

The Impact of Regulatory Reform on Stock Repurchases: Evidence from Japan

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Abstract

This study investigates corporate reactions to the deregulation of stock repurchases that began on October 01, 2001, in Japan, by closely examining the motivations for stock repurchases, by which we study firms' usage of treasury stocks and identify the characteristics of firms that were more likely to increase repurchases in response to deregulation. We found that Japanese firms engaged in stock repurchases to signal undervaluation but not to adjust capital structure or substitute dividend over the sample period. By examining the motivation for signalling undervaluation, we found that firms with relatively high market-to-book ratio or weak incentive to signal undervaluation became more likely to increase stock repurchases compared to firms with a strong incentive to, since former firms repurchased to prepare for undervaluation in the future. Regarding the motivation to engage in stock repurchases to mitigate agency problems, our results show that firms with a high cash flow and a high cash dividend engaged in stock repurchases to reduce agency costs related to excess cash before deregulation rather than after

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deregulation, since these firms have had much stronger incentive to reduce agency problems, while after deregulation, they were more likely to repurchase for a variety of purposes.

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1 Introduction

Having become an increasingly important financial practice within a large number of countries, stock repurchases have been receiving significant attention in financial literature. Much of the research has been aimed at identifying potential motivations for engaging in stock repurchases, such as a means of signaling undervaluation, deterring takeovers, substituting for dividend distributions, providing stock options, or performing capital structure adjustment (Kaplan and Reishus, 1990; Fenn and Liang, 1998; Bagwell and Shoven, 1988; Dittmar, 2000). Research into stock repurchases has overwhelmingly focused on the practices in the United States, making it difficult to draw conclusions regarding stock repurchases in Japan. Unlike in the United States, stock repurchases were strictly prohibited in Japan and only very limited cases, such as reducing capital or making acquisitions through mergers, until the Japanese Commercial Code was revised in October 1994. This revision allowed Japanese corporations to acquire their own shares for the purpose of retiring shares or for transferring shares to employees within six months of repurchasing after a resolution to do so had been adopted at a regular meeting of shareholders, while restricting the maximum number of repurchased shares to 3% of outstanding shares. The subsequent 1997 revision of the Code lifted the prohibition against engaging in stock repurchases

for the purpose of granting stock options and simplified the repurchasing procedure. Moreover, the revision permitted Japanese firms to acquire up to 10% of outstanding shares after a resolution to do so had been approved at a general shareholders' meeting and prescribed in the corporate articles, as well as to hold repurchased shares for a maximum period of ten years and to transfer such shares to both employees and executives as part of a stock options plan.

On October 01, 2001, the Japanese government further amended the Commercial Code to completely deregulate stock repurchases by abolishing all prior prohibitions and lifting the ban on holding treasury stocks. Since then, Japanese firms have been able to repurchase any number of shares of their own stock for any purpose. Firms can either cancel their repurchased shares to decrease the number of outstanding shares permanently (unless there is a new share issue) or hold them (or have their subsidiaries hold them) for later use as *treasury stocks* or *treasury shares* that are not considered to be outstanding, do not pay dividends, do not grant their holders voting rights, and can be resold in the market or traded to firms' preferred clients. Unlike before the 2001 amendment, when they were required to be redeemed or disposed of within a certain period, treasury stocks can now be held for an extended period, allowing corporate managers to freely initiate repurchasing plans and hold treasury stocks for as long as necessary to achieve specific aims.

As a result of the changes brought by the 2001 amendment, open-market stock repurchase announcements in Japan have increased drastically since the end of 2001 (see Figure 1). Table 1 illustrates the changes in open-market stock repurchase announcements in Japan. Panel A, which displays the monthly number of stock repurchase announcements and the monthly value and number of shares announced for repurchasing before and after deregulation (before and after October 01, 2001) during the period examined, shows that the average number of stock repurchase announcements after deregulation was 52 per month, almost twice the number before deregulation. Moreover, after deregulation, the total

value of shares announced for repurchasing by Japanese firms listed on the Tokyo Stock Exchange (TSE) increased by 441%, from Japanese Yen (JPY) 76 billion to JPY 411 billion, and the number of shares announced for repurchasing on a monthly basis increased by 198%, from 86 million to 256 million.

