Ownership structure and incentives to stock repurchase

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Abstract

This paper examines whether and how ownership structure affects stock repurchase by looking at the incentives to adjust capital structure and signal undervaluation through repurchasing. We find that a strong monitoring structure motivates the adoption of an optimal capital structure with which firms maximize corporate value. We also find that firms with a strong monitoring structure tend to initiate a repurchase plan as a value signal; on the other hand, entrenched firms are more sensitive to market performance and tend to have more stock repurchase if they are undervalued. Additionally, we find by looking at the motivation for sending a value-signal that a U-shaped relationship exists between stock repurchase and ownership structure.

Keywords: Ownership structure; Stock repurchase; Capital structure; Undervaluation; Takeover determent

1 Introduction

Open-market stock repurchase has recently been adopted by many countries, not only as a substitute for dividends as the means to distribute cash to shareholders, but also for other purposes, such as a value signal, takeover deterrent, or capital-structure adjustment (Fenn and Liang, 1997; Bagwell and Shoven, 1988; Dittmar, 2000). A large amount of research has explored this subject and has successfully explained why firms choose to initiate stock repurchase. Bagwell and Shoven (1989) and Grullon (1997) maintain that stock repurchase is positively related to the level of cash flow. In Miller and Modigliani's (1961) perfect and frictionless world, it does not matter whether cash is distributed to stockholders by dividends or stock repurchase. In reality, however, stock repurchases are taxed at the capital gains tax rate and dividends are taxable at the ordinary income tax rate. Kaplan and Reishus (1990) and Denis, Denis and Sarin (1994) suggested that since the income tax rate is higher than the capital gains tax rate, managers may prefer repurchase over dividends. Vermaelen (1981), Ofer and Thakor (1987), Comment and Jarrell (1991), and Dittmar (2000) suggest that stock repurchase may be a signal to the market about current undervaluation, which is followed by an increase in stock prices. Moreover, undervalued firms are likely to use stock repurchases to reduce the probability of becoming takeover candidates, since repurchase can decrease the number of shares held by the shareholders with the lowest valuation, and increase the cost of the bidders (Vermaelen, 1984; Harris and Raviv, 1988; Stulz, 1988; Bagwell, 1992). Bagwell and Shoven (1988), Opler and Titman (1996) and Dittmar (2000) illustrate that firms may retire a large number of

shares through stock repurchase to increase their debt-to-equity ratio. They find that firms with a leverage ratio that is below their target leverage may use stock repurchase as a tool to adjust capital structure and approximate their target-debt ratio.

This paper relates to existing literature on stock repurchase and ownership structure. It is well documented in the financial literature that a corporate ownership structure contributes to managerial decisions and motivates repurchase programs; however, most existing empirical studies use the agency theory explanation for stock repurchase by analyzing ownership structure effects. The agency theory suggests that managers of firms with weak shareholder rights not always act to maximize shareholder value but tend to waste excess cash on value-destroying projects in order to benefit themselves. A strong monitoring structure reduces the agency conflicts between managers and shareholders, which allows for a greater probability of maximizing firm value (John and Knyazewa, 2006). Stock repurchase is a mechanism to distribute cash to shareholders and lower the potential agency problem related to free cash (Jensen, 1986). Therefore, active monitoring by outside owners may force managers to distribute excess cash either by dividends or by stock repurchases and decrease the agency costs of free cash flow. Firms with weak shareholder rights are likely to retain more free cash and have less stock repurchase (Jiraporn, 2006). On the other hand, there are a few empirical studies that document a different story and support the argument that insider and outsider interests are closely aligned in those firms with management concentrations (Jensen and Meckling, 1976). Stock repurchase can be motivated by insider managers. Skjeltorp and Ødegaard (2004) assert that insider ownership is significantly higher (20%) in firms that announce stock repurchase than in non-announcing firms (8%), which is consistent with Li and McNally (2002), who support the conclusion that stock repurchase increases with insider ownership.

This paper mainly investigates the relationship between ownership structure and stock repurchase in more detail. Specifically, our empirical analysis has three goals. First, we examine whether strong monitoring by outsider ownership motivates firms to adopt an optimal capital structure for maximizing corporate value by testing a sample of repurchase-announcing firms in Japan. Second, we explain whether and how a strong monitoring structure influences the size of stock repurchase as value-signal or takeover deterrent. Third, we evaluate the impact of managerial entrenchment on the decision of stock repurchase, especially by analyzing undervalued firms.

Recent empirical studies about the association between ownership structure and capital structure follow Jensen and Meckling (1976) in asserting that management does not always approximate optimal capital structure to maximize corporate value according to the agency theory. Berger, Ofek and Yermack (1997) report that the level of managerial entrenchment affects the level of debt. They find that entrenchment-reducing events are always followed by an increase in firm leverage, which is much larger for underlevered firms than for all firms. On the other hand, Harris and Raviv (1988), with evidence support the finding that managers of entrenched firms may increase leverage beyond the optimal ratio to reduce a takeover

threat and retain their control positions. By analyzing ownership structure, our results demonstrate a negative and significant relation between stock repurchase and deviation from target leverage ratio when firms have a strong monitoring structure, and support the finding that outside monitoring encourages firms to repurchase outstanding shares to adjust capital structure. Simultaneously, by testing the subsample of underlevered firms, we do not find evidence that underlevered firms with strong monitoring structures have more stock repurchase by which they approximate capital structure with the value-maximizing level of debt.

