. Although the coefficients of the other variables change only slightly, we find that NEWS is more significantly correlated with AR than ICOVER. Nonetheless, because NEWS may capture more than media coverage (e.g., time trends and size differences), we prefer to use ICOVER to measure information asymmetries in an unbiased manner, in pooled time-series and cross-sectional data.

We next address the incentive of management to time the market. In our main analysis, we find a negative and significant relationship between the abnormal return of the firm share in the year preceding the repurchase initiation announcement - TIMING - and AR. This relationship contradicts explanations of these unanticipated share repurchases as a managerial attempt to time the market. To verify this result, we replace TIMING with the return of the S&P500 index in the same period ("S&P"). The difference between these two measures of market timing is that TIMING measures the performance of the specific firm, whereas S&P measures the performance of the

whole market. Thus, S&P is a weaker measure of managerial attempt to time the market. We find no significant relation between S&P and AR, which also implies that repurchases are not motivated by attempts to time the market as a whole.

Next, we examine whether it is the existence of a dividend payout policy that matters or the extent of dividends paid. In our main analysis, we account for the existence of a dividend payout policy through a dummy variable - IDIV - that takes a value of "1" when the firm paid cash dividends in the year preceding the announcement and "0" otherwise. As a robustness check, we replace this variable with the dividend yield ("DIVY") or the dividend cash amount ("DIVC") in the year prior to the announcement. In both cases, whereas MEW retain its significance, the coefficient of the dividend measure is insignificant.

In Table 9, we report the impact of including additional control variables, beyond those we use in our main test equation. Specifically, we include two measures of the repurchase size: the fraction of the shares repurchased ("%REP") and an indicator of whether the repurchased amount is declared in the announcement ("AMOUNT"). AMOUNT is a dummy variable that takes a value of "1" if the repurchase announcement indicates the planned size of the repurchase and "0" otherwise. We also include VOLATILITY, as higher volatility can generate more risk for an undiversified manager who owns equity in his own firm (Becker, 2006). VOLATILITY is the daily standard deviation of each stock.

We find that the inclusion of these additional controls has little effect on our main results.

6. Conclusions

Prior empirical studies measure the extent of the agency problem of dispersed ownership using both direct and indirect measures. The commonly used direct measure of this agency problem is the *fractional* holding of management in the equity of their firms. The commonly used indirect measure of the agency problem is Tobin's Q. The resulting empirical evidence regarding the importance of the agency problem of dispersed ownership is inconclusive.

We argue that theory suggests a more accurate measure of this agency problem. Specifically, in the theoretical analysis of agency costs of dispersed ownership, utility-maximising managers trade off the impact of their actions on the wealth they commit to their firm against the additional effects that their actions impose upon them. However, in the empirical tests of this theory, managerial susceptibility to the wealth effects of their actions is not measured by the value of their holdings in their firms; rather, it is measured by the fractional holdings. Thus, we suggest that the agency problem

of dispersed ownership be measured according to theory - by managerial equity wealth.

We empirically illustrate the superiority of this measure in the case of stock repurchase initiations. Because repurchase initiations reduce the agency problems of dispersed ownership, we expect that the price effect of announcements of repurchase initiations of firms with low managerial equity wealth will be stronger than that of firms with high managerial equity wealth.

We find a significant relationship between managerial equity wealth and abnormal return around repurchase initiation announcements in the period 1985-2001. As presented in Table 10, we find a lower (but positive) market reaction to repurchase announcements by the upper management equity wealth firms than to announcements by the lower management equity wealth firms. We find weaker, less significant results for the measures used by prior research - the fractional holdings of management and Tobin's Q. These results are robust to several modifications of the test equations and to inclusion of several control variables.