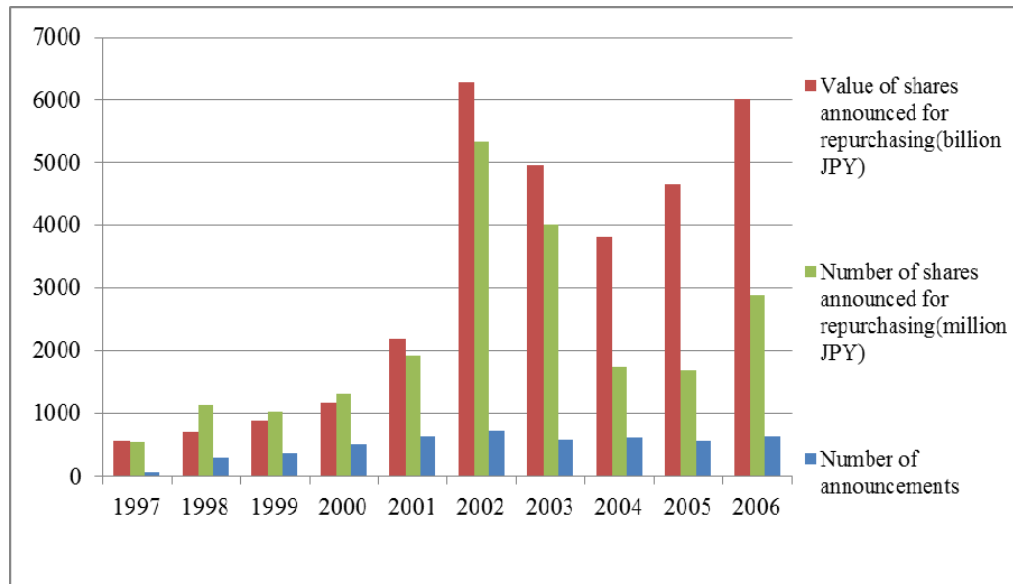


Figure 1: Fluctuation of stock repurchase announcements, fiscal years 1997–2006

Panels B and C illustrate the mean and median of shares per announcement in the two periods, respectively. By closely examining the stocks listed in the repurchasing announcements after the deregulation of stock repurchases on October 01, 2001, Panels B and C made two important findings. First, the mean value of shares per announcement increased, while that of the median value decreased, suggesting that firms with high stock prices tended to initiate repurchasing plans. Second, the number of shares announced for repurchasing per announcement decreased, regardless of the mean and median values of the shares, after the 2001 amendment, suggesting that as corporate managers gained more

discretion to engage in stock repurchases, they have become more likely to repurchase smaller numbers of shares of stock at one time, as well as to engage in repurchasing more frequently after the Japanese government deregulated stock repurchases.

Table 1: Stock repurchase announcements in the two periods

<i>Panel A</i>			
	Number of announcements per month	Value of shares announced for repurchasing per month (billion JPY)	Number of shares announced for repurchasing per month (million)
Before October 1, 2001	28	76	86
After October 1, 2001	52	411	256
	Value of shares per announcement (thousand JPY)	Number of shares per announcement	
<i>Panel B Mean</i>			
Before October 1, 2001	1746	1985	
After October 1, 2001	2331	1452	
<i>Panel C Median</i>			
Before October 1, 2001	392	654	
After October 1, 2001	293	293	

In this study, we investigated corporate reactions to the deregulation of stock repurchases by examining a sample of 2,092 open-market stock repurchases announced by Japanese firms listed on the TSE. By doing so, we were able to assess the increasing importance of stock repurchases among Japanese firms, study these firms' usage of treasury stocks, and identify in detail the characteristics of firms that have increased their stock repurchases in response to the deregulation of stock repurchases. Our examination resulted in several

significant findings. First, we found that the deregulation of stock repurchases has motivated Japanese firms to take advantage of their new ability to hold treasury stocks for an indefinite period. Second, we found that although many Japanese firms initiated repurchasing programs as a means to signal undervaluation over the sample period, they did not engage in stock repurchases for the purposes of capital structure adjustment or dividend substitution, before and after deregulation (before or after October 01, 2001). Third, by examining the motivation for signaling undervaluation, we found that after acquiring more managerial discretion and the ability to hold treasury stocks, firms increased stock repurchases that they issued in response to the deregulation. Further and importantly, regarding the intensity of the motivation for signaling, our results suggest that stock repurchases have increased more greatly among firms with a relatively weak incentive to signal undervaluation, although it has also increased among firms with a relatively strong incentive to do so. We termed the effect of deregulation on firms that had a weak incentive to engage in repurchasing as the *pump-priming effect*. Fourth, by simultaneously controlling for the variables of cash flow and cash dividends, we found that firms with a high cash flow and a high dividend value engaged in a larger amount of stock repurchases before deregulation than after deregulation.

This paper proceeds as follows. Section 2 surveys the motivations for stock repurchases. Section 3 develops the hypotheses. Section 4 describes the sample, data, and variables. Section 5 reports the results. Section 6 presents the conclusions drawn from the findings.

2 Literature Review and Hypothesis Development

Previous studies have documented five motivations for engaging in stock repurchases. The first motivation to engage in stock repurchases is to perform *undervaluation signaling*. The signaling theory is based on information

asymmetry that corporate managers have more information regarding future prospects for their firms than do investors. If managers believe that stock prices do not reflect their firms' intrinsic value and that their firms are undervalued, they attempt to communicate this private information to outsiders and expect a positive reaction from the market. Vermaelen (1981), Ofer and Thakor (1987), Comment and Jarrell (1991), and Dittmar (2000) suggest that managers often rectify information asymmetry by using stock repurchases as a means of signaling outside investors and correcting misvaluation by the market.

The second motivation to engage in stock repurchases is to perform *takeover deterrence*, particularly that of undervalued firms at high risk of takeover because they can be acquired with a low initial payment. By engaging in stock repurchases, firms can decrease the number of floating stocks and increase the number of stable shareholders' holdings, thereby increasing the lowest price at which their shares may be purchased and decreasing their risk of becoming takeover targets (Vermaelen, 1984; Harris and Raviv, 1988; Bagwell, 1992).

The third motivation is to engage in *capital structure adjustment*. According to trade-off theory of capital structure, firms aim to maintain an optimal leverage ratio at which they maximize shareholder value and are likely to mitigate deviation between their actual and target leverage ratios in order to achieve their optimal leverage ratio. Dittmar (2000) and Hovakimian et al. (2001) illustrated that one way that firms with a leverage ratio below their target ratio attempt to increase the ratio is by retiring a large number of shares via stock repurchases.

The fourth motivation to engage in stock repurchases is to perform *cash distribution* and *dividend substitution*. Stock repurchases and dividends are two means by which firms distribute cash to shareholders and decrease the agency costs resulting from excess cash flow (Jensen, 1986). Kaplan and Reishus (1990) and Denis et al. (1994) suggest that because the income tax rate is higher than the capital gains tax rate, management may prefer to engage in stock repurchases, the gains of which are taxed at the capital gains tax rate, rather than dividend

distribution, the gains of which are taxed at the income tax rate.