A strong monitoring structure may encourage managers to act on behalf of shareholder interests. Therefore, managers of monitored firms tend to use stock repurchase as a value signal if they believe their firms are undervalued by the market. However, Isagawa (2000) and Fried (2002) argue that managerial concentrations motivate stock repurchase for maximizing the future value of their own wealth; that is, entrenched managers are more likely to initiate a repurchase plan to signal current undervaluation or the good future prospects of the firm and reduce takeover risk in order to keep their control. Our results show that the relationship between stock repurchase and market performance is negative for monitored firms and for entrenched firms, although the negative relationship is significant only when firms are monitored. Further, by focusing on undervalued firms, we find that entrenched firms are more likely to undertake stock repurchase. Our results are consistent with an entrenchment effect that managers of entrenched firms may contribute to stock repurchase plans to maximize their own future value, or to protect their control against a takeover threat, once their firms are undervalued by the market.

Furthermore, we extend our analysis and examine the effect of ownership structure on stock repurchase by looking at undervalued firms. Our results do not support Jiraporn (2006), who asserts that firms with weak shareholder rights tend to have less stock repurchase, but instead confirm a U-shaped relationship between ownership structure and stock repurchase, which suggests that firms with a strong monitoring structure and that entrenched firms are likely to initiate repurchase programs, although they may each have difference motivations.

The remainder of this paper is organized as follows. Section 2 develops the hypotheses. Section 3 describes samples, data and variables. Section 4 directly estimates the relationship between ownership structure and stock repurchase. Sections 5 and 6 present our analysis of the effect of ownership structure on repurchasing firms by looking at capital structure adjustment and value-signal or takeover deterrents, respectively. Section 7 illustrates the extension and Section 8 concludes.

2 Hypotheses Development

As the trade-off theory of capital structure implies, firms are likely to mitigate deviation between actual and target leverage and approximate their optimal leverage ratio to maximize firm value. Firms with leverage ratio below their target tend to reduce shares outstanding through stock repurchase to increase their leverage ratio. On the basis of Berger, Ofek and Yermack (1997), we suppose that the degree of monitoring of management affects the probability of capital structure adjustment to

maximize firm value by stock repurchase. Since firms with monitoring of outside owners may be more sensitive to shareholder or firm value-maximizing decisions, it is possible that underlevered firms with strong monitoring from outside owners are more likely to initiate a stock repurchase plan to increase the debt to equity ratio and approximate the optimal one, in line with trade-off theory.

[H1] Firms with a strong monitoring structure have a tendency to repurchase shares outstanding for the motivation of capital structure adjustment; underlevered firms, especially, are more likely to initiate a repurchase program.

The theory of signaling undervaluation holds that corporate managers always have better information about their firms than outside investors. If they think stock prices do not mirror intrinsic corporate value and that their firms are undervalued, managers attempt to communicate this private information to outsiders and expect a positive reaction from the market. Stock repurchase, in this mode, can be used as a signal to correct a misvaluation by the market (Vermaelen, 1981; Ofer and Thakor, 1987; Comment and Jarrell, 1991; Dittmar, 2000). We assume that a strong monitoring structure forces managers to act to maximize shareholder value, and that monitored firms are more likely to repurchase outstanding shares to signal undervaluation and to avoid becoming takeover targets as shareholder rights increase.

[H2] Firms with a strong monitoring structure tend to undertake stock repurchase as a value-signal; especially, those firms that have stronger incentives to repurchase when they are undervalued by the market.

Jiraporn (2006) documents that firms with weak shareholder rights tend to have less stock repurchase, while Fried (2002) reports that managers act opportunistically and repurchase stocks to maximize their own wealth. We assume that firms with a strong monitoring structure and firms with considerable managerial entrenchment may have incentives to undertake stock repurchase; although, entrenched firms have stronger incentives to undertake stock repurchase than firms with a great deal of monitoring if they are undervalued by the market, since managers of entrenched firms tend to maximize their own wealth and reduce takeover risk to retain control.

[H3] Undervalued firms with a greater degree of managerial entrenchment have incentives to repurchase more shares.

3 Sample, Data, and Variable Construction

3.1 Sample and Data

We use a sample of Japanese firms that announced stock repurchase from 1997 to 2006. To build our final sample, we limit the following sets of firms within the sample: i) firms listed on the Tokyo Stock Exchange; ii) firms that are general businesses; iii) firms with sufficient financial data and stock prices; iv) firms with a 12-month fiscal year; and v) firms to which the 3σ rule for outliers applies[1]. The remaining sample consists of 2092 observations.

The three databases utilized in our analysis are the *Nikkei* Corporate Finance

Database, *Nikkei Corporate* Financial Database, and the *Toyo Keizai* Stock Price Data Bank. The *Nikkei* Corporate Finance Database provides data on stock repurchase announcements. The *Nikkei Corporate* Financial Database contains annual financial data. We gathered data on stock prices from the *Toyo Keizai* Stock Price Data Bank.

3.2 Variable Description

In this paper, we employ two measures of stock repurchase announcements. One is the natural logarithm of the value of announced stock repurchases (*ln value*). The other one is the natural logarithm of the number of announced stock repurchases (*ln number*).

To estimate the impact of ownership structure on stock repurchase, we define *monitoring* as the ratio of foreign investors to total shares outstanding, and *entrenchment* as the ratio of director and corporation stock holdings to total shares outstanding. Corporations are included as inside owners to respond to Jackson and Miyajima (2007), who show that cross-shareholding among corporations is a feature of Japanese firms, which provides a stable network of long-term relationships among corporate groups.

