

The Shareholder Base and Pay-Out-Policy*

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Abstract

Merton's (1987) investor recognition hypothesis implies that there should be a negative relationship between the size of the firm's shareholder base and its cost of capital. Consistent with this, we find that firms with smaller shareholder bases payout less of their net income, have higher cash holdings and lower capital expenditures. Additionally, Merton predicts that a reduction in the shareholder base has a higher price impact on firms with small shareholder bases. We find that firms with small shareholder bases are less likely to undertake a repurchase (reduce the shareholder base) and repurchase a lower fraction of shares outstanding.

JEL CLASSIFICATION: G35, G14, G15.

KEYWORDS: Cost of capital, Pay-out Policy, Repurchases, Investor recognition.

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1 Introduction

In a recent study of firm payout policy, Brav, Graham, Harvey and Michaely (2005) survey financial executives and conclude that "With respect to payout policy, the rules of the game include ..., it is good to have a broad and diverse investor base, ..." At first, this might seem surprising since the shareholder base is not per se related to either the cash flows or the riskiness of the firm's operations. However, Merton (1987) develops an incomplete risk sharing model where the size of the firm's investor base is negatively related to the required return on the firm and hence its cost of capital.¹ Effectively, implying that there is an inverse relationship between the size of the investor base and the cost of external financing. This paper documents the relationship between the firm's shareholder base and its investment / payout policy. More specifically we find that a firm with a smaller shareholder base pays out less, retains more cash, has lower capital expenditures and is less likely to repurchase shares.

Merton (1987) theoretically examines the effect of investors not holding all assets. In his model investors have information about an index security and a subset of all stocks and optimize their portfolio holdings given the set of securities that they know of. Investors in a firm with a less than complete shareholder base will be exposed to a large fraction of the companies idiosyncratic risk and will be compensated for this with higher returns. This implies that there is a negative relationship between the shareholder base and returns (cost of capital). Consequently, firms with smaller shareholder bases find it expensive to raise new capital and hence will payout less and build higher cash reserves. In terms of investment policy, a firm with a small shareholder base will have higher external financing costs and therefore find less projects profitable and hence have lower capital expenditures.

In Merton's model it is more costly for a firm with a small shareholder base to undertake a repurchase for two reasons. Firstly, because of the high cost of capital associated with the small shareholder base. Secondly, in Merton's model the demand for each stock depends on the fraction of investors that is informed about the stock. Therefore, assets of companies with a smaller shareholder base (denoted by Merton as investor recognition) should have a lower price. So a reduction in shareholder base should have a negative price impact. It is more costly for a firm with a small shareholder base to undertake a repurchase because the price impact of a

¹Among others, Foerster and Karolyi (1999), Bodnaruk and Östberg (2007) and Fang and Peress (2007) document a negative relationship between firm recognition and returns.

reduction in the shareholder base is larger the smaller the shareholder base is. This is because the price differential between low and high investor recognition firms is driven by risk sharing which is strictly monotonically increasing and concave in the shareholder base. When a firm considers whether to repurchase shares it would trade-off the benefits like a reduction in agency costs against the value impact that a reduction in the shareholder base implies. Therefore, we would expect firms with a small shareholder base to be less likely to undertake a repurchase and repurchase less shares when they do repurchase.

To test these implications we consider a sample of firms on NYSE, AMEX, and NASDAQ. We find that the shareholder base affects investment and payout policy through the cost of capital. Firms with a small shareholder base have lower payout levels (both in terms of total payout and dividend payout), they have larger cash reserves, and lower capital expenditures. Our analysis indicates that the shareholder base plays an important role in the decision to undertake a repurchase and how much to repurchase. We find that a one standard deviation increase in the amount of stock repurchased leads to a decrease in the shareholder base 5.1% over the year of repurchase and the subsequent year.

In terms of the effect of shareholder base on the decision to undertake a repurchase we find that a one standard deviation increase in our measure of the shareholder base increases the probability of undertaking a repurchase by 5.7% to 8.5%.² Additionally, we find that a one standard deviation increase in the size of the shareholder base leads to an increase in the amount repurchased by 29.5% to 55.3%.

This paper is related to the literature that examines the effect of financial constraints on investment / payout policy. Hennessy and Whited (2007) find a negative relationship between the degree of financial constraints and dividend payout. A number of papers document a relationship between financial constraints and cash holdings. Almeida, Campello and Weisbach (2004) show that financially constrained firms (firms with a high cash flow sensitivity) have a greater propensity to save cash.³ Opler, Pinkowitz, Stulz and Williamson (1999) find that firms which have the greatest access to the capital markets, such as large firms and those with high credit ratings, tend to hold lower ratios of cash to total non-cash assets. A relationship between external financing costs and investment has been documented by Fazzari, Hubbard and Petersen (1988) who find that firms that

²Our measure of the shareholder base controls for a number of variables that might proxy for other reasons to undertake a repurchase.

³Other work in this vein includes Fazzari and Petersen (1993) and Calomiris et al. (1995) that examines the effect of financial constraints on working capital.

have exhausted their internal financing invest less than mature dividend paying firms. Hennessy, Levy and Whited (2007) find that firms who are financially constrained invest less. Rauh (2006) demonstrates that firms with larger required pension contributions have lower capital expenditures. We contribute to this literature by using the shareholder base as a measure of access to external capital and relating it to cash holdings, payout and capital expenditure.

A number of papers have examined the relationship between investor recognition and returns. Foerster and Karolyi (1999) find that non-U.S. firms cross-listing on U.S. exchanges earn cumulative abnormal returns of 19% percent during the year before listing, but incur a loss of 14% during the year following listing.⁴ The listing decision is associated with an increase in the shareholder base and a subsequent fall in returns, just as predicted by Merton. Bodnaruk and Östberg (2007) document a negative relationship between the size of the shareholder base and cross-sectional returns. In this paper, we extend the implications of the investor recognition literature to investment and payout decisions.

Black (1976) coined the term "dividend puzzle" which refers to the fact that firms pay out so much dividends when repurchases are more tax efficient. To explain this puzzle there has to be some drawback with using a repurchase as a payment method instead of dividends. One difference between repurchases and dividends is that a repurchase will alter the shareholder base while a dividend will not. So Merton's incomplete risk sharing model presents a possible explanation to the dividend puzzle.

Since this paper argues that the shareholder base is an important consideration in the payout decision it is related to the extensive literature on the motives for payout. Early work by Bhattacharya (1979) and others illustrated that payout policy can function as a signal. Ikenberry, Lakonishok and Vermaelen (1995) argue that undervalued firms undertake a repurchase. They find that the average abnormal four-year buy-and-hold return is 12.1%. Even more suggestive of undervaluation is that "value" stocks outperform by 45.3%. Additionally, Stephens and Weisbach (1998) and Ikenberry, Lakonishok and Vermaelen (2000) show that repurchasing firms have poor performance prior to undertaking the repurchase. We control for the undervaluation motive by including the book-to-market ratio, previous years performance and the Rhodes-Kropf, Robinson and Viswanathan (2007) measure of misvaluation when estimating the likelihood that a firm undertakes a repurchase. Even after controlling for these measures of misvaluation, we find that the

⁴Other papers that consider the investor recognition hypothesis in an event study setting include, Amihud, Mendelson and Uno (1999) that examine changes in minimum trading units and Kadlec and McConnell (1994) that consider listings on the NYSE.

shareholder base is an important determinant of whether a firm undertakes a repurchase.