The fifth motivation is to provide a means of *stock-option-based compensation*. The findings of previous research suggest that granting stock options as a component of executive compensation plans can mitigate conflicts between managers and shareholders and better align manager–shareholder interests. Firms with stock option compensation schemes tend to repurchase their own shares to offset the diluting effect of issuing stock options, as stock options are more valuable after a repurchase (Dunsby, 1994; Jolls, 1998; Fenn and Liang, 1998; Dittmar, 2000).

Almost no Japanese firms engaged in stock repurchases prior to 1994, when the 1994 revision to the Japanese Commercial Code allowed Japanese firms to engage in repurchasing for the purposes of retiring shares of stock or contributing to employees' stock options plans. The 1997 revision to the Japanese Commercial Code allowed Japanese firms to engage in stock repurchases for the purpose of providing executive stock options. Since October 01, 2001, when the 2001 revision to the Japanese Commercial Code took effect, Japanese firms have been able to repurchase any number of shares of stock for any purpose and retire the repurchased stocks, and hold them as treasury stocks for later use or resell them to specific shareholders, business partners, or employees to strengthen their relationships with these stakeholders or to raise funding when they are overvalued by the market. We discuss in detail the effects of these changes in regulations from the view of motivations for repurchasing and propose hypotheses.

Base on the signalling theory documented by previous studies, firms may acquire their own shares if a firm finds that its stocks are undervalued by the market and subject to a takeover threat. These firms, which might have repurchased shares for cancellation from floating shareholders before the deregulation of stock repurchases, can now exchange treasury stocks with stable shareholders—their main bank, business partners, and employees who own stock ownership plans—because deregulation has provided them with the managerial

discretion to do so. By increasing the percentage of their stable stockholdings, firms mitigate the threat of takeover. Such phenomena lead to the expectation that firms increased shares announced for repurchasing for the purposes of undervaluation signaling and takeover deterrence after the deregulation of stock repurchases and managerial discretion increasing.

Since the deregulation of stock repurchases, firms have had the managerial discretion to hold these repurchased stocks as treasury stocks and use them flexibly. Firms may also resell treasury stocks to decrease their leverage ratio when they find that their leverage ratio is higher than expected. However, stock repurchases provides no additional benefits to these firms with respect to the purpose of adjusting capital structure, as firms that engage in repurchasing for the purpose of signaling are able to exchange treasury stocks with stable shareholders to achieve stock price stabilization and takeover deterrence. Nevertheless, although not directly related to the motivation for capital structure adjustment, as firms can now hold treasury stocks as a means of exercising subscription rights, it is likely that the deregulation of stock repurchases has promoted the granting of equity warrant bonds.

With respect to stock repurchases before deregulation for the purposes of increasing cash distributions and decreasing agency costs, Japanese firms were able to repurchase their own shares only for the purposes of stock cancellation or the transfer of shares to employees and executives, both of which may have reduced agency problems related to excess cash holdings and mitigated conflicts between managers and shareholders by aligning manager–shareholder interests. Since deregulation, Japanese firms have been able to repurchase stocks as treasury stocks until their cancellation or re-sale. Firms can now also exchange treasury stocks with other firms as a form of payment during the negotiation of mergers and acquisitions, managers, however, may pursue mergers and acquisitions solely to further their own interests or build their own empires. To the extent that they can be used as a form of payment in negotiations regarding mergers and

acquirements, treasury stocks have functions similar to those of cash. Thus, repurchasing is no longer an efficient means by which firms can mitigate agency problems in the interest of shareholders, as it once had been. At the same time, managers can now maintain discretion regarding the resources under their control by replacing cash with treasury stocks as a form of payment when pursuing mergers and acquisitions. Consideration of these phenomena led to development of the following hypotheses:

[H1] *The deregulation of stock repurchases led to an increase in stock repurchases for the purpose of gaining the degree of managerial discretion necessary to engage in undervaluation signaling and takeover deterrence.*

Firms may have a strong incentive to initiate a repurchasing plan for their survive, when they are seriously undervalued by the market, confront a severe financial crisis resulting from undervaluation, or become subject to high risk of takeover, whether before or after deregulation. However, before deregulation, firms that were not subject to serious undervaluation were less likely to repurchase for signaling due to financial costs. After deregulation, those firms that are not subject to serious undervaluation can gain the managerial discretion by holding treasury stocks or late re-sale. Following this consideration, we can expect that, after deregulation, firms with a strong incentive to initiate a repurchasing plan for the purpose of signaling increase stock repurchases, whereas firms that are not subject to serious undervaluation may be more likely to engage in stock repurchases in order to gain the managerial discretion granted by deregulation. Managers of these latter firms may announce a repurchasing plan to avoid either undervaluation in the future or a financial crisis resulting from further undervaluation. Thus, we hypothesized that as a whole, firms engaging in repurchasing have increased stocks listed in the repurchasing announcements since deregulation, especially firms with a weaker incentive to signal by repurchasing:

[H2] *The deregulation of stock repurchases has increased stock repurchases among firms that have a relatively weak motivation to engage in repurchasing for the purpose of signaling undervaluation, that is, firms that have higher valuation or that experience a relatively small degree of undervaluation.*

3 Sample, Data, and Variable Description

3.1 Sample and Data

To examine the effect of deregulation on stock repurchases among firms that had engaged in repurchasing prior to deregulation, we investigated all the open-market stock repurchases announced by Japanese firms listed on the TSE between fiscal year 1997 and fiscal year 2006. We limited our sample to firms that i) are listed on the First and Second Sections of the TSE, ii) are not financial institutions, iii) provide sufficient financial data and stock prices for analysis, iv) maintain a 12-month fiscal year, and v) firms with a fiscal year ending on March 31. We identified 2,092 observations via the screening process. We obtained data on stock repurchase announcements from the *Nikkei* Corporate Finance Database, annual corporate financial data from the *Nikkei* Corporate Financial Database, and data on stock prices from the *Toyo Keizai* Stock Price Data Bank.