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APPENDIX A

Table A.1. Sample Distribution of Firms that Initiated Repurchase in the Period 1985-2001

The sample consists of all announcements of initial share repurchase in the period 1985-2001. We define a repurchase as an initial repurchase if it is the first repurchase after four consecutive years with no repurchases. We exclude all financial firms (four-digit SIC code 6xxx) and all repurchases that are driven by non-cash- management reasons. These include repurchases of odd-lot holdings and

repurchases that are part of a legal process. We also exclude repurchases of shares between parent companies and subsidiaries, repurchases of preferred shares, repurchases from a single identifiable person, and all repurchases announced in the month following September 11, 2001. Lastly, we exclude repurchase announcements that are made jointly with earning announcements.

Year	Number
1985	1
1986	2
1987	8
1988	7
1989	8
1990	9
1991	2
1992	17
1993	33
1994	65
1995	73
1996	64
1997	101
1998	202
1999	141
2000	82
2001	75
Total	890

Table A.2. Descriptive Statistics

The sample consists of 890 announcements of initial share repurchase in the period 1985-2001. We define a repurchase as an initial repurchase if it is the first repurchase after four consecutive years with no repurchases. We exclude all financial firms (four-digit SIC code 6xxx) and all repurchases of odd-lot holdings and repurchases that are part of a legal process. We also exclude repurchases of shares between parent companies and subsidiaries, repurchases of preferred shares, repurchases from a single identifiable person, and all repurchases announced in the month following September 11, 2001. Lastly, we exclude repurchase announcements that are made jointly with earning announcements.

AR is the stock return less the return on the S&P 500 on the three days surrounding each announcement. %OWN is managerial fractional

holdings in the equity of their firm as reported in the last proxy files before each announcement. Q is Tobin's Q measured by the market value of equity plus book value of debt divided by the book value of equity and debt. MEW is managerial equity wealth measured by %OWN times the price of each stock at the end of the month preceding each announcement (in million dollars). BLOCK is the percentage of equity that is held by BLOCK-holders. COVER is the number of news items in the Dow Jones Newswire in the year preceding the announcement. TIMING is the abnormal return on the stock in the 12-month period preceding each announcement. TAX is the ratio of the maximal capital gains tax to the marginal ordinary income tax in the announcement year. LEVERAGE is the ratio of long term debt to total assets. %REP is the fraction of the shares repurchased.

	Mean	Median	Standard Deviation	Min	Max
AR	3.1497	2.3597	10.535	-52.105	53.997
%OWN	22.403	15.800	20.145	0.0000	92.000
Q	1.4997	1.1566	1.2601	0.0441	10.728
MEW	73.901	22.330	202.36	0.0000	3782.4
BLOCK	19.620	15.750	18.944	0.0000	92.900
COVER	56.808	20.000	302.29	0.0000	6280.0
TIMING	-13.900	-21.668	78.003	-97.975	1774.6
TAX	58.182	50.500	12.393	40.000	100.00
LEVERAGE	18.989	14.865	18.840	0.0000	106.44
%REP	7.2031	5.5187	6.0040	0.2085	58.763

Correlation Matrix

	AR	%OWN	Q	MEW	BLOCK	COVER	TIMING	TAX	LEVERAGE
%OWN	0.058								
Q	-0.077	0.011							
MEW	-0.134	0.131	0.243						
BLOCK	0.064	0.025	0.020	-0.012					
COVER	-0.002	-0.088	0.012	0.128	-0.008				
TIMING	-0.073	-0.029	0.110	-0.004	-0.068	0.008			
TAX	0.024	-0.070	-0.015	-0.026	-0.210	-0.052	0.080		
LEVERAGE	0.021	0.005	-0.211	0.037	-0.040	-0.010	-0.040	-0.005	
%REP	0.110	-0.022	-0.120	-0.063	0.018	0.006	-0.064	-0.098	0.148

Table A.3. The Relation between Tobin's Q and Managerial Stock Ownership

The table reports the relation between Tobin's Q, the dependent variable, and managerial stock ownership. The estimated regression is

$$Q_i = \alpha + \beta * M_i + \gamma * M_i^2 + \varepsilon_i$$

where M is one of two measures of managerial stock ownership - either %OWN or MEW.