If there is an agency conflict between managers and shareholders then undertaking a repurchase will reduce the amount of capital that is exposed to the conflict (Easterbrook (1984) and Jensen (1986)). Lang and Litzenberger (1989) and more recently Lie (2000) document empirical evidence that cash disbursements are a way of mitigating agency problems. We control for the agency motive for undertaking a repurchase by including book-to-market (which is the inverse of Tobin's Q that has been used by Lang and Litzenberger (1989) and others) and the excess cash (following Dittmar (2000), Stephens and Weisbach (1998) and Lie (2000)) into our specifications.

Hovakimian, Opler and Titman (2001) document that the repurchase decision affects the firms capital structure and hence one motive for undertaking a repurchase is to alter ones capital structure. To that end we include measures of the firm's current capital structure when determining the factors that influence the repurchase decision.

It may be argued that the shareholder base is related to the liquidity of the stock. Barclay and Smith (1988) suggest that the liquidity of a stock may be harmed by an open-market-repurchase. It is possible that a larger shareholder base means that informed trading by a manager will result in less adverse effect because of a greater presence of liquidity traders. They find that the bid-ask spread widens around repurchase announcements.⁵ Using very detailed equity buyback data from Hong Kong, Brockman and Chung (2001) find that managers have significant timing ability. They find that the bid-ask spread widens and the depth narrows during repurchase periods. However, they also find that the spread and the depth returns to benchmark levels when managers disclose that they are the source of the informed trading. The return to benchmark levels indicates that even though the liquidity effect is pervasive it is temporary.⁶ When including controls for liquidity into our analysis we find that liquid firms are less likely to repurchase and if they do repurchase they repurchase less. However, even when we include liquidity, we find that the shareholder base matters for the repurchase decision indicating that investor recognition plays a role in the repurchase decision.

The remainder of this paper is organized as follows, section 2 presents our testable hypotheses, section 3 introduces our data and the construction of our measure the shareholder base, our

⁵Miller and McConnell (1995) find no evidence of a widening in bid-ask spread when considering a different sample and methodology.

⁶Grullon and Ikenberry (2000) provide an argument as to why liquidity might rise during a repurchase. They argue that a repurchase might actually increase sell side depth and therefore the effect of a repurchase on liquidity is not clear. They find that firms that are actively repurchasing firms are less sensitive to market movements in a bearish market. In a study of U.S. repurchases, Cook, Leach and Krigman (2004) find that liquidity increases after a repurchase and they attribute this result to the difference in the disclosure environment in Hong Kong and the U.S..

empirical findings are presented in section 4 and section 5 concludes.

2 Testable Hypotheses

In this section we use Merton's (1987) model to illustrate how the shareholder base is related to the value of the firm, returns / cost of capital and hence investment and payout policy. Merton (1987) demonstrates that if investors only know about a sub-set of the available securities and hence only invest in this sub-set, risky assets will be valued below their full-information equilibrium price. He arrives at the following relationship between value of the firm shadow cost of incomplete information,

$$V_k = \frac{V_k^*}{1 + \lambda_k/R_f} \quad (1)$$

Where for firm k , V_k is the value, V_k^* is the full information value, λ_k is the shadow cost and R_f is the risk-free rate. Since the shadow cost of firm k (λ_k) and the risk-free rate are non-negative, firm value is going to be less than the full-information value. So the value of the firm crucially depends on the shadow cost which is defined as,

$$\lambda_k = \delta x_k \frac{1 - q_k}{q_k} \sigma_k^2 \quad (2)$$

Where for firm k , q_k is the fraction of investors that are informed about the firm, x_k is the relative market weight of the firm and σ_k^2 is the idiosyncratic risk of the firm. There will be no shadow cost if the shareholder base is complete ($q_k = 1$), the firm has no idiosyncratic risk ($\sigma_k^2 = 0$) or the firm has no size ($x_k = 0$).

The relationship between the shadow cost and returns in Merton's model is given by,

$$R_k - R_k^* = \lambda_k \frac{R_k^*}{R_f} \quad (3)$$

Where for firm k , R_k is the required return, R_k^* is the full information required return and the rest of the variables are defined as above. The intuition behind the relationship specified by equations (2) and (3) is that investors are going to require compensation from a firm that has a smaller shareholder base, large idiosyncratic risk or is relatively large part of the market and therefore a firm with a large shadow cost is going to be traded at a lower value. Equation (3) implies that a firm with a small shareholder base (low q_k) will have a large shadow cost λ_k and hence a large

required return / cost of capital.

Since firms with small shareholder bases have higher costs of capital we expect:

H1: The shareholder base is positively related to firm payout.

H2: The shareholder base is negatively related to cash reserves.

Since firms with a small shareholder base have a high cost of capital we expect them to have a higher hurdle rate when evaluating projects and therefore:

H3: The shareholder base is positively related to capital expenditures.

Brav, Graham, Harvey and Michaely (2005) survey financial executives and find that "Many firms feel that their stock price would fall if they had a less diverse investor base." This relationship is a natural consequence of Merton's model who argues that the number of shareholders that a firm has is a good measure of how recognized the firm is. So when a firm undertakes a repurchase and some shareholders sell off their entire stake the recognition of the firm falls. Of course in Merton's world this is instantaneous, in practice we would often expect this to be a gradual process. For example, suppose a shareholder has decided to leave the market (moving from the country, or an estate is selling off shares for an inheritance) then the fact that the counterparty in this trade will be the firm instead of another market participant means that the recognition of the firm has fallen. So in equation (2) a repurchase implies a fall in q_k .

It is important for this argument that a repurchase actually leads to a fall in the shareholder base. If all investors would pro-rata tender then the shareholder base would remain unaltered by a repurchase. So in order to argue that the shareholder base is an important consideration when deciding whether to repurchase we need to verify that the shareholder base actually falls after a repurchase. This leads to the following testable hypothesis:

H4a: A repurchase leads to a decrease in the shareholder base.

To determine whether the cost (in terms of value) of a reduction in the shareholder base is larger for a firm with a smaller shareholder base. Merton arrives at the following expression for the sensitivity of the value of the firm (V_k) with respect to the size of the shareholder base (q_k),

$$\frac{\partial V_k}{\partial q_k} = V_k \frac{\delta x_k \sigma_k^2}{q_k^2} \quad (4)$$

From the above expression it is evident that the magnitude of the effect of a change in the shareholder base is larger the smaller the shareholder base is ($q_k \leq 1$). So all other things equal we would expect,

H4b: Firms with a small shareholder base are less likely to undertake a repurchase.

All other things equal, from (4) we would also expect those firms with a small shareholder base to repurchase less.

H4c: Firms with a small shareholder base choose to repurchase less.

We now proceed to describe our data-set and our measures.