3.2 Variable Description

To measure the dependent variable in this study, that is, stock repurchases, we used the ratio of the number of shares announced for repurchasing to the number of outstanding shares (i.e., *stock repurchase ratio*).

We examined its relationship with the independent variables of market-to-book ratio (*M/B*), *leverage*, *cash flow*, and *dividend*. We examined the *M/B*, defined as the market value of equity to the book value of equity at the end

of the year prior to a repurchase, to investigate the nature of stock repurchases for the purposes of undervaluation signaling and takeover deterrence (Comment and Jarrell, 1991; Bagwell, 1992; Dittmar, 2000). As firms with low M/B ratios have a greater probability of being undervalued by the market, they are more likely to engage in stock repurchases to correct misvaluation and avoid becoming takeover targets. Therefore, we expected stock repurchase announcements to be negatively related to the M/B ratio. Classifying the sample into quintiles based on the M/B ratio, we categorized firms in the bottom two quintiles as those with low M/B ratios and firms in the top two quintiles as those with high M/B ratios.

We used the *leverage*, calculated as the ratio of interest-bearing liabilities to book equity, as a proxy for the motivation of achieving capital structure adjustment through repurchasing. As Hovakimian et al. (2001) and Dittmar (2000) suggested, firms with very low leverage ratios are likely to initiate a repurchasing plan, which would increase their debt ratio. We predicted that we would find a negative relationship between stock repurchase announcements and the leverage ratio.

We used the *cash flow*, defined as net income before depreciation scaled by sales prior to repurchasing, as a proxy for the existence of agency problems and the provision of cash distributions (We found cash flow to sale ratio and free cash flow to sale ratio are positively and significantly related (significant at 1% level). Although not reported, we also replaced free cash flow ratio for cash flow ratio in our analysis and found results are similar. By using free cash flow ratio instead cash flow ratio, the observations before the deregulation decrease to 346 (from 638), since relative data of many firms before 2001 are unavailable.). Jensen and Mecking (1976) and Rajagopalan (1997) argued that when firms have substantial cash flow but limited investment opportunities, managers may invest cash in low-return projects or use it to fulfill their own interests. To better align manager–shareholder interests and lower agency costs, firms may distribute cash to shareholders directly. We predicted that we would find a positive relationship

between stock repurchase announcements and firms' cash flow.

We calculated the *dividend* as the ratio of cash dividends to sales prior to repurchasing. Previous studies have documented that stock repurchases and distributing cash dividends are alternative mechanisms by which firms pay shareholders, although they are not perfect substitutes owing to taxation, information asymmetry, and financial flexibility (Kaplan and Reishus, 1990; Denis et al., 1994). Both the cash flow ratio and the dividend ratio can thus serve as proxies for cash distribution. We predicted that we would find a negative relationship between the dividend ratio and stock repurchase announcements.

According to Dittmar (2000), unlike large firms, which can easily attract relatively more attention from investors than the small firms, the small firms are likely to buy back more outstanding shares as a means of attracting attention from the market. We thus included *size*, defined as the natural logarithm of total assets, as another measure for signaling misvaluation, and predicted that it would be negatively related to stock repurchase announcements. In accordance with previous studies (Dittmar, 2000), we also included *cash*, defined as the ratio of cash and cash equivalents to total assets, and designed the *stock option* as a dummy, setting it equal to one if a firm grants stock options and zero if otherwise (We found that the stock option dummy is always rejected when year indicators are added in regression models. We assumed that macroeconomic effects are also reflected in stock options.). We predicted that we would find a positive relationship between the cash ratio and stock repurchase announcements and between the granting stock options and stock repurchase announcements.

Altogether and in accordance with previous research, we predicted that we would find the following: the smaller a firm's M/B ratio, the more likely it is for the firm's managers to identify the firm as undervalued; the smaller a firm's leverage ratio, the more likely it is for the firm's managers to identify the firm as underleveraged; and the larger a firm's cash flow ratio (or the smaller the firm's dividend ratio), the more likely that the firm will engage in stock repurchases in

response to the agency problems that arise from a large cash flow ratio (or a small dividend ratio).

3.3 Summary Statistics

Table 2 reports the summary statistics regarding the variables examined in our analysis. Regarding the percentage of total shares announced for repurchasing, we found a mean of 2.4 percent and a median of 1.7 percent with a standard deviation of 2.2 before deregulation, and a mean of 3.6 percent and a median of 2.7 percent with a standard deviation of 3.1 after deregulation. Regarding the M/B ratio, we found a mean of 1.2 and a median of 1.0 both before and after deregulation.

Table 2: Summary statistics

Variable		Mean	Median	Std.	Min	20th	80th	Max
Dependent variable								
Stock repurchase ratio	Before	2.418	1.725	2.255	0.006	0.720	3.858	15.591
	After	3.624	2.669	3.142	0.001	1.131	5.512	23.396
Independent variable								
M/B	Before	1.241	0.925	1.051	0.179	0.538	1.647	9.951
	After	1.218	1.015	0.811	0.154	0.610	1.681	9.154
Leverage	Before	0.680	0.470	0.660	0.000	0.137	1.110	3.378
	After	0.538	0.321	0.605	0.000	0.074	0.907	3.356
Cash flow	Before	7.350	6.902	6.722	-16.993	2.451	11.901	34.727
	After	8.321	7.616	7.192	-18.020	2.933	13.525	35.733
Dividend	Before	0.843	0.730	0.522	0.067	0.426	1.185	3.362
	After	0.895	0.765	0.589	0.074	0.416	1.283	3.359
Size	Before	11.786	11.542	1.286	9.113	10.745	12.627	16.679
	After	11.781	11.527	1.451	8.473	10.613	12.829	17.174
Cash	Before	0.169	0.148	0.098	0.012	0.086	0.238	0.628
	After	0.139	0.120	0.091	0.004	0.062	0.210	0.514

Regarding the leverage ratio, we found a mean of 0.7 and a median of 0.5 before deregulation, and a mean of 0.5 and a median of 0.3 after deregulation. Regarding the cash flow ratio, we found a mean of 7.4 and a median of 6.9 before deregulation and a mean of 8.3 and a median of 7.6 after deregulation. Regarding the dividend ratio, we found a mean of 0.8 percent with a standard deviation of 0.5 before deregulation, and a mean of 0.9 percent with a standard deviation of 0.6 after deregulation. We also found that the mean of the natural logarithm of the assets of firms that issue repurchasing announcements was 11.8 both before and after regulation, as well as that on average, firms had a ratio of cash holdings to total assets of 0.2 before deregulation and a ratio of 0.1 after deregulation.