The sample consists of 890 announcements of initial share repurchase in the period 1985-2001. We define a repurchase as an initial repurchase if it is the first repurchase after four consecutive years with no repurchases. We exclude all financial firms (four-digit SIC code 6xxx) and all repurchases of odd-lot holdings and repurchases that are part of a

legal process. We also exclude repurchases of shares between parent companies and subsidiaries, repurchases of preferred shares, repurchases from a single identifiable person, and all repurchases announced in the month following September 11, 2001. Lastly, we exclude repurchase announcements that are made jointly with earning announcements.

%OWN is managerial fractional holdings in the equity of their firm as reported in the last proxy files before each announcement. *MEW* is managerial equity wealth measured by *%OWN* times the price of each stock at the end of the month preceding each announcement (in million dollars).

Explanatory variable	α	β	X	Adjusted R ²
<i>%OWN</i>	1.390** (0.081)	1.263 (0.681)	-1.907 (1.037)	0.002
<i>MEW</i>	1.369** (0.046)	1.875** (0.578)	-0.162 (0.213)	0.058

White heteroskedasticity consistent standard errors are in parentheses. * Significant at 5% level ** Significant at 1% level

Table A.4. Market Reaction to Share Repurchases and Agency Problems

Variable	Expected Sign	Model I	Model II	Model III	Model IV
<i>MEW</i>	-	-0.0062** (0.0009)			-0.0061** (0.0010)
<i>%OWN</i>	-		0.0083 (0.0181)		0.0195 (0.0183)
<i>Q</i>	-			-0.5991 (0.3397)	-0.3466 (0.3281)
<i>BLOCK</i>	-	0.0385 (0.0227)	0.03979 (0.0228)	0.0402 (0.0228)	0.0384 (0.0226)
<i>ICOVER</i>	-	-1.8743** (0.7242)	-2.1821** (0.7374)	-2.0328** (0.7204)	-1.5929* (0.7481)
<i>TIMING</i>	-	-0.0088 (0.0045)	-0.0086 (0.0044)	-0.0077 (0.0040)	-0.0083* (0.0041)
<i>TAX</i>	-	0.0501 (0.0260)	0.0534* (0.0260)	0.0544* (0.0262)	0.0508 (0.0261)
<i>DIV</i>	-	-1.4934* (0.6539)	-1.3592* (0.6621)	-1.7860** (0.6792)	-1.4596* (0.6829)
LEVERAGE		0.0221 (0.0223)	0.0196 (0.0225)	0.0126 (0.0229)	0.01665 (0.0227)
Adjusted R ²		0.035	0.021	0.025	0.035

White heteroskedasticity consistent standard errors are in parentheses. * Significant at 5% level ** Significant at 1% level

The table presents cross-sectional regressions of the abnormal return approximately 890 repurchase initiation announcements. The sample consists of all announcements of initial share repurchase in the period 1985-2001. We define a repurchase as an initial repurchase if it is the first repurchase after four consecutive years with no repurchases. We exclude all financial firms (four-digit SIC code 6xxx) and all repurchases of odd-lot holdings and repurchases that are part of a legal process. We also exclude repurchases of shares between parent companies and subsidiaries, repurchases of preferred shares, repurchases from a single identifiable person, and all repurchases announced in the month following September 11, 2001. Lastly, we exclude repurchase announcements that are made jointly with earning announcements.

The dependent variable is *AR*, the stock return on the three days surrounding each announcement less the concurrent return on the S&P 500. *%OWN*

is managerial fractional holdings in the equity of their firm as reported in the last proxy files before each announcement. *Q* is Tobin's *Q*, which is measured by the market value of equity plus book value of debt divided by the book value of equity and debt. *MEW* is managerial equity wealth measured by *%OWN* times the price of each stock at the end of the month preceding each announcement (in million dollars). *BLOCK* is the percentage of equity that is held by block-holders. *ICOVER* is a dummy variable that takes a value of "1" when the firm has media coverage above the median coverage in the year of each announcement and "0" otherwise. *TIMING* is the abnormal return on the stock in the 12-month period preceding each announcement. *TAX* is the ratio of the maximal capital gains tax to the marginal ordinary income tax in the announcement year. *IDIV* is a dummy variable that takes a value of "1" when the firm paid cash dividends in the year preceding the

announcement and “0” otherwise. *LEVERAGE* is the ratio of the total debt to total assets.