3 Sample and Variable Construction

A Data

Data on returns, prices, repurchases and shares outstanding of NYSE, AMEX, and NASDAQ stocks are obtained from the CRSP database and the CRSP-Compustat Merged Industrial Database (CCM). Our main variable of interest is the number of common shareholders of record (CCM data 100).

We consider period of 1984 to 2004. The choice of the period is motivated by the introduction of SEC Rule 10b-18 in 1982, which provides a legal safe harbor for companies repurchasing their shares, which greatly reduced the ambiguity associated with this activity. Furthermore, since 1984, firms have been required to report the value of their repurchases in their cash flow statements and this item can be found in the CRSP-Compustat Merged database as data item # 115. Grullon and Ikenberry (2000) argue that during the crash of 1987 numerous firms would use repurchase programs to prevent their stock from falling. However, excluding 1987 and the period prior to the crash does not alter our results qualitatively.

In our analysis we use a number of control variables. All our accounting control variables are from CCM. We also use CCM to calculate the Rhodes-Kropf, Robinson and Viswanathan (2005) measure of company misvaluation. We provide a detailed description of all variables used in our study in the Appendix. In addition we use CRSP Monthly Stocks to calculate the stock's

liquidity. We use CRSP Daily Stocks to calculate volatility of firm's stock returns, company age and median share price over the previous year. We use CDA / Spectrum 13f-filing to estimate firm's institutional ownership. In our robustness analysis we also control for corporate governance by utilizing Corporate Governance Index of Gompers, Ishii, and Metrick (2003) obtained from IRRC.

We construct our measure of repurchases using the CCM data item Purchase of Common and Preferred Stock (item 115), which reports the amount of money a company spends on repurchasing its own securities. As noted by Stephens and Weisbach (1998) and Jagannathan, Stephens, and Weisbach (2000) this item overstates actual repurchases of common stock because it also includes repurchases of other securities. Therefore, we follow Dittmar (2000) and Weisbenner (2002) and subtract any decreases in the par value of preferred stock (annual data item 130) from CCM item 115 to construct our variable *Fraction Repurchased*. We further screen stock repurchases by setting repurchases equal to zero for any firm that does not repurchase at least 1% of its market value of equity (as in Dittmar (2000)).

In selecting our sample we omit firms with missing or negative values of *Market Capitalization*, *Book-to-Market* and *Number of Common Shareholders*. Additionally, we omit financial firms and focus exclusively on U.S. listed firms. This leaves us with 64769 firm year observations which is the basis for our analysis.

Table 1 presents summary statistics of our data. The descriptive statistics of our main variables (e.g., *Cash*, *Total Payout* etc.) are similar to other studies in the literature (Opler, Pinkowitz, Stulz, Williamson (1999)), even though our sample is slightly different. In our sample, firm cash holdings (*Cash*) are on average 15.6% of total assets. *Capital Expenditure* to total assets ratio is on average 6.9% average total payout is 20.8%. Overall, the characteristics of our sample are in line with those reported in recent studies.

B The Residual Shareholder Base

In this section we calculate our measures of the shareholder base. Grullon, Kanatas and Weston (2004) and others note that there is a strong relationship between *Number of Common Shareholders* and other variables such as *Size* which has been associated with a plethora of arguments. In order to ensure that the results that we find are not driven by any of the other arguments that size has been associated with we purge the *Number of Common Shareholders* from a number of factors. We follow Grullon, Kanatas and Weston (2004) and estimate the relationship between the shareholder

base of the company and its determinants, including *Size*, *Firm Age*, *Past Year Return*, *Book-to-Market*, *Share Price*. In all subsequent analysis we use the residuals from this regression as our estimates of the shareholder base.⁷

Table 2 presents results from our panel regression with industry and time fixed effects. As expected, we find that larger firms have a larger shareholder base. This may be due to larger firms having greater recognition through analyst following / press coverage, but it could equally well be due to larger firms having more shares outstanding. Due to transaction costs we expect firms that are trading at a low price to have a larger shareholder base. It turns out that $1 / \text{Share Price}$ is an important determinant of the number of shareholders. Like, Grullon et al (2004) we find that firms with poor performance have larger shareholder base. Additionally, value companies and mature companies have larger shareholder bases. Overall our regression results are very similar to those found in Grullon et. al (2004). We define *Residual Number of Common Shareholders (ResComSh)* as the residual from this regression and employ it as our measure of shareholder base for the rest of our study.

4 Results

A Residual Shareholder Base and Payout

In this section we examine the relationship between the residual shareholder base and payout. Panel A of Table 3 presents univariate results of the relationship between *Residual Number of Common Shareholders (ResComSh)* and *Total Payout*. Since *ResComSh* is a regression residual we define companies with positive (negative) values of *ResComSh* as high (low) residual shareholder base companies. This division almost evenly splits firms into high and low residual shareholder groups. Companies with small shareholder bases pay out on average 19.2% of their net income while firms with large shareholder bases pay out on average 21.8% (or 13.5% more). The difference is statistically significant. Additionally, the difference in payout between small and large shareholder base firms is even more pronounced when we only consider firms with a positive total payout. Small shareholder base firms payout on average 47.2% and large shareholder base firms payout 54.7% (or 15.9% more).

⁷Bodnaruk and Östberg (2007) document that the residual shareholder base is negatively related to returns.

Panel B of Table 3 displays our panel regressions analysis. Since firm payout policy is sticky (Lintner (1956), Graham et al. (2005)) we include the current year's *Total Payout* among our control variables. The coefficient on *ResComSh* is positive and statistically significant, indicating that the shareholder base is positively related to payout. Additionally, as expected we find that larger companies with higher operating income and with higher current payout have a higher *Total Payout* during the next year. Also, a high level of institutional ownership results in higher *Total Payout*. Firms with a higher level of *Capex* payout less. Through out the paper, our regressions control for time and industry (sic 1) fixed effects and standard errors are clustered around industry. Overall the results of these panels have corroborated our first hypothesis that *ResComSh* is positively and statistically significantly related to next years *Total Payout*.

B Residual Shareholder Base and Cash Holdings

In this section we examine the relationship between the residual shareholder base and cash holdings. Panel A of Table 4 presents univariate results of the relationship between *Residual Number of Common Shareholders (ResComSh)* and *Cash*. Companies with small shareholder bases have a ratio of cash to total assets of 17.2% while firms with large shareholder bases have on average 14.5% (or 15.7% less). The difference is statistically significant.

Panel B of Table 4 displays our panel regressions analysis. The coefficient on *ResComSh* is negative and statistically significant, indicating that the shareholder base is negatively related to cash holdings. Since there is persistence in *Cash* (the first order auto-correlation coefficient is 0.823) we include the current year's *Cash* as a control variable. Additionally, we find that *Operating Income* is negatively related to *Cash*, perhaps indicating that firms substitute strong earnings for cash holdings. Value firms (high *Book-to-Market* ratio) have lower cash holdings. Their lack of need for cash might be due to them being in a safe line of business. We find that larger firms have lower cash holdings. The importance of *Size* and *Book-to-Market* for cash holdings is corroborated by Opler et al. (1999) and Dittmar, Mahrt-Smith and Servaes (2003). Additionally, firms with high stock return volatility have higher cash holdings. Overall the results of these panels have corroborated our second hypothesis that *ResComSh* is negatively and statistically significantly related to next years *Cash*.