Table 3: Difference between the two periods

<i>Panel A Difference of means</i>					
	M/B	Leverage	Cash flow	Dividend	N
Before	1.241	0.680	7.350	0.843	638
After	1.218	0.538	8.321	0.895	1454
<i>t</i> -statistics	-0.505	-4.663	2.978	2.020	
<i>p</i> -value	0.614	0.000	0.003	0.044	
<i>Panel A Difference of medians</i>					
	M/B	Leverage	Cash flow	Dividend	N
Before	0.925	0.470	6.902	0.730	638
After	1.015	0.321	7.616	0.765	1454
Wilcoxon	-2.091	-5.844	-2.868	-1.101	
<i>p</i> -value	0.037	0.000	0.004	0.271	

Note: N is the number of the observations.

Table 3 lists the main explanatory variables and tests the difference in means and medians before and after deregulation. Regarding the M/B ratio, the mean ratio after deregulation is not significantly different from the mean ratio before deregulation, but the median ratio after deregulation is significantly higher than the median ratio before deregulation, as illustrated in Panels A and B. Regarding the leverage ratio, both the mean and median leverage ratios after deregulation are significantly lower than those before deregulation. Regarding cash flow ratio, both

the mean and median ratios after deregulation are significantly higher than those before deregulation. Regarding the dividend ratio, the mean ratio after deregulation is significantly higher than the mean ratio before regulation, but the median ratio after deregulation is not significantly different from the median ratio before deregulation.

4 Empirical Results

4.1 Univariate Analysis

To investigate the impact of the deregulation of stock repurchases on the financial behaviors of Japanese firms in terms of their motivations for engaging in stock repurchases, we performed a univariate analysis. After sorting the sample into quintiles according to the four independent variables, M/B ratio, leverage ratio, cash flow ratio, and dividend ratio, we computed the percentage of total shares announced for repurchasing before and after deregulation in each quintile and generated *t*-statistics regarding the difference between the fifth and first quintiles or the difference between the two periods.

The results from Panel A in Table 4 shows the significant differences between the mean number ratios of the first and fifth quintiles and suggests a monotonic relationship between stock repurchase announcements and the M/B ratio both before and after deregulation, indicating that during both periods, firms with low M/B ratios were more likely to issue stock repurchase announcements. This finding, which is consistent with previous studies, provides evidence that one motivation for firms to initiate a repurchasing plan is to signal undervaluation. By examining each quintile, we also found that firms increased the number of shares announced for repurchasing that they issued after deregulation, suggesting that deregulation has encouraged firms to engage in more repurchasing.

To further investigate the increase in stock repurchase announcements issued

in response to deregulation, we examined the ratio of the difference between the fifth and first quintiles divided by the mean ratio of shares announced for repurchasing to the total outstanding shares $((5^{th}) - (1^{st})/mean)$. We found that the $(5^{th}) - (1^{st})/mean$ has a value -0.876 before deregulation and -0.677 after deregulation, indicating that the relationship between stock repurchase announcements and the M/B ratio became less negative after deregulation. In each quintile, we found a significant (at the 1% level) difference between stock repurchase announcements before deregulation and stock repurchase announcements after deregulation. Regarding the effect of repurchasing announcements on the growth rate for all quintiles $((2) - (1)/(1))$, we found the highest growth rate occurred during the fifth quintile and the second highest during the fourth quintile. This finding suggests that more firms had a relatively weaker incentive to engage in repurchasing during quintiles characterized by a high M/B ratio.

Panel B, which presents the relationship between stock repurchase announcements and the leverage ratio, shows that there are no significant differences in the leverage ratios between the first and fifth leverage quintiles both before and after deregulation. Such an absence of differences does not support the trade-off theory of capital structure, which posits that firms with low leverage ratios tend to increase their debt ratios by engaging in stock repurchases as a means of maximizing the firm's value. When we compared stock repurchase announcements before and after deregulation, we found that the average number ratio after deregulation was significantly larger than the ratio before deregulation during all quintiles. Moreover, we did not find any significant trends in the growth rate of stock repurchase announcements across all quintiles.

Panel C shows the results regarding our examination of the relationship between stock repurchase announcements and the cash flow ratio. As can be observed, the mean number ratio in the fifth quintile is significantly smaller than that in the first quintile. The results suggest a non-monotonous relationship

between stock repurchase announcements and the cash flow ratio both before and after deregulation. These findings contradict previous studies, which have indicated that firms tend to engage in stock repurchases when they have severe agency problems related to excess cash holdings or have large cash holdings that can be considered as accumulated cash flow. We suggest that firms with severe agency problems may prefer to distribute cash by distributing dividends, as dividend distribution is an efficient means of monitoring managers (Gryglewicz, 2004). We also found that in all quintiles, firms issued greater stock repurchase announcements after deregulation, the growth ratio of stock repurchase announcements was around 0.5, and there were no significant trends regarding growth rates.