The estimated equation is

$$AR_i = \beta_0 + \beta_1 \text{Measures}(s)_i + \beta_2 \text{BLOCK}_i + \beta_3 \text{ICOVER}_i + \beta_4 \text{TIMING}_i + \beta_5 \text{TAX}_i + \beta_6 \text{DIV}_i + \beta_7 \text{LEVERAGE}_i + \varepsilon_i$$

where $M(s)_i$ is either one of the measures of the extent of the agency costs of dispersed ownership - %OWN, *Q*, and *MEW* - or all three measures together.

Table A.5. Non-linearity in Market Reactions to Share Repurchases and Agency Problems

Variable	Expected Sign	Model I Squared	Model II Squared	Model IV Squared
<i>MEW</i>	-	-0.0075** (0.0023)		-0.0082** (0.0025)
<i>MEW</i> ²		0.0000 (0.0000)		0.0000 (0.0000)
%OWN	-		0.0949 (0.0574)	0.1198* (0.0577)
%OWN ²			-0.0014 (0.0009)	-0.0015 (0.0009)
<i>Q</i>	-			-0.3390 (0.3266)
<i>BLOCK</i>	-	0.0381 (0.0228)	0.0395 (0.0227)	0.0373 (0.0226)
<i>ICOVER</i>	-	-1.8421* (0.7285)	-2.1294** (0.7401)	-1.4505 (0.7608)
<i>TIMING</i>	-	-0.0087 (0.0045)	-0.0088* (0.0044)	-0.0083* (0.0041)
<i>TAX</i>	-	0.0499 (0.0261)	0.0539* (0.0258)	0.0510* (0.0259)
<i>DIV</i>	-	-1.4840* (0.6546)	-1.1897 (0.6518)	-1.2177 (0.6763)
<i>LEVERAGE</i>		0.0228 (0.0225)	0.0222 (0.0224)	0.0206 (0.0227)
Adjusted <i>R</i> ²		0.034	0.022	0.036

White heteroskedasticity consistent standard errors are in parentheses. * Significant at 5% level ** Significant at 1% level

The table presents cross-sectional regressions of the abnormal return approximately 890 repurchase initiation announcements. The sample consists of all announcements of initial share repurchase in the period 1985-2001. We define a repurchase as an initial repurchase if it is the first repurchase after four consecutive years with no repurchases. We exclude all financial firms (four-digit SIC code 6xxx) and all repurchases of odd-lot holdings and repurchases that are part of a legal process. We also exclude repurchases of shares between parent companies and subsidiaries, repurchases of preferred shares, repurchases from a single identifiable person, and all repurchases announced in the month following September 11, 2001. Lastly, we exclude repurchase announcements that are made jointly with earning announcements. The dependent variable is AR, the stock return on the three days surrounding each announcement less the concurrent return on the S&P 500. %OWN is

managerial fractional holdings in the equity of their firm as reported in the last proxy files before each announcement. *Q* is Tobin's *Q*, which is measured by the market value of equity plus book value of debt divided by the book value of equity and debt. *MEW* is managerial equity wealth measured by %OWN times the price of each stock at the end of the month preceding each announcement (in million dollars). *BLOCK* is the percentage of equity that is held by block-holders. *ICOVER* is a dummy variable that takes a value of “1” when the firm has media coverage above the median coverage in the year of each announcement and “0” otherwise. *TIMING* is the abnormal return on the stock in the 12-month period preceding each announcement. *TAX* is the ratio of the maximal capital gains tax to the marginal ordinary income tax in the announcement year. *IDIV* is a dummy variable that takes a value of “1” when the firm paid cash dividends in the year preceding the announcement

and “0” otherwise. LEVERAGE is the ratio of the total debt to total assets. The estimated equation in models I and II is

$$AR_1 = \beta_0 + \beta_1 Measures (s)_i + \beta_2 BLOCK_i + \beta_3 I_{cover,i} + \beta_4 TIMING_i + \beta_5 TAX_i + \beta_6 I_{div,i} + \beta_7 LEVERAGE_i + \varepsilon_i$$