C Residual Shareholder Base and Capital Expenditure

In this section we document the relationship between the residual shareholder base and capital expenditure. Since our goal is to examine the effect of the cost of external financing on investment we need to control for availability of internal financing (cash holdings). In Table 5 we present pooled panel regressions. To examine the effect of the residual shareholder base while keeping the level of internal financing constant we introduce a variable that interacts the shareholder base with the cash holdings of the firm $ResComSh \times Cash$. We find that while keeping cash levels constant that the shareholder base is positively related to next years capital expenditures, corroborating our third hypothesis. All our specifications include current years $Capex$ to control for persistence in firm investment decisions.

Additionally, we find that firms with low growth opportunities (high *Book-to-Market*) and firms with high stock volatility have lower capital expenditures. Firms with more operating income and more cash have higher capital expenditures. Also, firms in less competitive industries (as measured by a herfindahl index) invest less.

D Repurchases and the Shareholder Base

To argue that the shareholder base is an important consideration when undertaking a repurchase we need to verify that the shareholder base is reduced by a repurchase. If all investors pro-rata tender then a repurchase does not imply that the shareholder base falls. In this section we examine the effect of a repurchase on the size of the shareholder base.

Our dependent variable is the change in the number of common shareholders ($\Delta ShBase$) in year t , $t + 1$ and $t + 2$. We present results in terms of changes in the number of common shareholders to facilitate interpretation, but the results in terms of changes in the residual shareholder base are qualitatively equivalent.⁸

In Panel A of Table 6 our main variable of interest is *Share Repurchase* which is a dummy variable that takes the value 1 if the firm has repurchased at least 1% of its outstanding stock between year $t - 1$ and year t . We find that undertaking a repurchase has a significantly negative impact on the shareholder base. The effect is also economically significant, a firm that undertakes a repurchase suffers a reduction in the number of shareholders of 2.5% in the year of repurchase and a

⁸The correlation between $\Delta ShBase$ and changes in the $ResComSh$ is 86.9%.

further reduction of 2.6% in the next year. Examining $\Delta ShBase_{t+2}$ indicates that the shareholder base does not revert to its original levels even two years following the repurchase.

In Panel B of Table 6, we define *Fraction Repurchased* as the fraction of outstanding shares repurchased by the firm between year t , $t + 1$ and $t + 2$. As expected, when a firm repurchases a larger fraction this has a significantly negative impact on the shareholder base. In terms of economic magnitude, a repurchase of an additional 1% of shares outstanding leads to a 0.3% reduction in the number of shareholders in year t and 0.8% in year $t + 1$ (i.e. a total reduction of 1.1%). Using *Fraction Repurchased* instead of *Share Repurchase* improves both statistical and economic significance. However, the main control variables behave in a very similar manner to when *Share Repurchase* was used. Overall, the results in this section indicate that undertaking a repurchase has a negative impact on the change in the shareholder base.

E The Shareholder base and Repurchases

E.1 Univariate Results

In this section we analyze the univariate relationship between the residual shareholder base and the probability of undertaking a repurchase. In Table 7, Panel A we split firms into two groups depending on whether they have a *ResComSh* that is below or above zero.⁹ We then compare the probability of undertaking a repurchase of the two groups of firms. We find that 20.4% of firms with a large shareholder base undertake a repurchase, while only 18.6% of firms with a small shareholder base undertake a repurchase. The difference in the probability of undertaking a repurchase is significant at the 1% level. Additionally, firms with a large shareholder base repurchase more. On average they repurchase 1.4% of the outstanding shares, while firms with a low shareholder base repurchase 1.1% (the difference is significant at the 1% level).

When we only consider firms that have undertaken a repurchase, firms with a large shareholder base repurchase on average 7% of the outstanding shares while firms with a small shareholder base only repurchase 6.1%. The 0.9% difference between the two types of firm is statistically significant at the 1% level.¹⁰ The univariate analysis indicates that not only are large shareholder base firms more likely to undertake a repurchase, but when they choose to repurchase they repurchase significantly more.

⁹These results are qualitatively unaltered if we use the median level of the residual shareholder base as breakpoint.

¹⁰These results are confirmed in median analysis as well.

E.2 Probit Analysis

In this section we analyze the determinants of the decision to undertake a repurchase. We model the repurchase decision as a binary choice; to repurchase or to abstain. Panel B of Table 7 presents our probit regressions, we have three specifications; the first two have less explanatory variables, but a more complete sample and the last specification contains *Corporate Governance Dummies* which results in a much more restricted sample. The dependent variable is whether the firm undertakes a repurchase and our main explanatory variable is the *ResComSh* (estimated in Section 3B). Dittmar (2000) and others have documented that larger firms tend to repurchase more and firms with a high book-to-market tend to repurchase less. So to control for these effects we include *Size* and *Book-to-Market*.¹¹ Additionally, to control for agency motives to distribute cash we include *Operating Income*, *Non-Operating Income* and *Capital Expenditure* as measures of cash flow availability. Both *Book-to-Market* and *Past-Year-Return* are controls for the market timing hypothesis. In the last two specifications we have also included the Rhodes-Kropf et. al (2007) measure of misvaluation. We have included firm dummies to control for firm specific effects.

We find that *ResComSh* is significantly (at the 1% level in the first two specifications and at the 10% in the last specification) positively related to the probability to undertake a repurchase. The marginal effect of the *ResComSh* is also significant, a one standard deviation increase in the residual shareholder base leads to an increase in the probability that a repurchase is undertaken by between 1.1% to 1.6% which corresponds to between 5.7% and 8.5% of the unconditional probability of undertaking a repurchase. As expected, *Size* is positively related to the probability of undertaking a repurchase. We find that cash disbursement is important for the repurchase decision. Both *Operating Income* and *Non-Operating Income* are positively related to the decision to repurchase. We find that *Capital Expenditures* is negatively related to the probability of undertaking a repurchase, indicating that firms with extensive research and development programmes repurchase less. As expected, by the market timing hypothesis, both *Book-to-Market* and *Past-Year-Return* are important for the repurchase decision. Value firms and firms with poor prior performance are more likely to repurchase. The results in this section show that the *ResComSh* is statistically and economically significantly related to the probability that a repurchase will be undertaken.

¹¹Since we include *Book-to-Market* instead of market-to-book we expect a negative sign.

E.3 Tobit Analysis

In this section we explore the hypothesis that firms that have a low *ResComSh* repurchase less of their outstanding shares. To analyze this we use a Tobit regression where we have as dependent variable the fraction of shares repurchased (*Fraction Repurchased*). This variable is bounded at 0 and 1, firms do not repurchase a negative fraction of its outstanding shares and they cannot repurchase more than all of the outstanding shares. As during the Probit analysis our main variable of interest is the *ResComSh*. We use the same control variables as in the previous section.