In Panel D, which investigates the relationship between stock repurchase announcements and the dividend ratio, we can observe that there were significantly fewer stock repurchase announcements during the fifth quintile than in the first quintile after deregulation, while there was no difference between the first and fifth quintiles before deregulation. Panel D also demonstrates that (1) after deregulation, the number ratio was around 3.5 percent from the second to fifth quintile but 4.1 percent in the first quintile; (2) there was a non-monotonous relationship between stock repurchase announcements and the dividend ratio; (3) firms with a low dividend ratio issued greater stock repurchase announcements; (4) for all dividend quintiles, stock repurchase announcements issued after deregulation were significantly larger than those issued before deregulation; and (5) stock repurchase announcements increased at a higher rate in the lower dividend quintiles. These findings suggest that deregulation encourages stock repurchases by firms that have a strong incentive to distribute cash dividends and that the increase in stock repurchase announcements was smallest in the fifth quintile, that is, firms were most likely to distribute dividends in the fifth quintile.

Table 4: Univariate analysis

<i>Panel A</i>									
	Quintiles of M/ B					$5^{\text{th}}-1^{\text{st}}$	$(5^{\text{th}}-1^{\text{st}})/\text{mean}$	<i>t</i> -statistics	<i>p</i> -value
	1 st	2 nd	3 rd	4 th	5 th				
(1)Before	3.412	2.645	2.588	1.862	1.295	- 2.117	-0.876	- 8.543	0.000
(2)After	5.146	4.074	3.396	2.978	2.693	- 2.453	-0.677	- 9.510	0.000
(2)-(1)	1.734	1.429	0.808	1.116	1.398				
$((2)-(1))/(1)$	0.508	0.540	0.312	0.600	1.079				
<i>t</i> -statistics	5.881	4.840	3.077	5.223	6.905				
<i>p</i> -value	0.000	0.000	0.002	0.000	0.000				
<i>Panel B</i>									
	Quintiles of leverage					$5^{\text{th}}-1^{\text{st}}$	$(5^{\text{th}}-1^{\text{st}})/\text{mean}$	<i>t</i> -statistics	<i>p</i> -value
	1 st	2 nd	3 rd	4 th	5 th				
(1)Before	2.497	2.929	2.055	2.408	2.353	- 0.145	- 0.060	- 0.468	0.640
(2)After	3.728	3.495	3.792	3.484	3.609	- 0.120	-0.033	- 0.427	0.670
(2)-(1)	1.231	0.566	1.737	1.076	1.256				
$((2)-(1))/(1)$	0.493	0.193	0.846	0.447	0.534				
<i>t</i> -statistics	4.018	1.746	7.523	4.131	4.361				
<i>p</i> -value	0.000	0.082	0.000	0.000	0.000				
<i>Panel C</i>									
	Quintiles of cash flow					$5^{\text{th}}-1^{\text{st}}$	$(5^{\text{th}}-1^{\text{st}})/\text{mean}$	<i>t</i> -statistics	<i>p</i> -value
	1 st	2 nd	3 rd	4 th	5 th				
(1)Before	2.826	2.510	2.405	1.983	2.310	- 0.517	-0.214	- 1.652	0.100
(2)After	4.231	3.807	3.530	3.215	3.380	- 0.850	-0.235	- 3.201	0.001
(2)-(1)	1.404	1.298	1.125	1.232	1.071				
$((2)-(1))/(1)$	0.497	0.517	0.468	0.621	0.464				
<i>t</i> -statistics	4.759	4.766	4.548	4.651	3.785				
<i>p</i> -value	0.000	0.000	0.000	0.000	0.000				
<i>Panel D</i>									
	Quintiles of dividend					$5^{\text{th}}-1^{\text{st}}$	$(5^{\text{th}}-1^{\text{st}})/\text{mean}$	<i>t</i> -statistics	<i>p</i> -value
	1 st	2 nd	3 rd	4 th	5 th				
(1)Before	2.550	2.268	2.418	2.331	2.560	0.010	0.004	0.032	0.974
(2)After	4.111	3.699	3.395	3.512	3.403	- 0.708	-0.196	- 2.641	0.009
(2)-(1)	1.561	1.431	0.977	1.181	0.843				
$((2)-(1))/(1)$	0.612	0.631	0.404	0.507	0.329				
<i>t</i> -statistics	5.087	5.216	3.826	4.585	3.193				
<i>p</i> -value	0.000	0.000	0.000	0.000	0.002				

4.2 Regression Analysis

In accordance with the previous research into stock repurchases, we regressed a model in which the nature of stock repurchases announced by firm i in year t is dependent on a set of potential motivations as is mentioned above (Although not reported, we included year indicators in all the regressions):

$$\begin{aligned} \text{Stock Repurchase}_{i,t} = & a + \beta_1 \times (M/B)_{i,t-1} + \beta_2 \times \text{Leverage}_{i,t-1} + \beta_3 \times \text{Cash Flow}_{i,t-1} \\ & + \beta_4 \times \text{Dividend}_{i,t-1} + \beta_5 \times \text{Size}_{i,t-1} + \beta_6 \times \text{Stock Option}_{i,t-1} \\ & + \beta_7 \times \text{Cash}_{i,t-1} + \varepsilon_{i,t} \end{aligned}$$

To fully understand the change in the nature of stock repurchase announcements that resulted from the deregulation of stock repurchases, we classified our observations into two subsamples, the first containing announcements issued before deregulation and the second containing announcements issued after deregulation³. Table 5 shows that the Adj. R² increased from 0.105 before deregulation to 0.149 after deregulation. It also shows that the coefficients of the M/B ratio increased from -0.570 (significant at the 1% level) before deregulation to -0.443 (significant at the 1% level) after deregulation, indicating that there has been a less strong negative relationship between stock repurchase announcements and the M/B ratio after deregulation. These results indicate that stock repurchase announcements are negatively and significantly related to the M/B ratio over the sample period, as well as that deregulation of stock repurchases increased stock repurchase announcements of firms with a weaker incentive to signal undervaluation during the period after deregulation.