Table A.6. Examination of the Definition of “Management”

The table presents cross-sectional regressions of abnormal returns around repurchase initiation announcements. The sample consists of all announcements of initial share repurchase in the period 1985-2001. We define a repurchase as an initial repurchase if it is the first repurchase after four consecutive years with no repurchases. We exclude all financial firms (four-digit SIC code 6xxx) and all repurchases of odd-lot holdings and repurchases that are part of a legal process. We also exclude repurchases of shares between parent companies and subsidiaries, repurchases of preferred shares, repurchases from a single identifiable person, and all repurchases announced in the month following September 11, 2001. Lastly, we exclude repurchase announcements that are made jointly with earning announcements. The dependent variable is AR, the stock return on the three days surrounding each announcement less the concurrent return on the S&P 500. CEO is the CEO equity wealth. %CEO is the fractional holdings of the CEO. BLOCK is the percentage of equity that is held by block-holders. ICOVER is a

dummy variable that takes a value of “1” when the firm has media coverage above the median coverage in the year of each announcement and “0” otherwise. TIMING is the abnormal return on the stock in the 12-month period preceding each announcement. TAX is the ratio of the maximal capital gains tax to the marginal ordinary income tax in the announcement year. IDIV is a dummy variable that takes a value of “1” when the firm paid cash dividends in the year preceding the announcement and “0” otherwise. LEVERAGE is the ratio of the total debt to total assets. The estimated equation is

$$AR_1 = \beta_0 + \beta_1 Measures (s)_i + \beta_2 BLOCK_i + \beta_3 I_{cover,i} + \beta_4 TIMING_i + \beta_5 TAX_i + \beta_6 I_{div,i} + \beta_7 LEVERAGE_i + \varepsilon_i$$

where M(s)_i is either one of the measures of the extent of the agency costs of dispersed ownership: CEO or %CEO.

Variable	Model I CEO	Model II %CEO	Model IV CEO & %CEO
CEO	-0.0003* (0.0002)		0.0003 (0.0002)
%CEO		-0.0065 (0.0273)	-0.0005 (0.0290)
Q			-0.6003 (0.3401)
BLOCK	0.0389 (0.0230)	0.0393 (0.0231)	0.0392 (0.0230)
ICOVER	-2.1926** (0.7253)	-2.2530** (0.7191)	-1.9715** (0.7269)
TIMING	-0.0087 (0.0044)	-0.0086 (0.0045)	-0.0078 (0.0040)
TAX	0.0565* (0.0264)	0.0574 (0.0301)	0.0577 (0.0302)
IDIV	-1.3674* (0.6610)	-1.4466* (0.6586)	-1.6967* (0.6834)
LEVERAGE	0.0208 (0.0226)	0.0202 (0.0225)	0.0133 (0.0230)
Number of observations	889	890	889
Adjusted R ²	0.021	0.021	0.023

White heteroskedasticity consistent standard errors are in parentheses. * Significant at 5% level ** Significant at 1% level