Our results from the Tobit regression are reported in Panel *C* of Table 7. In all specifications, we find that *ResComSh* is positively and significantly related to the amount repurchased. Our Tobit analysis uses the same controls as the Probit in the previous section. Overall in the Tobit analysis the effect of *ResComSh*, is both statistically and economically more significant than in the Probit. The marginal effect of a standard deviation increase in the *ResComSh* is to increase the size of the repurchase program by 0.4% to 0.7% which corresponds to between 29.5% and 55.3% of the unconditional size of the repurchase. The control variables behave qualitatively the same as in the probit analysis. The significance levels and impacts are occasionally altered, but the sign is the same for all the controls. As in the probit analysis, specifications two and three includes misvaluation controls. The *ResComSh* is significant at the 1% level in all three specifications.

Overall it seems as if the tobit analysis manages to capture the importance of the shareholder base in a better way than the probit. It is reassuring that our measure of shareholder base that has been purged from some variables that are related to the recognition (like size and momentum) of the firm still is important for both the repurchase decision and how much to repurchase.

5 Conclusion

Merton (1987) states that "an increase in the relative size of the firm's investor base will reduce the firm's cost of capital and increase the market value of the firm." There is a growing literature that verifies this negative relationship between the investor base and the firm's cost of capital. This paper examines a number of implications of the relationship between the investor base and the cost of capital for investment and payout policy. We find that firms with a small investor base (high cost of capital) pay out less of their net income to investors, maintain higher cash reserves and have lower capital expenditures.

Additionally, in Merton's model it is more costly for a firm with a small shareholder base to undertake a repurchase. Firstly, because of the high cost of external financing that a small shareholder base implies. Secondly, the value impact of a decrease in the shareholder base is larger the smaller the shareholder base is. This implies that firms with small shareholder bases should be less likely to undertake a repurchase and repurchase less if they do. We document that the probability of undertaking a repurchase is significantly lower for firms with a small shareholder base. Additionally, we find that firms with a small shareholder base repurchase much less than firms with a large shareholder base.

In 1976 Fischer Black argued that it was a puzzle that firms used dividends as a payout method even though there were tax advantages to using repurchases. To explain this puzzle, there needs to be some asymmetry between repurchases and dividends. This paper argues that one advantage of paying out through dividends is that this leaves the shareholder base unaltered and shows that the repurchase decision is related to the shareholder base. Overall, the findings of this paper suggest that the shareholder base affects payout and investment policy through the cost of capital as hypothesized by Merton.

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Appendix: Variable Definitions

Variable	Description of Variable and Source of Data
Number of Common Shareholders (ComSh)	number of common shareholders of record (in 000s) CRSP-COMPUSTAT Merged database (CCM) data item # 100.
Size	end of the year equity market capitalization: (price x shares outstanding), CCM data 24 x data 25.
Book-to-Market (B/M)	ratio of long-term debt to the total equity of the firm: CCM data 9/ data 60.
Price-to-Earnings (P/E)	ratio of the year-end stock price to earnings per share for the prior fiscal year: CCM data 24/data 58.
Debt-to-Equity (D/E)	ratio of long-term debt to the total equity of the firm: CCM data 9/ data 60.
Operating Income	ratio of operating income to total assets: CCM data 13/ data 6.
Non-Operating Income	ratio of non-operating income to total assets: CCM data 61/ data 6
Net Liquid Assets	current assets minus current liabilities, divided by the total assets: CCM (data 4 – data 5)/ data 6.
Cash	ratio of cash holdings to total assets: CCM data 1/ data 6.
Dividend Payout	ratio of dollar amount of dividends to net income: CCM data 21/ data 237.
Total Payout	sum of dollar amount of dividends and dollar volume of repurchases divided by net income: CCM (data 21 + data 115)/ data 237.
Stock Liquidity	sum of the monthly share volume over the previous year divided by the number of shares outstanding at the end of the year: CRSP Monthly Stocks.
Past Year Return	compounded monthly return for the previous year: CRSP Monthly Stocks.
Volatility	stock return volatility, computed as the standard deviation of daily stock returns for the previous year: CRSP Daily Stocks
Capital Expenditure (Capex)	ratio of capital expenditure to total assets of the firm: CCM data 128/ data 6.
Firm Age	number of years the firm existed in CRSP daily stocks database.
Share Price	median price of the firm share over the previous one year: CRSP daily stocks.
ROE	ratio of earnings to average equity for the prior fiscal year: CCM data 20/ (data 60 + data 60(t-1))/2).
Institutional Ownership	end of the year fraction of shares outstanding owned by institutional fund managers: Spectrum 13f.
Industry Concentration	sum of the squared market share of each firm in the same industry during a year. Market share is defined as the total sales of the firm in a given year divided by the total sales of the industry in the year. The industry is defined at the three-digit SIC code level, where the SIC codes have been obtained from CRSP Monthly Stocks (SICCD). The sales data comes from CCM: data 12.
Misvaluation (RRV)	sector-adjusted firm-specific valuation errors corresponding to the residuals of Model 3 in Rhodes-Kropf, Robinson and Viswanathan (RRV) (2005) that regresses market value on leverage, book value of assets and net income for each of twelve Fama-French sectors of the economy. Estimated from COMPUSTAT
Corporate Governance Index	measured on the same principle as Gompers, Ishii, and Metric (2003): sum of the number of provisions restricting shareholder rights. Data obtained from IRRC.
Share Repurchase	a dummy variable, which takes a value of 1 if the company undertakes a share repurchase in a given year (if Fraction Repurchased is positive), 0 – otherwise:
Fraction Repurchased	purchase of common and preferred stock less the decrease in par value of preferred stock: CCM data 115+ data 130

Table 1: Descriptive statistics of the data

We present descriptive statistics on the variables used in our study. All variables are described in Appendix. We winsorized book-to-market, debt-to-equity, price-to-earning and capital expenditures at 1% of both tails of the distribution.

variable	N	mean	median	std
ComSh	64769	7.833	1.610	26.875
Size	64769	1344.523	96.532	8652.031
Book-to-Market (B/M)	64769	0.780	0.567	1.203
Price-to-Earnings (P/E)	64769	13.235	11.756	13.485
Debt-to-Equity (D/E)	64769	0.539	0.253	0.828
Operating Income	64769	0.079	0.120	0.233
Non-Operating Income	64769	0.012	0.007	0.042
Net Liquid Assets	64769	0.274	0.267	0.239
Cash	64769	0.156	0.072	0.184
Dividend Payout	59227	0.126	0.000	0.283
Total Payout	59227	0.208	0.000	0.425
Stock Liquidity	64769	1.119	0.650	3.816
Past Year Return	64769	0.170	0.149	0.627
Volatility	64769	0.011	0.005	0.022
Capital Expenditures (Capex)	64010	0.069	0.050	0.064
Firm Age	64769	9.436	8.000	6.156
ROE	64769	0.072	0.097	0.212
Institutional Ownership	64769	0.306	0.249	0.259
Industry Concentration	64769	0.082	0.053	0.095
Misvaluation (RRV)	51728	-0.001	-0.003	0.409
Share Repurchase	64769	0.194	0.000	0.395
Fraction of Repurchased	64769	0.012	0.000	0.050