As Figure 1 illustrates, we divide the sample into five portfolios on the basis of the two ratios—*monitoring* and *entrenchment*. We view firms in the top two portfolios as firms with strong monitoring of outside owners (those with strong managerial entrenchment) and firms in the bottom two portfolios as those with weak monitoring of outside owners (firms with weak managerial entrenchment). We then define D_m as the proxy for monitored firms with good monitoring of outside owners and weak managerial entrenchment, D_e as the proxy for entrenched firms with weak monitoring of outside owners and considerable managerial entrenchment, and D_{mm} as the proxy for other firms in which monitoring and entrenchment are evenly matched in strength.

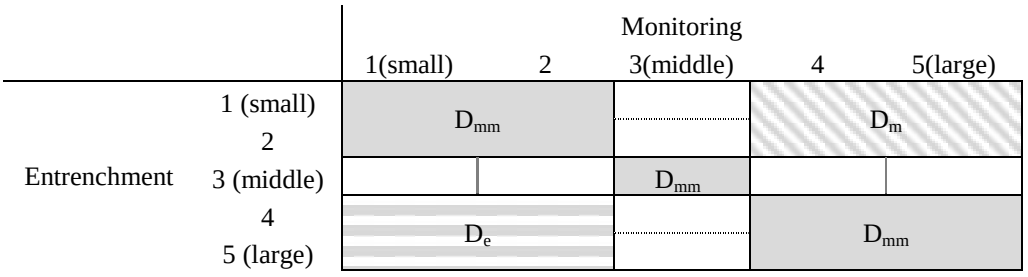

Figure 1: Corporate ownership structure distribution

Deviation is the proxy for the motivation of capital structure adjustment for stock repurchase, which is the difference between a firm's actual and target leverage ratio. The target leverage ratio is predicted by the industry median leverage[2]. D_{ud} is designed to be equal to one if firms are underlevered, and zero otherwise.

The ratio of the market value of equity to the book value of equity (*M/B*) is included to measure market performance and takeover risk. Firms with low *M/B* ratio may be undervalued by the market and are subject to the threat of becoming takeover candidates. These firms are likely to initiate a repurchase plan as a value signal. We divide the sample into five portfolios based on the *M/B* ratio. We regard firms in the

bottom two portfolios as undervalued firms. D_{uv} is a dummy variable to proxy for those undervalued firms.

We employ *cash*, *FCF*, and *payout* as measures of dividend substitution by stock repurchase. *Cash* is the ratio of cash and equivalents to total assets. Free cash flow (*FCF*) is operating income before depreciation minus interest expense, income taxes, and dividends scaled by the book value of total assets. *Payout* is the ratio of cash dividends paid to net income in the year prior to stock repurchase.

Stock option is a dummy variable, which is equal to one if firms offer stock options, and zero otherwise. According to Dunsby (1994), Jolls (1998) and Fenn and Liang (1997), stock options encourage managers to substitute stock repurchases for dividends, since stock repurchases do not dilute the per-share value of firms.

We also include firm *size* and return on equity (*ROE*) as control variables. *Size* is defined as the natural logarithm of sales[3].

3.3 Descriptive Statistics

Table 1: Descriptive statistics

Variables	Mean	Median	Std.	Min	25th	75th	Max
Dependent variables							
ln value	14.193	14.078	1.577	8.161	13.122	15.096	20.212
ln number	14.412	14.450	1.461	9.210	13.487	15.425	20.030
Independent variables							
Deviation	-0.047	-0.147	0.585	-2.274	-0.382	0.198	2.212
M/B	1.312	0.991	3.093	0.074	0.658	1.511	133.272
Monitoring	0.047	0.010	0.086	0.000	0.002	0.034	0.445
Entrenchment	0.097	0.030	0.145	0.002	0.016	0.074	0.648
Cash	0.153	0.133	0.097	0.001	0.079	0.210	0.505
FCF	2.326	1.821	5.177	-24.917	0.000	4.802	52.815
Payout	0.539	0.282	4.526	-12.222	0.158	0.487	176.000
Size	11.615	11.426	1.363	8.523	10.650	12.401	16.862
ROE	0.039	0.041	0.070	-0.622	0.015	0.072	0.380

Table 1 provides descriptive statistics for the variables used in this analysis. The natural logarithm of the value of repurchase and the natural logarithm of the number of repurchase in the sample have a mean and a median of 14 and a standard deviation of 1.5, respectively. It seems that the value of repurchase and the number of repurchase have a similar distribution. The median *deviation* is -14.7 percent, with a standard deviation of 58.5 percent, which suggests that the sample includes many firms with a leverage ratio below their target. This is expected since underlevered firms have incentives to increase their debt ratio according to the trade-off theory. The *M/B* has a mean of 1.3, a median of 1.0, and a standard deviation of 3.1. *Monitoring* owns about 4.7 percent of the shares outstanding on average, with a standard deviation of 8.6 percent, while *entrenchment* holds about 9.7 percent of the shares outstanding on average, with a standard deviation of 14.5 percent.

4 Ownership Structure and Stock Repurchase

4.1 Univariate Analysis

We examine the impact of monitoring of outside owners and managerial entrenchment on the decision of stock repurchase regardless of the motivations for repurchase. Table 2 presents a first look at the relationship between ownership structure and stock repurchase. The value of repurchase is significantly and positively related to monitoring by outside owners, which suggests that monitoring outsiders encourages a repurchase program, while, there is an inverse U-shaped relationship between monitoring outside owners and the number of stock repurchases. We also find a U-shaped relationship between managerial entrenchment and the value of repurchase, which suggests that firms with weaker or stronger managerial entrenchment are likely to initiate a repurchase plan. However, our results show a negative relationship between managerial entrenchment and the number of stock repurchases. In this analysis, we do not take into account the motivations for stock repurchase. Since ownership structure may have different levels of effect on stock repurchase if firms confront different situations, we further control firm situations to determine the impact of ownership structure in more detail.