In the period before deregulation, the relationship between stock repurchase announcements and cash flow was significantly negative, which suggests that firms that had experienced severe agency problems related to excess cash holdings

³ We also compared the statistical significance of parameters in the same regression without dividing into two subsamples, and got similar results as those from Table 5.

had been more likely to distribute cash to shareholders by distributing cash dividends (Although not reported, we found that firms' cash flow is positively and significantly related to cash dividend distribution.).

Table 5: Regression of stock repurchase announcements

	Before		After	
	coefficient	(t-statistics)	coefficient	(t-statistics)
(Constant)	4.994	(4.824)***	6.791	(9.072)***
M/B	-0.570	(-6.588)***	-0.443	(-4.143)***
Leverage	0.205	(1.405)	0.229	(1.606)
Cash flow	-0.025	(-1.768)*	0.011	(0.867)
Dividend	0.302	(1.568)	-0.174	(-1.121)
Size	-0.183	(-2.570)**	-0.299	(-5.173)***
Cash	2.434	(2.441)**	2.254	(2.372)**
Adj. R ²	0.105		0.149	
N	638		1454	

Notes: 1. Estimated t-statistics appear in parentheses after the coefficient estimates. N is the number of observations.

2. *, ** and *** indicates significance at the 10%, 5% and 1% levels, respectively. All models include year indicators.

After deregulation, this significantly negative relationship disappears, indicating that stock repurchases do not depend on cash flow after deregulation. Our explanation for this change is that deregulation has enabled firms to use their treasury stocks more flexibly. Our results also indicate that firms did not use stock repurchases as means of dividend substitution either before or after deregulation and that there was no significant relationship between stock repurchase announcements and the leverage ratio either before or after deregulation, with the latter finding suggesting that Japanese firms tend not to use stock repurchases as means of capital structure adjustment.

The results thus far suggest that the deregulation of stock repurchases has encouraged firms that wish to increase their level of managerial discretion to

increase their stock repurchases, and that firms with a weak incentive to engage in repurchasing for signaling have increased their stock repurchases after deregulation to a greater degree than firms with a strong incentive. To further explore the relationship between stock repurchase announcements and the M/B ratio, we performed a regression analysis after dividing the total sample into quintiles and classifying the quintiles into low and high M/B firms according to whether they had a low (the first and second quintiles) or high (the fourth and fifth quintiles) M/B ratio, and compared the difference between the periods before and after deregulation. A portion of our testing models' estimates is shown in Table 6, which includes only the coefficients of the M/B ratio with Panel A presenting some results for the total sample from Table 5 to serve as a benchmark. We found that the relationship between stock repurchase announcements and the M/B ratio was more strongly negative for low M/B firms and less strongly negative for high M/B firms both before and after deregulation, indicating that firms with low market performance are more likely to initiate repurchasing plans because they face a greater risk of being undervalued by the market. In particular, we calculated an M/B coefficient of -2.233 (significant at the 5% level) before deregulation in comparison to a coefficient of -2.089 (significant at the 5% level) after deregulation, when the M/B ratio was in the low quintiles, and an M/B coefficient of -0.282 (significant at the 1% level) before deregulation in comparison to an M/B coefficient of -0.254 (significant at the 10% level) after deregulation, when the M/B ratio was in the high quintiles. These results suggest that before the deregulation of stock repurchases, firms had been more sensitive to market performance and that there had been a greater difference between firms with a strong incentive to repurchase and those with a weak incentive to repurchase. After deregulation, the relationship between stock repurchase announcements and the M/B ratio became less strongly negative, suggesting that managers are now more likely to repurchase shares and hold treasury stocks for a variety of purposes.

Table 6: Regression analysis on stock repurchase announcements for signalling

	Before		After	
	coefficient	(<i>t</i> -statistics)	coefficient	(<i>t</i> -statistics)
<i>Panel A: Total sample</i>				
M/B	-0.570	(-6.588)***	-0.443	(-4.143)***
Adj. R ²	0.105		0.149	
N	638		1454	
<i>Panel B: Low M/B quintiles</i>				
M/B	-2.233	(-2.315)**	-2.089	(-2.337)**
Adj. R ²	0.043		0.117	
N	277		560	
<i>Panel C: High M/B quintiles</i>				
M/B	-0.282	(-3.587)***	-0.254	(-1.955)*
Adj. R ²	0.129		0.092	
N	234		603	

Notes: 1. Estimated *t*-statistics appear in parentheses after the coefficient estimates. N is the number of observations.
2. *, ** and *** indicates significance at the 10%, 5% and 1% levels, respectively. All models include year indicators.

Since we use both cash flow and cash dividends as proxies for cash distribution and dividend substitutions, we performed a similar analysis as above in order to identify stronger evidence regarding the effect of deregulation on agency problems. We divided the total sample into quintiles on the basis of cash flow ratio and dividend ratio, then classified firms in the bottom two quintiles as those with low cash flow ratios or low dividend ratios and firms in the top two quintiles as those with high cash flow ratios or high dividend ratios. By controlling for cash flow and dividends simultaneously, we could further divide our sample into four subsamples. We then divided the observations of each subsample into two groups, one of which included firms that issued repurchasing announcements before deregulation and the other included those after deregulation. Table 7, which shows a portion of the results from the regression analysis, includes only the results regarding the coefficients of cash flow ratio and dividend ratio. Panel A repeats a part of results for the total sample from Table 5, shown as a benchmark.

Panels B and C show that stock repurchase announcements were negatively related to both cash flow and cash dividend distribution, although not significantly both before and after deregulation.