Table 2: Determinants of Shareholder Base

We report the results of regression analysis relating company shareholder base to its determinants. The dependent variable is the logarithm of common shareholders of record (CCM data 100). All the variables are described in Table 1. We report the results of panel regression with trading exchange, industry (sic1) and time fixed effects. Standard errors are clustered by industry (sic1).

	estimate	t-stat
Log (Age)	0.553	(24.49)
ROE	0.000	(-0.95)
Log (Size)	0.395	(16.74)
Log (B/M)	0.122	(4.34)
1/Share Price	0.122	(9.39)
Stock Liquidity	-0.001	(-0.49)
Past Year Return	-0.104	(-11.35)
Volatility	1.583	(2.61)
Exchange dummies	Yes	
Industry dummies	Yes	
Time Dummies	Yes	
Clustering	Sic1	
Adj. R ²	0.431	
N	64769	

Table 3: Shareholder Base and Total Payout

In this table we report the results from estimating the relationship between residual shareholder base and company's total payout. We utilize the residual errors from the regressions reported in Table 2 as our measures of residual shareholder base (ResComSh). The dependent variable is total payout to shareholders over the following year. All control variables are described in the Appendix. In panel A we report the results of univariate analysis both for the full sample and for the sample of companies with positive total payout. Panel B reports the results of panel regressions with industry (sic1), time fixed effects. As a robustness test we also control for the corporate governance. Standard errors are clustered by industry (sic1). Estimates for the residual shareholder base are multiplied by 100.

Panel A: univariate analysis

ResComSh	<u>Total Payout</u>		<u>Total Payout (>0)</u>		
	N	mean	N	mean	median
high (positive)	29173	0.218	10476	0.547	0.454
low (negative)	30054	0.192	11136	0.472	0.355
		t-stat/prob		t-stat/prob	Wilcoxon/prob
		6.76		13.17	14.36
		0.01		0.01	0.01

Panel B: pooled panel regressions

	estimate	t-stat	estimate	t-stat	estimate	t-stat
ResComSh	0.981	(3.86)	0.987	(4.03)	1.427	(3.08)
Log (Size)	0.037	(8.85)	0.040	(8.02)	0.042	(5.30)
Log (B/M)	-0.001	(-0.33)	-0.011	(-2.33)	-0.039	(-2.32)
D/E	0.000	(-22.76)	0.000	(-16.45)	0.000	(-3.37)
P/E	0.000	(-6.48)	0.000	(-6.42)	0.000	(-1.92)
Operating Income	0.186	(10.64)	0.204	(9.51)	0.777	(4.34)
Non-Operating Income	0.107	(1.34)	0.292	(3.65)	0.381	(0.93)
<i>Total Payout</i>	0.468	(15.83)	0.476	(15.89)	0.348	(14.18)
Net Liquid Assets	-0.012	(-1.00)	-0.026	(-2.59)	0.013	(0.22)
Past Year Return	-0.009	(-2.28)	-0.013	(-2.52)	-0.019	(-0.90)
Volatility	-0.287	(-2.49)	-0.535	(-3.98)	-2.873	(-1.56)
Capex	-0.175	(-8.15)	-0.215	(-6.35)	-0.369	(-1.71)
Institutional Ownership	0.048	(2.73)	0.034	(2.01)	-0.007	(-0.19)
Industry Concentration	0.037	(1.41)	0.090	(2.30)	0.336	(2.02)
Stock Liquidity	-0.002	(-0.90)	-0.002	(-0.85)	-0.022	(-3.13)
Misvaluation (RRV)			-0.042	(-3.94)	-0.108	(-3.63)
Industry Dummies	Yes		Yes		Yes	
Time Dummies	Yes		Yes		Yes	
Corporate Govern. Index	No		No		Yes	
Clustering	Sic1		Sic1		Sic1	
Adj. R ²	0.258		0.261		0.254	
N	59227		49154		4825	

Table 4: Shareholder Base and Cash Holdings

We report the results of regression analysis relating company residual shareholder base to its cash holdings. We utilize the residual errors from the regressions reported in Table 2 as our measures of residual shareholder base (ResComSh). The dependent variable is company's cash holdings at the end of the following fiscal year. All variables are as described in Appendix. In panel A we report the results of univariate analysis. Panel B we report the results of panel regressions with industry (sic1), time fixed effects. As a robustness test we also control for the corporate governance. Standard errors are clustered by industry (sic1). Estimates for the residual shareholder base are multiplied by 100.

Panel A: univariate analysis

ResComSh	N	Cash Holdings		t-stat	prob	Wilcoxon	prob
		mean	median				
high (positive)	31831	0.145	0.065	17.34	0.01	16.48	0.01
low (negative)	32938	0.172	0.088				

Panel B: pooled panel regressions

	estimate	t-stat	estimate	t-stat	estimate	t-stat
ResComSh	-0.099	(-2.11)	-0.103	(-2.31)	-0.121	(-2.37)
Log (Size)	-0.001	(-3.22)	-0.001	(-3.12)	0.001	(0.82)
Log (B/M)	-0.005	(-4.09)	-0.007	(-5.64)	-0.006	(-2.33)
D/E	0.000	(1.59)	0.000	(0.70)	0.000	(-1.92)
P/E	0.000	(-1.57)	0.000	(-1.90)	0.000	(-0.57)
Operating Income	-0.027	(-2.72)	-0.029	(-2.85)	-0.037	(-1.96)
Non-Operating Income	0.002	(0.15)	0.010	(0.54)	0.013	(0.20)
Dividend Payout	0.000	(-0.49)	0.000	(0.95)	0.000	(0.25)
<i>Cash Holdings</i>	0.814	(96.51)	0.817	(101.60)	0.850	(78.41)
Past Year Return	0.006	(2.56)	0.006	(2.18)	0.012	(6.28)
Volatility	0.081	(2.83)	0.111	(3.28)	0.326	(1.27)
Capex	-0.024	(-3.24)	-0.032	(-4.04)	0.026	(1.37)
Institutional Ownership	0.002	(1.29)	0.001	(0.46)	-0.023	(-2.71)
Industry Concentration	0.003	(0.30)	-0.002	(-0.14)	-0.030	(-0.57)
Stock Liquidity	0.000	(1.08)	0.000	(1.00)	0.004	(4.98)
Misvaluation (RRV)			-0.004	(-1.91)	-0.011	(-1.72)
Industry Dummies	Yes		Yes		Yes	
Time Dummies	Yes		Yes		Yes	
Corporate Govern. Index	No		No		Yes	
Clustering	Sic1		Sic1		Sic1	
Adj. R ²	0.756		0.772		0.843	
N	64769		51728		5188	

Table 5: Shareholder Base and Capital Expenditures

In this table we report the results from estimating the relationship between residual shareholder base and company's capital expenditures. We utilize the residual errors from the regressions reported in Table 2 as our measures of residual shareholder base (ResComSh). The dependent variable is company's capital expenditures over the following year. All variables are described in Appendix. We report the results of panel regressions with industry (sic1) and time fixed effects. As a robustness test we also control for the corporate governance. Standard errors are clustered by industry (sic1). Estimates for the residual shareholder base and interactive term of residual shareholder base and cash are multiplied by 100.