Table 2: Univariate analysis

	Monitoring					difference					
	1 (small)	2	3 (middle)	4	5 (large)	5-3	t-test	3-1	t-test	5-1	t-test
ln value	13.037	13.641	14.417	14.932	14.939	0.522	5.044***	1.380	16.141***	1.902	19.441***
ln number	14.150	14.416	14.853	14.675	13.966	-0.887	-8.679***	0.703	7.860***	-0.184	-1.943*
	Entrenchment					difference					
	1 (small)	2	3 (middle)	4	5 (large)	5-3	t-test	3-1	t-test	5-1	t-test
ln value	14.781	14.098	13.578	14.116	14.393	0.815	8.711***	-1.203	-11.671***	-0.388	-3.503***
ln number	15.141	14.787	14.315	14.139	13.678	-0.637	-7.478***	-0.826	-8.488***	-1.463	-14.069***

Note: *, **, and ***: significant at the 10%, 5%, and 1% levels, respectively.

4.2 Regression Analysis

According to previous empirical studies, stock repurchase is a function of a set of potential motivations (Dittmar, 2000). For firm *i* in year *t*, stock repurchase is estimated by the regression of the following form:

$$Stock\ Repurchase_{i,t} = \alpha + \beta_1 \times Deviation_{i,t-1} + \beta_2 \times (M/B)_{i,t-1} + \beta_3 \times Cash_{i,t-1} + \beta_4 \times FCF_{i,t-1} + \beta_5 \times Payout_{i,t-1} + \beta_6 \times Stock\ Option_{i,t-1} + b\beta_7 \times Size_{i,t-1} + \beta_8 \times ROE_{i,t-1} + \varepsilon_{i,t}$$

Our regression analysis is based on the above model, and also takes into account ownership structure effects[4]. Table 3 illustrates the estimates of our regressions relating to the model specification presented above. Models III and IV in Table 3 consider the intercept effect on stock repurchase by the three types of firms: monitored firms with strong monitoring by outsiders and weak insider entrenchment (D_m), entrenched firms with weak monitoring by outsiders and a great deal of insider

entrenchment (D_e), and those firms for which monitoring and entrenchment are evenly matched in strength (D_{mm}).

Table 3: Ownership structure and stock repurchase

	Model I		Model II		Model III		Model IV	
	ln value		ln number		ln value		ln number	
	coefficient	(t-statistic)	coefficient	(t-statistic)	coefficient	(t-statistic)	coefficient	(t-statistic)
(Constant)	4.600	(18.214)***	8.587	(31.852)***	5.056	(18.616)***	9.078	(31.290)***
Deviation	-0.371	(-8.079)***	-0.121	(-2.477)**	-0.340	(-7.422)***	-0.099	(-2.024)**
M/ B	0.010	(1.165)	-0.025	(-2.786)***	0.007	(0.842)	-0.024	(-2.709)***
Cash	2.525	(8.960)***	-1.288	(-4.280)***	2.187	(7.682)***	-1.216	(-4.001)***
FCF	0.006	(1.202)	0.024	(4.346)***	0.006	(1.264)	0.023	(4.197)***
Payout	-0.004	(-0.628)	0.002	(0.275)	-0.004	(-0.631)	0.002	(0.386)
Stock option	0.417	(5.233)***	-0.035	(-0.409)	0.367	(4.613)***	-0.008	(-0.091)
Size	0.754	(38.137)***	0.528	(24.998)***	0.714	(33.410)***	0.498	(21.822)***
ROE	1.021	(2.664)***	-2.674	(-6.538)***	0.948	(2.492)**	-2.558	(-6.294)***
D_m					0.382	(4.157)***	0.018	(0.182)
D_{mm}					0.206	(3.421)***	-0.319	(-4.960)***
D_e					-0.255	(-2.744)***	-0.411	(-4.136)***
Adj. R^2	0.440		0.257		0.450		0.269	
N	2092		2092		2092		2092	

Notes: Estimated *t*-statistics appear in parentheses after the coefficient estimates. N is the number of observations.

*, **, and ***: significant at the 10%, 5%, and 1% levels, respectively.

From Table 3, we can see that Adj. R^2 increases by 1 percent when we take into account the corporate ownership structure (0.450 for Model III vs. 0.440 for Model I; 0.269 for Model IV vs. 0.257 for Model II). The results from Model III show that the coefficient of D_m is larger than the coefficient of D_{mm} (0.382 vs. 0.206), although both are positive and significant, while the coefficient of D_e is negative and significant at the 1% level. From Model IV, we find that the coefficient of D_m is positive but not significant. We also find that stock repurchase is less for entrenched firms (-0.411 significant at 1% level) than for those firms in which monitoring and entrenchment are evenly matched in strength (-0.319 significant at 1% level). These findings suggest that firms with stronger monitoring of outside owners tend to have more stock repurchase, which may be due to the incentives of managers to maximize shareholder value. The findings also show that entrenched firms repurchase less than monitored firms, which seems to support Jiraporn (2006), who asserts that firms with weak shareholder rights are likely to have less stock repurchase. However, the four models in Table 3 do not take into account firms that are underleveraged and undervalued. We continue to consider the impact of ownership structure on underlevered firms in Section 5, and discuss ownership structure effect and signaling undervaluation in Section 6.