Table 7: Regression of stock repurchase announcements on agency interpretation

	Before		After	
	coefficient	(t-statistics)	coefficient	(t-statistics)
<i>Panel A: Total sample</i>				
Cash flow	-0.025	(-1.768)*	0.011	(0.867)
Dividend	0.302	(1.568)	-0.174	(-1.121)
Adj. R ²	0.105		0.149	
N	638		1454	
<i>Panel B: Low cash flow and low dividend</i>				
Cash flow	-0.022	(-0.422)	-0.010	(-0.177)
Dividend	-0.404	(-0.344)	-0.340	(-0.268)
Adj. R ²	0.071		0.117	
N	157		340	
<i>Panel C: Low cash flow and high dividend</i>				
Cash flow	-0.157	(-1.406)	-0.039	(-0.726)
Dividend	-0.256	(-0.269)	-0.119	(-0.190)
Adj. R ²	0.057		0.155	
N	65		120	
<i>Panel D: High cash flow and low dividend</i>				
Cash flow	0.117	(1.012)	0.080	(0.882)
Dividend	-0.687	(-0.178)	-1.297	(-0.585)
Adj. R ²	0.109		0.124	
N	53		121	
<i>Panel E: High cash flow and high dividend</i>				
Cash flow	0.002	(0.066)	0.036	(1.224)
Dividend	0.711	(2.287)**	0.076	(0.268)
Adj. R ²	0.130		0.165	
N	128		381	

Notes: 1. Estimated t-statistics appear in parentheses after the coefficient estimates. N is the number of observations.

2. *, ** and *** indicates significance at the 10%, 5% and 1% levels, respectively. All models include year indicators.

Panel D shows that stock repurchase announcements were positively related to cash flow but negatively related to cash dividend distribution both before and after deregulation, which are not significantly. Panel E shows that stock repurchase announcements were positively but not significantly related to cash flow both before and after deregulation. Panel E also shows that although stock repurchase announcements was positively related to cash dividends both before and after deregulation, it was significantly related only before deregulation.

The results presented in Table 7 do not support the assumption that firms had been likely to substitute the initiation of repurchasing programs for the distribution of cash dividends before deregulation. However, by controlling cash flow and cash dividend distribution simultaneously, we found that among firms with high rates of both cash flow and dividend distribution, the greater cash dividends that they distributed, the stronger was their incentive to engage in repurchasing. We attribute this phenomenon to the fact that firms with high rates of cash flow and cash dividend distribution may have a stronger incentive to reduce agency problems related to free cash flow by distributing cash to shareholders directly, leading them to issue more stock repurchase announcements. After the deregulation of stock repurchases, repurchasing firms became less sensitive to cash dividends and more likely to repurchase shares and use such shares flexibly.

5 Conclusion

The deregulation of stock repurchases in Japan that began on October 01, 2001 gave firms the ability to freely repurchase their own shares and to hold treasury stocks for later use, naturally leading to a change in corporate behaviors. This study examined these behaviors by investigating firms' motivations for engaging in stock repurchases, identifying in detail the characteristics of firms that have increased their stock repurchase announcements in response to deregulation,

and delineating the nature of the pump-priming effect of deregulation on stock repurchases. We found that because firms recognize that repurchasing allows for a great degree of financial flexibility, they have significantly increased their stock repurchase announcements after deregulation. Among our sample of firms that engage in stock repurchases, we found that they engaged in stock repurchase announcements to signal undervaluation but not to engage in capital structure adjustment or dividend substitution both before and after deregulation. After deregulation, firms with the motivation to signal undervaluation or deter hostile takeovers increased stock repurchase announcements in response to the deregulation of stock repurchases. Those firms with a relatively weaker incentive to signal undervaluation became more likely to increase their stock repurchase announcements compared to firms with a strong incentive to, which is one of our important finding, called the pump-priming effect of deregulation on stock repurchases. Regarding the motivation to engage in stock repurchases to mitigate agency problems, we found that before deregulation, firms with high rates of cash flow and cash dividend distribution appeared to have a strong incentive to decrease agency costs related to holding excess cash by engaging in stock repurchases solely for the purpose of distributing cash. After deregulation, stock repurchases may now be undertaken more flexibly for multiple purposes.

By examining the motivations for engaging in stock repurchases, this study aimed to identify the manner in which the deregulation of stock repurchases has affected the nature of managerial discretion, as well as the nature of stock repurchases itself. By doing so, it has provided insight into the impact of deregulation on the stock repurchase announcements of firms that engage in repurchasing to signal their good prospects, and thereby deter undervaluation and the threat of takeover, as well as firms that adjust their capital structure to approximate their target leverage ratio and firms that distribute excess cash to lower their agency costs, particularly firms that had a relatively weak incentive to engage in repurchasing. Our findings that firms that had a weak incentive to signal undervaluation became

more likely to increase their stock repurchase announcements in response to the deregulation of stock repurchases to avoid further undervaluation and that firms with the motivation to engage in capital structure adjustment or dividend substitution may engage in repurchasing for other specific purposes make a contribution to financial literature.

The implications of our findings are as follows. First, regulatory reform motivates stock repurchase announcements by firms with strong incentive to signaling, as well as firms with weak incentive to, by which firms gain managerial discretion. It appears that policy makers had better to consider the effect of regulatory reform on managerial discretion and pump-priming effect in advance, which is not only necessary to the deregulation of stock repurchases, but also necessary to general regulations. Second, many companies take financial behaviors to prepare for emergencies in the future in advance, which is an important implication for investors when they predict firms' prospects. How much managers recognize their firms' intrinsic value and the deviation between current valuation and intrinsic value, and how to mitigate the deviation by means of financial behaviors managers understand, are important factors that managers prepare for future changes in market valuation. It is an implication for investors that sometimes financial behaviors can be a signaling for future prospects rather than current situation.

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