Table A.7. Examination of the Measurement of Q

The table presents cross-sectional regressions of the abnormal return around repurchase initiation announcements. The sample consists of all announcements of initial share repurchase in the period 1985-2001. We define a repurchase as an initial repurchase if it is the first repurchase after four consecutive years with no repurchases. We exclude all financial firms (four-digit SIC code 6xxx) and all repurchases of odd-lot holdings and repurchases that are part of a legal process. We also exclude repurchases of shares between parent companies and subsidiaries, repurchases of preferred shares, repurchases from a single identifiable person, and all repurchases announced in the month following September 11, 2001. Lastly, we exclude repurchase announcements that are made jointly with earning announcements. The dependent variable is AR, the stock return on the three days surrounding each announcement less the concurrent return on the S&P 500. $IQ < 1$ is a dummy variable that takes a value of "1" when Q is less than 1.0 and "0" otherwise. %OWN is managerial fractional holdings in the equity of their firm as reported in the last proxy files before each announcement. MEW is managerial equity wealth measured by %OWN times the number of shares outstanding times the price of each stock at the end of the month preceding each announcement (in million dollars). BLOCK is the percentage of equity that is held by block-holders. ICOVER is a dummy variable that takes a value of "1" when the firm has media coverage above the median coverage in the year of each announcement and "0" otherwise. TIMING is the abnormal return on the stock in the 12-month period preceding each announcement. TAX is the ratio of the maximal capital gains tax to the marginal ordinary income tax in the announcement year. IDIV is a dummy variable that takes a value of "1" when the firm paid cash dividends in the year preceding the announcement and "0" otherwise. LEVERAGE is

the ratio of the total debt to total assets. The estimated equation is

$$AR_1 = \beta_0 + \beta_1 Measures(s)_i + \beta_2 BLOCK_i + \beta_3 I_{cover,i} + \beta_4 TIMING_i + \beta_5 TAX_i + \beta_6 I_{div,i} + \beta_7 LEVERAGE_i + \varepsilon_i$$

where M(s) is $IQ < 1$ in model III and all three measure of the agency costs of dispersed ownership – %OWN, $IQ < 1$, and MEW – together in model IV.

Variable	Model III $IQ < 1$	Model IV $IQ < 1$
MEW		-0.0061** (0.0009)
%OWN		0.0197 (0.0183)
$IQ < 1$	1.7524* (0.7458)	1.4013 (0.7507)
BLOCK	0.0379 (0.0226)	0.0367 (0.0225)
ICOVER	-2.0160** (0.7251)	-1.5261* (0.7506)
TIMING	-0.0078 (0.0042)	-0.0081 (0.0043)
TAX	0.0547* (0.0259)	0.0513* (0.0259)
IDIV	-1.8280** (0.6777)	-1.5659* (0.6806)
LEVERAGE	0.0147 (0.0230)	0.0166 (0.0227)
Adjusted R^2	0.027	0.038

White heteroskedasticity consistent standard errors are in parentheses. * Significant at 5% level ** Significant at 1% level.

Table A. 8. Modified Control Variables

The table presents cross-sectional regressions of the abnormal return around repurchase initiation announcements. The sample consists of all announcements of initial share repurchase in the period 1985-2001. We define a repurchase as an initial repurchase if it is the first repurchase after four consecutive years with no repurchases. We exclude all financial firms (four digit SIC code 6xxx) and all repurchases of odd-lot holdings and repurchases that are part of a legal process. We also exclude repurchases of shares between parent companies and subsidiaries, repurchases of preferred shares, repurchases from a single identifiable person, and all repurchases announced

in the month following September 11, 2001. Lastly, we exclude repurchase announcements that are made jointly with earning announcements. The dependent variable is AR, the stock return on the three days surrounding each announcement less the concurrent return on the S&P 500. %OWN is managerial fractional holdings in the equity of their firm as reported in the last proxy files before each announcement. Q is Tobin's Q, which is measured by the market value of equity plus book value of debt divided by the book value of equity and debt. MEW is managerial equity wealth measured by %OWN times the number of shares outstanding times the price of each stock at the end of the

month preceding each announcement (in million dollars). BLOCK is the percentage of equity that is held by block-holders. ICOVER is a dummy variable that takes a value of “1” when the firm has media coverage above the median coverage in the year of each announcement and “0” otherwise. TIMING is the abnormal return on the stock in the 12-month period preceding each announcement. TAX is the ratio of the maximal capital gains tax to the marginal ordinary income tax in the announcement year. IDIV is a dummy variable that takes a value of “1” when the firm paid cash dividends in the year preceding the announcement and “0” otherwise. LEVERAGE is the ratio of the total debt to total assets. NEWS is the actual