	estimate	t-stat	estimate	t-stat	estimate	t-stat
ResComSh	-0.069	(-3.26)	-0.068	(-5.49)	-0.034	(-1.03)
ResComSh × Cash	0.323	(3.13)	0.303	(4.53)	0.282	(3.15)
Log (Size)	0.000	(0.14)	0.000	(0.19)	0.001	(1.85)
Log (B/M)	-0.003	(-2.86)	-0.003	(-2.51)	-0.002	(-1.03)
D/E	0.000	(-2.42)	0.000	(-2.48)	0.000	(-0.79)
P/E	0.000	(0.68)	0.000	(1.25)	0.000	(0.54)
Operating Income	0.020	(4.92)	0.021	(4.59)	0.045	(9.94)
Non-Operating Income	0.000	(0.01)	-0.007	(-0.43)	0.014	(0.33)
Dividend Payout	0.000	(-0.79)	0.000	(-2.06)	0.000	(-0.38)
Cash	0.014	(3.72)	0.014	(3.89)	0.000	(0.14)
Past Year Return	0.007	(6.99)	0.008	(7.47)	0.008	(5.57)
Volatility	-0.038	(-2.03)	-0.055	(-2.33)	0.014	(0.25)
Capex	0.619	(22.51)	0.619	(26.90)	0.664	(26.55)
Institutional Ownership	-0.001	(-0.72)	-0.002	(-1.08)	0.002	(0.70)
Industry Concentration	-0.010	(-2.30)	-0.014	(-2.36)	-0.010	(-1.34)
Stock Liquidity	0.000	(3.65)	0.000	(3.89)	-0.001	(-1.88)
Misvaluation (RRV)			0.000	(0.28)	-0.004	(-2.63)
Industry Dummies	Yes		Yes		Yes	
Time Dummies	Yes		Yes		Yes	
Corporate Govern. Index	No		No		Yes	
Clustering	Sic1		Sic1		Sic1	
Adj. R ²	0.475		0.483		0.654	
N	64010		51209		5166	

Table 6: Share Repurchases and Changes in Shareholder Base

We present the results of the effect of the share repurchase on the change in the shareholder base in the year when share repurchases were undertaken and on the change in the shareholder base over the next and one over next year. The change in shareholder base in year t is calculated as a difference in the logarithms of the number of the common shareholders of record at the end of year t and year $t-1$. In Panel A we use a Share Repurchase dummy which takes value of 1 if the company undertook a repurchase in year t , 0 – otherwise as our main explanatory variable. In Panel B we report the results of the relationship between Fraction Repurchased and change in shareholder base in the following years.

Panel A: Share Repurchases and Changes in the Shareholder Base

	$\Delta \text{sh.base}_t$		$\Delta \text{sh.base}_{t+1}$		$\Delta \text{sh.base}_{t+2}$	
	estimate	t-stat	estimate	t-stat	estimate	t-stat
Share Repurchase_t	-0.025	(-3.07)	-0.026	(-2.11)	-0.001	(-0.14)
$\Delta \text{sh.base}_{t+1}$					-0.123	(-8.69)
$\Delta \text{sh.base}_t$			-0.144	(-7.09)	-0.074	(-6.47)
$\Delta \text{sh.base}_{t-1}$	-0.129	(-8.09)	-0.054	(-4.13)	-0.041	(-2.92)
$\Delta \text{sh.base}_{t-2}$	-0.043	(-6.14)	-0.023	(-2.04)	-0.028	(-4.99)
Log (Size)	0.009	(3.34)	0.004	(2.28)	0.002	(0.83)
Log (B/M)	-0.030	(-7.63)	-0.032	(-11.50)	-0.027	(-9.84)
D/E	0.000	(-41.17)	0.000	(-5.84)	0.000	(30.26)
P/E	-0.028	(1.09)	-0.024	(0.13)	-0.040	(-0.98)
Operating Income	-0.070	(-1.12)	-0.123	(-1.13)	-0.055	(-1.90)
Non-Operating Income	-0.001	(-1.42)	-0.001	(-2.00)	0.000	(-0.66)
Dividend Payout	0.057	(-1.82)	0.046	(-1.90)	0.026	(-0.29)
Net Liquid Assets	0.023	(5.79)	0.022	(3.73)	0.012	(2.21)
Past Year Return	0.000	(4.14)	0.000	(4.59)	0.000	(2.92)
Volatility	0.282	(3.37)	0.158	(-0.26)	0.147	(-0.83)
Capex	0.003	(5.84)	0.017	(5.23)	0.013	(2.32)
Institutional Ownership	0.087	(0.16)	0.077	(0.93)	0.051	(0.78)
Industry Concentration	0.009	(3.67)	0.002	(3.79)	-0.001	(3.24)
Stock Liquidity	0.402	(4.03)	-0.031	(0.79)	-0.090	(-0.60)
Industry Dummies	Yes		Yes		Yes	
Time Dummies	Yes		Yes		Yes	
Corporate Govern. Index	Yes		Yes		Yes	
Clustering	Sic1		Sic1		Sic1	
Adj. R ²	0.029		0.027		0.021	
N	44959		37670		31386	

Panel B: Size of Share Repurchases and Changes in the Shareholder Base

	$\Delta \text{sh.base}_t$		$\Delta \text{sh.base}_{t+1}$		$\Delta \text{sh.base}_{t+2}$	
	estimate	t-stat	estimate	t-stat	estimate	t-stat
Fraction Repurchased_t	-0.312	(-4.16)	-0.769	(-1.79)	0.247	(0.43)
$\Delta \text{sh.base}_{t+1}$					-0.1234	(-8.69)
$\Delta \text{sh.base}_t$			-0.1433	(-7.04)	-0.0742	(-6.47)
$\Delta \text{sh.base}_{t-1}$	-0.1282	(-8.12)	-0.0534	(-4.10)	-0.0409	(-2.92)
$\Delta \text{sh.base}_{t-2}$	-0.0417	(-6.07)	-0.0227	(-2.01)	-0.0281	(-5.02)
Log (Size)	0.0045	(1.79)	0.0031	(1.83)	0.0020	(0.81)
Log (B/M)	-0.0329	(-8.10)	-0.0326	(-11.80)	-0.0274	(-9.78)
D/E	0.0000	(-36.63)	0.0000	(-6.07)	0.0000	(30.57)
P/E	-0.0295	(-1.17)	-0.0285	(-1.37)	-0.0404	(-1.91)
Operating Income	-0.0632	(-1.27)	-0.1275	(-2.06)	-0.0566	(-0.67)
Non-Operating Income	-0.0010	(-2.18)	-0.0009	(-1.94)	-0.0003	(-0.29)
Dividend Payout	0.0710	(6.10)	0.0446	(3.63)	0.0260	(2.18)
Net Liquid Assets	0.0230	(4.42)	0.0226	(4.75)	0.0121	(2.92)
Past Year Return	0.0000	(1.29)	0.0000	(0.12)	0.0000	(-0.98)
Volatility	0.3048	(6.53)	0.1613	(5.37)	0.1484	(2.34)
Capex	-0.0093	(-0.58)	0.0141	(0.75)	0.0131	(0.81)
Institutional Ownership	0.0840	(4.11)	0.0772	(3.87)	0.0510	(3.20)
Industry Concentration	0.0106	(4.37)	0.0020	(0.94)	-0.0015	(-0.59)
Stock Liquidity	0.4370	(3.43)	-0.0290	(-0.24)	-0.0899	(-0.83)
Industry Dummies	Yes		Yes		Yes	
Time Dummies	Yes		Yes		Yes	
Corporate Govern. Index	Yes		Yes		Yes	
Clustering	Sic1		Sic1		Sic1	
Adj. R ²	0.029		0.026		0.021	
N	44959		37670		31386	