5 Ownership Structure and Capital Structure Adjustment

5.1 Cross-variable Analysis

Table 4: Ownership structure and capital structure adjustment

Panel A	**Monitoring**			**ln value**				
				Deviation			difference	
		1(low)	2	3(middle)	4	5(high)	5-1	t-test
Monitoring	1(low)	12.901	12.807	12.944	13.143	13.183	0.283	1.575
	2	13.931	13.559	13.638	13.626	13.520	-0.412	-2.255**
	3(middle)	14.584	14.185	14.436	14.294	14.535	-0.049	-0.244
	4	14.835	15.046	15.088	14.954	14.668	-0.167	-0.653
	5(high)	14.824	14.888	14.802	15.063	15.431	0.606	1.811*
	5-1	1.924	2.081	1.859	1.919	2.247		
	t-test	8.075***	10.166***	8.432***	8.395***	8.659***		
				ln number				
				Deviation			difference	
		1(low)	2	3(middle)	4	5(high)	5-1	t-test
Monitoring	1(low)	14.039	13.761	14.025	14.190	14.416	0.376	1.945*
	2	14.629	14.297	14.353	14.478	14.358	-0.272	-1.350
	3(middle)	14.945	14.509	14.645	14.812	15.265	0.320	1.375
	4	14.598	14.698	14.657	14.735	14.712	0.114	0.394
	5(high)	13.827	13.769	13.840	14.192	14.750	0.922	3.009***
	5-1	-0.212	0.007	-0.184	0.002	0.334		
	t-test	-0.886	0.037	-0.908	0.008	1.343		
Panel B	**Entrenchment**			**ln value**				
				Deviation			difference	
		1(low)	2	3(middle)	4	5(high)	5-1	t-test
Entrenchment	1(low)	15.207	14.691	14.973	14.518	14.648	-0.559	-2.351**
	2	14.291	14.326	14.136	13.957	13.911	-0.380	-1.968*
	3(middle)	13.889	13.338	13.736	13.465	13.421	-0.468	-2.523**
	4	13.934	14.473	14.125	14.317	13.744	-0.191	-0.653
	5(high)	14.382	14.502	14.315	14.497	14.213	-0.169	-0.645
	5-1	-0.825	-0.190	-0.658	-0.021	-0.435		
	t-test	-4.124***	-0.804	-2.286**	-0.084	-1.422		
				ln number				
				Deviation			difference	
		1(low)	2	3(middle)	4	5(high)	5-1	t-test
Entrenchment	1(low)	15.518	14.889	14.904	15.004	15.334	-0.185	-0.728
	2	14.837	14.738	14.598	14.663	15.054	0.217	1.115
	3(middle)	14.544	14.015	14.338	14.205	14.455	-0.088	-0.484
	4	14.079	14.072	14.090	14.268	14.217	0.138	0.595
	5(high)	13.548	13.629	13.589	13.973	13.807	0.259	1.069
	5-1	-1.970	-1.260	-1.315	-1.031	-1.526		
	t-test	-9.571***	-6.475***	-5.149***	-4.281***	-5.129***		

Note: *, **, and ***: significant at the 10%, 5%, and 1% levels, respectively.

We examine the impact of ownership structure on the stock repurchase decision by

looking at the motivation of capital structure adjustment for stock repurchase. We first divide the sample into twenty-five portfolios based on the variables of ownership structure and the deviation from target leverage. Table 4 reports the mean stock repurchase of each portfolio and *t*-statistics for the difference between high and low portfolios. First, we look at the columns in Table 4. The results from Panel A indicate that the value of repurchase is significantly and positively related to the monitoring of outside owners regardless of deviation from target leverage, and the relationship between the number of repurchases and the monitoring of outside owners is not significant. The results from Panel B report that the relationship between the value of repurchase and managerial entrenchment is negative and significant at the 1% and 5% levels when firms have low and middle deviation, respectively. With respect to the number of repurchases, the relation between stock repurchase and managerial entrenchment is significant and negative regardless of deviation from target leverage. The findings suggest that a strong monitoring structure may improve a repurchase plan. We do not find that underlevered firms have more stock repurchase than overlevered firms.

On analyzing the rows in Table 4, we find that the results from Panel A show a significantly positive relationship between stock repurchase and deviation from target leverage when firms have strong monitoring by outside owners. The results from Panel B report that the difference between high and low deviation is negative and partly significant when firms have weak managerial entrenchment. We do not find a consistent pattern. The results do not support a finding that a strong monitoring structure motivates firms to increase debt ratio by stock repurchase in line with the trade-off theory. We assume that this is because we do not control the other effects of stock repurchase. To clarify the results and to ensure the accuracy of our hypotheses, we employ regression models in which we can compare the differences in behavior among the three types of firms mentioned above and check the impact of ownership structure.

5.2 Regression Analysis

On the basis of Brambor et al. (2006), we develop a basic model of stock repurchase and regression using the following model, by which we can examine the slope effect of ownership structure on stock repurchase, and check the differences among the three types of firms (D_m, $D_{mm,}$ and D_e), which are monitored firms with strong monitoring by outsiders and weak insider entrenchment, entrenched firms with weak monitoring by outsiders and considerable insider entrenchment, and firms for which monitoring and entrenchment are evenly matched in strength[5]. X_n presents a set of potential motivations for stock repurchase.

$$Stock\ Repurchase_{i,t} = a + \sum_{n=1}^{8} \beta_n X_{i,t-1,n} + D_m\left(\sum_{n=1}^{8} \beta_n X_{i,t-1,n}\right) + D_{mm}\left(\sum_{n=1}^{8} \beta_n X_{i,t-1,n}\right) + D_e\left(\sum_{n=1}^{8} \beta_n X_{i,t-1,n}\right) + \varepsilon_{i,t}$$

Table 5: The relations between stock repurchase, ownership, and motivations for repurchasing