number of news items. S&P is the return of the S&P500 index in the year preceding the repurchase initiation announcement. DIVY is the dividend yield. DIVC is the dividend cash amount. ST_DEBT and LT_DEBT are the amount of short-term and long-term debt, respectively (in million dollars). The estimated equation is

$$AR_1 = \beta_0 + \beta_1 MEW_i + \beta_2 \% OWN_i + \beta_3 Q_i + \sum_i \beta_j CONTROL_{j,i} + \varepsilon_i$$

where CONTROL_{j,i} are the control variables specified above.

Modified Control	News coverage	Market timing	Dividend payment	Dividend payment	Leverage type	Leverage type
MEW	-0.0068** (0.0010)	-0.0058** (0.0009)	-0.0063** (0.0010)	-0.0068** (0.0010)	-0.0059** (0.0010)	-0.0060** (0.0010)
%OWN	0.0306 (0.0180)	0.0200 (0.0184)	0.0280 (0.0180)	0.0285 (0.0186)	0.0225 (0.0182)	0.0196 (0.0187)
Q	-0.4048 (0.3255)	-0.4045 (0.3311)	-0.2414 (0.3173)	-0.2452 (0.3289)	-0.4115 (0.3251)	-0.3891 (0.3282)
BLOCK	0.0373 (0.0228)	0.0405 (0.0226)	0.0387 (0.0228)	0.0406 (0.0231)	0.0375 (0.0227)	0.0387 (0.0229)
COVER		-1.6659* (0.7471)	-1.7514* (0.7471)	-1.0020** (0.7684)	-1.5358* (0.7423)	-1.5569* (0.7531)
TIMING	-0.0088* (0.0041)		-0.0084 (0.0043)	-0.0082 (0.0042)	-0.0082* (0.0041)	-0.0084* (0.0042)
TAX	0.0520* (0.0262)	0.0476 (0.0268)	0.0402 (0.0254)	0.0428 (0.0263)	0.0527* (0.0261)	0.0493 (0.0262)
DIV	-1.6473* (0.6797)	-1.4713* (0.6924)			-1.3198 (0.6812)	-1.4253* (0.6858)
LEVERAGE	0.0146 (0.0226)	0.0173 (0.0224)	0.0136 (0.0227)	0.0192 (0.0233)		
NEWS	0.0008** (0.0002)					
S&P		0.0009 (0.0265)				
DIVY			0.0005 (0.0005)			
DIVC				0.0001 (0.0010)		
ST_DEBT					-0.0003 (0.0002)	
LT_DEBT						-0.0000 (0.0002)
Number of observations	890	890	890	856	888	886
Adjusted R ²	0.031	0.032	0.032	0.036	0.035	0.035

White heteroskedasticity consistent standard errors are in parentheses. * Significant at 5% level ** Significant at 1% level

Table A.9. Additional Control Variables

The table presents cross-sectional regressions of the abnormal return around repurchase initiation announcements. The sample consists of all

announcements of initial share repurchase in the period 1985-2001. We define a repurchase as an initial repurchase if it is the first repurchase after

four consecutive years with no repurchases. We exclude all financial firms (four digit SIC code 6xxx) and all repurchases of odd-lot holdings and repurchases that are part of a legal process. We also exclude repurchases of shares between parent companies and subsidiaries, repurchases of preferred shares, repurchases from a single identifiable person, and all repurchases announced in the month following September 11, 2001. Lastly, we exclude repurchase announcements that are made jointly with earning announcements. The dependent variable is AR, the stock return on the three days surrounding each announcement less the concurrent return on the S&P 500. %OWN is managerial fractional holdings in the equity of their firm as reported in the last proxy files before each announcement. Q is Tobin's Q, which is measured by the market value of equity plus book value of debt divided by the book value of equity and debt. MEW is managerial equity wealth measured by %OWN times the number of shares outstanding times the price of each stock at the end of the month preceding each announcement (in million dollars). BLOCK is the percentage of equity that is held by block-holders. ICOVER is a dummy variable that takes the value "1" when the firm has media coverage above the median coverage in the