Table 7: Shareholder Base and Propensity to Undertake a Repurchase

We report the results of regression analysis relating company residual shareholder base to the likelihood and volume of stock repurchases.

Panel A presents univariate results on the relationship between the residual shareholder base ResComSh and the decision to repurchase and the fraction of shares repurchased (both for the full sample and the sample of repurchasing companies only).

Panel B presents results of probit analysis of the relationship between the residual shareholder base and the decision to undertake a repurchase. The dependent variable is a Share Repurchase dummy, which takes a value of 1 if the company undertook a share repurchase over the next year, 0 – otherwise.

Panel C presents the results of tobit analysis of the relationship between the residual shareholder base and the fraction of shares repurchased. The dependent variable is Fraction Repurchased.

We utilize the residual errors from the regressions reported in Table 2 as our measures of residual shareholder base (ResComSh). All variables are described in Appendix. We report the results of panel regressions with industry (sic1) and time fixed effects. As a robustness test we also control for the corporate governance. Standard errors are clustered by industry (sic1). Estimates and marginal effects for the residual shareholder base are multiplied by 100.

Panel A: univariate analysis

ResComSh	N	<u>prob of repurchase</u>	<u>fraction repurchased</u>	<u>fraction repurchased (>0)</u>		
		mean	mean	N	mean	median
high (positive)	33715	0.204	0.014	6883	0.070	0.035
low (negative)	32039	0.186	0.011	5951	0.061	0.033
		t-stat/prob	t-stat/prob		t-stat/prob	Wilcoxon/prob
		6.37	7.81		5.39	2.74
		0.01	0.01		0.01	0.01

Panel B: Shareholder Base and the Decision to Undertake a Repurchase: Probit Analysis

	estimate	t-stat	ME	estimate	t-stat	ME	Estimate	t-stat	ME
ResComSh	3.687	(4.18)	0.912	3.979	(4.15)	1.021	4.120	(1.65)	1.364
Log (Size)	0.122	(10.34)	0.030	0.130	(8.14)	0.033	0.137	(6.69)	0.045
Log (B/M)	0.186	(8.64)	0.046	0.092	(4.03)	0.024	0.057	(1.18)	0.019
D/E	0.001	(3.20)	0.000	0.000	(2.96)	0.000	-0.008	(-0.84)	-0.003
P/E	0.000	(-0.53)	0.000	0.000	(-0.70)	0.000	0.000	(-0.80)	0.000
Operating Income	1.074	(3.07)	0.266	1.124	(2.93)	0.289	3.998	(9.38)	1.324
Non-Operating Income	1.544	(2.70)	0.382	1.743	(3.44)	0.447	5.044	(4.21)	1.671
Dividend Payout	0.000	(-1.10)	0.000	0.001	(0.44)	0.000	0.002	(0.44)	0.001
Net Liquid Assets	0.358	(3.65)	0.089	0.211	(2.41)	0.054	0.143	(0.91)	0.047
Past Year Return	-0.110	(-4.02)	-0.027	-0.123	(-4.64)	-0.032	-0.169	(-2.81)	-0.056
Volatility	-3.747	(-2.66)	-0.927	-4.027	(-1.87)	-1.034	-26.206	(-3.89)	-8.679
Capex	-0.862	(-2.96)	-0.213	-0.957	(-2.54)	-0.246	-3.114	(-4.45)	-1.031
Institutional Ownership	0.367	(7.93)	0.091	0.330	(5.18)	0.085	0.383	(2.58)	0.127
Industry Concentration	-0.075	(-0.40)	-0.019	-0.021	(-0.14)	-0.005	-1.150	(-2.20)	-0.381
Stock Liquidity	-0.057	(-5.32)	-0.014	-0.059	(-6.31)	-0.015	-0.031	(-1.11)	-0.010
Misvaluation (RRV)				-0.330	(-9.84)	-0.085	-0.457	(-5.45)	-0.151
Industry Dummies	Yes			Yes			Yes		
Time Dummies	Yes			Yes			Yes		
Corporate Gov. Index	No			No			Yes		
Clustering	Sic1			Sic1			Sic1		
Adj. R ²	0.097			0.098			0.140		
N	64769			53960			5211		

Panel C: Shareholder Base and the Decision to Undertake a Repurchase: Tobit Analysis

	estimate	t-stat	estimate	t-stat	estimate	t-stat
ResComSh	0.581	(7.92)	0.552	(7.57)	0.311	(2.31)
Log (Size)	0.017	(27.87)	0.015	(22.98)	0.007	(5.23)
Log (B/M)	0.030	(23.78)	0.015	(10.16)	0.004	(1.33)
D/E	0.000	(3.44)	0.000	(2.73)	0.000	(-0.44)
P/E	0.000	(-0.20)	0.000	(-0.68)	0.000	(-0.47)
Operating Income	0.149	(28.17)	0.145	(26.91)	0.276	(12.36)
Non-Operating Income	0.198	(6.54)	0.231	(7.46)	0.340	(4.64)
Dividend Payout	0.000	(-0.44)	0.000	(0.24)	0.000	(-0.22)
Net Liquid Assets	0.038	(8.89)	0.015	(3.49)	-0.004	(-0.41)
Past Year Return	-0.016	(-9.34)	-0.016	(-9.19)	-0.010	(-2.52)
Volatility	-0.543	(-6.74)	-0.449	(-4.73)	-1.903	(-3.75)
Capex	-0.107	(-7.56)	-0.111	(-7.65)	-0.227	(-6.35)
Institutional Ownership	0.014	(3.22)	0.022	(5.01)	0.032	(3.71)
Industry Concentration	0.015	(1.44)	0.016	(1.49)	-0.038	(-1.37)
Stock Liquidity	-0.005	(-8.19)	-0.006	(-8.39)	-0.001	(-0.67)
Misvaluation (RRV)			-0.043	(-15.83)	-0.043	(-7.25)
Industry Dummies	Yes		Yes		Yes	
Time Dummies	Yes		Yes		Yes	
Corporate Govern. Index	No		No		Yes	
Clustering	No		No		No	
Adj. R ²	0.191		0.215		0.419	
N	64769		53967		5232	