Panel A	**Dependent variable: the value of stock repurchase**							
			D_m		D_{mm}		D_e	
	coefficient	(t-statistic)	coefficient	(t-statistic)	coefficient	(t-statistic)	coefficient	(t-statistic)
(Constant)	5.048	(18.391)***						
Deviation	-0.328	(-4.204)***	-0.647	(-3.680)***	-0.043	(-0.407)	0.271	(1.949)*
M/ B	0.237	(3.686)***	-0.194	(-1.898)*	-0.236	(-3.639)***	-0.033	(-0.219)
Cash	1.863	(3.580)***	0.251	(0.270)	0.283	(0.455)	1.035	(0.865)
FCF	0.004	(0.368)	0.053	(2.450)**	-0.006	(-0.422)	0.016	(0.893)
Payout	0.029	(0.823)	-0.066	(-1.071)	-0.037	(-1.019)	-0.020	(-0.527)
Stock option	0.202	(1.655)*	0.742	(2.813)***	0.229	(1.322)	0.035	(0.146)
Size	0.711	(29.174)***	-0.025	(-1.014)	0.019	(1.133)	-0.040	(-1.546)
ROE	0.003	(0.004)	-0.232	(-0.171)	1.196	(1.258)	-0.070	(-0.050)
Adj. R^2				0.462				
F				57.157				
N				2092				
Panel B	**Dependent variable: the number of stock repurchase**							
			D_m		D_{mm}		D_e	
	coefficient	(t-statistic)	coefficient	(t-statistic)	coefficient	(t-statistic)	coefficient	(t-statistic)
(Constant)	8.846	(30.289)***						
Deviation	-0.168	(-2.023)**	-0.561	(-2.997)***	0.200	(1.787)*	0.255	(1.728)*
M/ B	-0.054	(-0.794)	-0.337	(-3.106)***	0.035	(0.511)	-0.164	(-1.027)
Cash	-1.434	(-2.590)**	-0.791	(-0.803)	0.476	(0.720)	2.314	(1.819)*
FCF	0.011	(0.950)	0.064	(2.774)***	0.004	(0.262)	0.017	(0.921)
Payout	0.012	(0.329)	-0.059	(-0.891)	-0.015	(-0.396)	0.007	(0.183)
Stock option	-0.202	(-1.554)	0.945	(3.366)***	0.199	(1.081)	0.349	(1.360)
Size	0.539	(20.760)***	-0.044	(-1.664)*	-0.047	(-2.631)***	-0.085	(-3.096)***
ROE	-2.174	(-2.607)***	2.882	(2.001)**	-1.242	(-1.228)	1.138	(0.766)
Adj. R^2				0.291				
F				27.844				
N				2092				

Notes: Estimated *t*-statistics appear in parentheses after the coefficient estimates. N is the number of observations.

*, **, and ***: significant at the 10%, 5%, and 1% levels, respectively.

With respect to the motivation for capital structure adjustment by stock repurchase, the results from Panel A and Panel B in Table 5 provide a negative and significant

relationship between stock repurchase and deviation from target leverage (-0.328 significant at the 1% level when stock repurchase is measured by value, and -0.168 significant at the 5% level when stock repurchase is measured by number), on average. By observing corporate ownership structure, we find that stock repurchase is negatively and significantly related to deviation only when firms have a strong monitoring structure, and the coefficients of *deviation* are -0.647 and -0.561 when measuring stock repurchase by value and number, respectively, which are significant at the 1% level. The results from Panels A and B also provide a positive and significant relationship between stock repurchase and deviation from target leverage when firms are entrenched. The results support our hypothesis and suggest that managers of monitored firms have a tendency to initiate a repurchase program on the notion of capital structure adjustment in line with the trade-off theory and act for maximizing shareholder value. We also find that stock repurchase is positively and significantly related to free cash flow, as well as stock options, only for monitored firms. These findings suggest that repurchase programs by monitored firms are also motivated by high free cash flow and stock options regardless of the firms' deviation from their target leverage, which is consistent with Jenson (1986) and Fenn and Liang (1997).

Table 6: The relation between stock repurchase, ownership and capital structure adjustment

Panel A	**Dependent variable: the value of stock repurchase**			
	coefficient	(t-statistics)	R^2	N
subsample				
D_m=1	0.323	(1.246)	0.509	111
D_{mm}=1	-0.522	(-2.528)**	0.401	407
D_e=1	-0.043	(-0.083)	0.241	78
Panel B	**Dependent variable: the number of stock repurchase**			
	coefficient	(t-statistics)	R^2	N
subsample				
D_m=1	-0.196	(-0.648)	0.426	111
D_{mm}=1	-0.745	(-3.215)***	0.189	407
D_e=1	-0.049	(-0.101)	0.156	78

Notes: Estimated *t*-statistics appear in parentheses after the coefficient estimates. N is the number of observations.

*, **, and ***: significant at the 10%, 5%, and 1% levels, respectively.

We assume that underleverage is the situation in which managers have a stronger incentive to undertake stock repurchase. We then look at this situation and further test the effect of ownership structure on capital structure adjustment through stock repurchase. We only focus on underlevered firms and divide them into three subsamples (D_m, $D_{mm,}$ and D_e), based on corporate ownership structure. Table 6 provides parts of the estimates of the basic model presented in Section 4 for each subsample, and only includes the coefficients of *deviation*. With respect to monitored firms, from Panel A in Table 6 we find that stock repurchase is positively but not significantly related to deviation from target leverage, and the results from Panel B

report that the relationship between stock repurchase and deviation from target leverage ratio is negative but not significant. The results from Panels A and B also provide a negative but not significant relationship between stock repurchase and deviation from target leverage for entrenched firms. Our results do not support a finding that monitored firms are more sensitive to their deviation from target leverage ratio than entrenched firms, when they are underlevered.