year of each announcement, and "0" otherwise. TIMING is the abnormal return on the stock in the twelve-month period preceding each announcement. TAX is the ratio of the maximal capital gains tax to the marginal ordinary income tax in the announcement year. IDIV is a dummy variable that takes the value "1" when the firm paid cash dividends in the year preceding the announcement, and "0" otherwise. LEVERAGE is the proportion of the total debt to total assets. %REP is the percentage of equity that is declared to be repurchased at the repurchase announcement. AMOUNT is a dummy variable that takes the value "1" when the percentage of equity to be repurchased is declared at the repurchase announcement, and "0" otherwise. VOLATILITY is the daily standard deviation of each stock (or sector, if not available) at the twelve-month period preceding each announcement from the BLOOMBERG system. The estimated equation is:

$$AR_1 = \beta_0 + \beta_1 MEW_i + \beta_2 \% OWN_i + \beta_3 Q_i + \sum_i \beta_j CONTROL_{j,i} + \varepsilon_i$$

where $CONTROL_{j,i}$ are the control variables specified above.

Variable	Adding %REP	Adding AMOUNT	Adding VOLATILITY
MEW	-0.0050** (0.0015)	-0.0058** (0.0009)	-0.0060** (0.0010)
%OWN	0.0100 (0.0214)	0.0193 (0.0184)	0.0207 (0.0184)
Q	-0.5199 (0.3632)	-0.3530 (0.3330)	-0.3839 (0.3288)
BLOCK	0.0403 (0.0259)	0.0395 (0.0227)	0.0371 (0.0225)
ICOVER	-1.9505* (0.8657)	-1.6837* (0.7506)	-1.5766* (0.7450)
TIMING	-0.0069 (0.0036)	-0.0081* (0.0040)	-0.0079 (0.0041)
TAX	0.0709* (0.0285)	0.0457 (0.0262)	0.0559* (0.0263)
ICOVER	-1.9007* (0.7407)	-1.4509* (0.6789)	-1.1826 (0.6784)
LEVERAGE	0.0090 (0.0243)	0.0158 (0.0227)	0.0203 (0.0228)
%REP	0.1902* (0.0937)		
AMOUNT		1.4724 (0.8187)	
VOLATILITY			0.0146 (0.0095)
Number of observations	749	890	890
Adjusted R ²	0.042	0.037	0.037

White heteroskedasticity consistent standard errors are in parentheses. * Significant at 5% level ** Significant at 1% level

Table A.10. Abnormal return - descriptive Statistics

The sample consists of 890 announcements of initial share repurchase in the period 1985-2001. We define a repurchase as an initial repurchase if it is the first repurchase after four consecutive years with no repurchases. We exclude all financial firms (four-digit SIC code 6xxx) and all repurchases of odd-lot holdings and repurchases that are part of a legal process. We also exclude repurchases of shares between parent companies and subsidiaries, repurchases of preferred shares, repurchases from a single identifiable person, and all repurchases announced in the month following September 11, 2001. Lastly, we exclude repurchase announcements that are made jointly with earning

announcements. AR is the stock return less the return on the S&P 500 on the three days surrounding each announcement. AR – upper MEW is the stock return less the return on the S&P 500 on the three days surrounding each announcement for the upper managerial equity wealth measured by %OWN times the price of each stock at the end of the month preceding each announcement. AR – Lower MEW is the stock return less the return on the S&P 500 on the three days surrounding each announcement for the lower managerial equity wealth measured by %OWN times the price of each stock at the end of the month preceding each announcement.

	Mean	Median	Standard Deviation	Min	Max	Number of observations
AR - full sample	3.1497	2.3597	10.535	-52.105	53.997	890
AR - upper MEW	1.6204	1.7779	10.349	-52.108	37.688	445
AR - Lower MEW	4.6790	3.4005	10.509	-51.186	53.997	445