6 Ownership Structure and Value Signal

6.1 Cross-variable Analysis

Table 7: Ownership structure and value signal

ln number

		M/B					difference	
		1(low)	2	3(middle)	4	5(high)	5-1	t-test
Monitoring	1(low)	14.303	14.097	14.153	13.992	13.555	-0.748	-2.888***
	2	14.609	14.438	14.499	14.132	13.817	-0.792	-2.922***
	3(middle)	14.852	14.663	14.808	15.070	14.905	0.053	0.227
	4	14.062	14.400	14.673	15.050	14.601	0.539	1.444
	5(high)	13.972	13.996	13.771	14.225	13.871	-0.101	-0.278
	5-1	-0.332	-0.102	-0.382	0.234	0.315		
	t-test	-1.259	-0.502	-1.660*	0.746	0.901		
		M/B					difference	
		1(low)	2	3(middle)	4	5(high)	5-1	t-test
Entrenchment	1(low)	14.878	14.586	15.030	15.534	15.255	0.378	1.306
	2	14.830	14.853	14.980	14.502	14.557	-0.273	-1.088
	3(middle)	14.375	14.334	14.249	14.259	14.280	-0.095	-0.442
	4	14.256	13.899	14.183	14.518	13.896	-0.360	-1.734*
	5(high)	13.752	13.841	13.530	13.897	13.515	-0.237	-0.961
	5-1	-1.125	-0.745	-1.499	-1.638	-1.741		
	t-test	-4.214***	-2.957***	-7.036***	-7.429***	-8.569***		

Note: *, **, and ***: significant at the 10%, 5%, and 1% levels, respectively.

In this section we examine the impact of ownership structure on stock repurchase by looking at repurchase as a value signal. The value of stock repurchase is naturally positively related to the market price, all things being equal; thus, we consider the number of stock repurchases only and neglect the estimates of the value of stock repurchases to avoid biasing the results. Our analysis begins with a cross-variable test similar to the one in Section 5, in which the sample is divided into twenty-five portfolios based on ownership structure and market performance simultaneously. Table 7 provides the mean stock repurchase of each portfolio and *t*-statistics for the difference between high and low portfolios. There is a negative but not significant relationship between stock repurchase and outsider ownership when firms have depressed market performance; while we find a negative and significant relationship between stock repurchase and insider entrenchment regardless of the price reaction, which suggests that stock repurchase increases with a decrease in insider ownership. We also find, both, for firms with weak monitoring of outsiders and firms with a great

deal of managerial entrenchment, there tends to be more stock repurchasing when they firms have relatively low market-to-book equity ratio, which suggests that an entrenched structure may encourage the probability of signaling undervaluation by stock repurchase. Thus far, we have discussed the effects of monitoring outsider ownership and entrenchment of insiders separately.

6.2 Regression Analysis

Looking at Panel B in Table 5 we find that stock repurchase is negatively but not significantly related to market-to-book ratio with the coefficient of -0.054 for *M/B*, on average. When we focus on the ownership structure effects, we find that for monitored firms, firms in which monitoring and entrenchment are evenly matched in strength, and entrenched firms the coefficients of *M/B* are -0.337 (significant at the 1% level), 0.035, and -0.164, respectively. This suggests that firms with a strong monitoring structure are more sensitive to market performance and tend to initiate a repurchase program as a value signal. Hence, we can determine that the pressure from monitoring by outsider ownership provides a probability that insider managers have more sensitivity to shareholder interests and act to maximize shareholder wealth.

We then pay attention to the situation of undervaluation from the market, since firms in this situation tend to initiate repurchase programs according to the signaling theory, and expect to further confirm the relationship between stock repurchase and market performance by looking at ownership structure effect. As in Section 5, we divide undervalued firms into three groups based on corporate ownership structure (D_m, $D_{mm,}$ and D_e), and test the basic model of stock repurchase for the three subsamples. Table 8 illustrates the estimates of *M/B* only. The results from Table 8 show that the coefficients of *M/B* are 0.662, -0.799 (significant at the 5% level) and -1.708 (significant at the 1% level), for monitored firms, firms in which monitoring and entrenchment are evenly matched in strength, and entrenched firms, respectively. The results do not support a finding that firms with a strong monitoring structure tend to repurchase outstanding shares when they are undervalued by the market, but suggest that entrenched firms are more likely to undertake stock repurchases to signal undervaluation, as Isagawa (2000) and Fried (2002) document. Manager wealth will be destroyed if their firms are undervalued by the market, and managers of undervalued firms also confront a situation in which they may lose their positions of control, since their firms might be acquired by a potential bidder. Thus, those managers have a strong incentive to undertake stock repurchase, by which they signal the good future prospects of their firms and protect themselves against the risk of a takeover; moreover, a strong entrenchment structure creates a greater probability that managers will do so.

Overall, on average, a strong monitoring structure motivates a repurchase program, since the propensity to maximize shareholder wealth increases with the pressure from monitoring by outsider ownership. On the other hand, managers of entrenched firms are more sensitive to market performance once those firms are undervalued by the market, since they have a tendency to maximize their own future wealth and keep control positions against takeover threats.

Table 8: The relation between stock repurchase,

Ownership and value-signal

	ln number			
	coefficient	(t-statistics)	R^2	N
subsample				
D_m=1	0.662	(0.201)	-0.025	35
D_{mm}=1	-0.799	(-2.163)**	0.181	365
D_e=1	-1.708	(-2.865)***	0.125	133

Notes: Estimated *t*-statistics appear in parentheses after the coefficient estimates. N is the number of observations.

*, **, and ***: significant at the 10%, 5%, and 1% levels, respectively.

7 Extensions

Table 9: The impact of ownership structure on undervalued firms

	Model I		Model II	
	ln number		ln number	
	coefficient	(t-statistic)	coefficient	(t-statistic)
(Constant)	9.496	(19.862)***	10.022	(21.567)***
Deviation	-0.061	(-0.823)	-0.061	(-0.847)
M/ B	-0.617	(-2.552)**	-0.656	***
Cash	-0.219	(-0.472)	-0.297	(-0.659)
FCF	0.016	(1.978)**	0.017	(2.165)**
Payout	-0.001	(-0.196)	-0.001	(-0.094)
Stock option	0.052	(0.426)	0.082	(0.688)
Size	0.474	(12.145)***	0.449	(11.882)***
ROE	-1.173	(-1.934)*	-1.028	(-1.733)*
Monitoring	-4.382	(-1.587)		
Mornitoring^2	6.388	(0.476)		
Entrenchment			-8.295	(-6.626)***
Entrenchment^2			14.677	(5.614)***
Adj. R^2	0.164		0.204	
N	837		837	

Notes: Estimated *t*-statistics appear in parentheses after the coefficient estimates. N is the number of observations.

*, **, and ***: significant at the 10%, 5%, and 1% levels, respectively.

The above results suggest that both monitored and entrenched firms may initiate a repurchase plan when we look at the motivation for signaling undervaluation, although they may act for different incentives. This finding is consistent with John and Knyazewa (2006), who document that monitoring by outsider ownership encourages managers to maximize a firm's value, and on the other hand, also supports Isagawa (2000), Fried (2002), and Li and MeNally (2002), who determine that managerial incentives enable managers to maximize their own wealth by stock repurchase. Hence, we extend our analysis to directly test the relationship between stock repurchase and ownership structure by looking at the subsample of undervalued

firms. Considering the probability of a U-shaped relationship between ownership structure and stock repurchase, we regress non-linear models and test our hypotheses. The results from Model I in Table 9 report a negative but not significant relationship between stock repurchase and *monitoring*, and stock repurchase is positively but not significantly related to *monitoring^2*. Moreover, from Model II in Table 9, we find that stock repurchase is negatively and significantly related to *entrenchment*, and positively and significantly related to *entrenchment^2*, which suggests a U-shaped relationship between stock repurchase and managerial entrenchment.

8 Conclusions

This paper provides a detailed examination of the incentives to stock repurchase by analyzing ownership structure effects. Stock repurchase can be used to increase leverage ratio to approximate optimal leverage, or to signal a firm's current undervaluation or good future prospects. We find that ownership structure influences the size of stock repurchases even if firms have the same motivation for stock repurchase.

Regardless of the motivations for stock repurchase, our results suggest that entrenched firms tend to engage less in stock repurchasing than monitored firms, which seems to support Jiraporn (2006). The results are not robust, since we do not take into account whether there is underleverage or undervaluation.

Consistent with Berger, Ofek and Yermack (1997), we find that on average, a strong monitoring structure motivates the propensity to initiate a repurchase program on the basis of capital structure adjustment. Since monitoring of outsider ownership forces managers to act to maximize shareholder value, managers of monitored firms tend to repurchase shares outstanding in line with the trade-off theory of capital structure. However, when we look only at underlevered firms, we do not find support for a finding that underlevered firms with strong monitoring by outsider ownership have a stronger incentive to increase debt to equity ratio by stock repurchase.

When we look at the potential incentive to undertake stock repurchase for a value signal and examine the effect of ownership structure on the size of stock repurchase, we find that stock repurchase is negatively and significantly related to market performance only when firms have a strong monitoring structure. A strong monitoring structure enables managers to consider shareholder interests and to tend to undertake stock repurchase, by which they signal the firm's good future prospects and maximize shareholder wealth. This is consistent with John and Knyazewa (2006), who provide an agency explanation. Moreover, when we focus on undervalued firms, we find that managers of entrenched firms are more sensitive to market performance, since they tend to maximize their own wealth and keep control positions. Our results support Isagawa (2000) and Fried (2002) and show that firms with management concentrations have more stock repurchase if they confront undervaluation from the market, by which managers can expect an increase in market price and retain control in the face of takeover threats.

This paper documents some interesting patterns in the relationship between stock repurchase and ownership structure. Our results show that both monitored firms and

entrenched firms may initiate repurchase plans in line with the value-signaling theory, although they may act for different incentives, which does not support Jiraporn (2006) but provides a U-shaped relationship between stock repurchase and ownership structure.

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Notes

[1]We apply the 3σ rule to the two key variables—*Monitoring* and *Entrenchment* for outliers. After this screening process, the number of observations decreases to 41 (from 2133 to 2092).

[2]We use two methods to predict firms' target leverage ratio. First, following Hovakimian, Opler, and Titman (2007), we model a similar regression to predict firms' targets. Second, considering firms' potential preference, we also use industry median leverage as another measure of predicted leverage ratio. Results suggest that firms do not perform the complicated regression model to estimate their target leverage ratio, because the regression model does not make it easier for firms to benchmark themselves to industry counterparts, and industry median leverage may be a more reliable estimator than the regression model.

[3]Using this, we control both firm and stock sizes. We find the relationship between market capitalization and sales is positive and significant at the 1% level. In addition, when we replace sales by market capitalization as the proxy for firm size, we get similar results.

[4][5]We also include year dummies in the models to control macro-economic effects, the results are similar to those from the regression models without year dummies. But, by adding year dummies, stock option dummy is always rejected. Then, we can determine that macro-economic effects are controlled by including stock option dummy in the models.