Revisit to Stock Buyback in the Perspective of the Theory of the Firm

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In this research, we examine why firms buy back their own stocks by revisiting the extant studies. We hypothesize that: 1) Firms that make repurchase announcement will witness an increase in market value during the short announcement window; 2) Firms that make repurchases are relatively undervalued compared to non-repurchasing firms in the same industry; 3) Proportion of ownership by institutional investors for stock repurchase firms is greater than that for non-repurchasing firms in the same industry. Our findings support the first and the third hypothesis. We do not find that firms that repurchase their own stocks are undervalued compared to the non-repurchasing firms. However, further tests show that compared to the less undervalued subsample of the repurchasing firms, relatively more undervalued subsample of the repurchasing firms exhibit a more stable and consistent increase in market value, suggesting a difference in the growth pattern of the market value between these two subsample firms following the stock repurchases.

INTRODUCTION

There has been a rapid increase in the number of open-market share repurchases (OMR) in the last three decades (Grullon and Michaely, 2002). According to Buyback Quarterly of 2016, in the trailing twelve months ending in Q2 of 2016, 137 companies in the S&P 500 spent more on buybacks than they generated in earnings. The five largest sectors that repurchased stocks in 2013 were: Information Technology ($121.5 billions), consumer Discretionary ($70.2 billions), Healthcare ($62 billion), Financials ($58.5) and Industrials ($53.7 billions) (Schneider and Kohlmeyer, 2015).

Numerous studies have been done to investigate the motivations for share repurchase activities. For instance, some common motivations are: to distribute excess cash (Jensen 1986; Stephens and Weisbach 1998), to signal undervaluation to the market (Stephens and Weisbach, 1998; Vermaelen, 1981) and to increase leverage ratio so as to achieve optimal capital structure (Bagwell and Shoven, 1988; Opler and Titman, 1996). Other research suggests firms use buyback as a takeover defense (Bagwell, 1991), substitution of dividend (Grullon and Michaely, 2002) and a means to counter the dilution of stock options (Fen and Liang, 1997).

Our paper made an attempt to use one of the fundamental economic theories—the theory of the firm to explain why firms repurchase their own stocks. The theory suggests that managers will not take stock

buybacks if they expect losses by their buyback actions. The implication of this theory is that the value of the firm is expected to increase during the short window of stock repurchase announcement.

Combining the cost/benefit framework with the signaling theory, we further examined the performance of these repurchasing firms over a longer period. The cost /benefit framework suggests that firms are more likely to take an action if the cost of the action is less than the potential benefit of it. Signaling theory is closely related to asymmetric information and undervalution. Management's insider knowledge of their firms and their beliefs of the firms' undervaluation motivate them to buy back their own stocks. This repurchase action, in turn, sends a signal to the market that the firms repurchasing their own stocks are undervalued. If the market responds to this signal, it will adjust the value of these firms accordingly.

Market value of firms is greatly influenced by institutional investors. It is known that institutional investors are the second in terms of information accuracy for the firms next to firm insiders (Scott, 2014; Chemmanur and Li, 2014). In this regard, if stock repurchase is made to generate gains for the firm, it is safely conjectured that the stock repurchase firms may be the investment targets by institutional investors. Results of significantly higher proportion of institutional ownership in the repurchasing firms confirm this general belief.

Our paper provides additional insights to the signaling theory and it contributes to the stock repurchase literature by studying the repurchasing firms from a relatively long-term view. No prior research ever examined if the repurchasing firms were equally (under)valued after they sent this signal through repurchase announcement. By examining the change in MTB ratio following the announcement, we provide evidence that repurchase announcement seems to have a stronger "signaling" effect for repurchasing firms with higher degree of undervaluation and that the consistent upward adjustment of MTB for these relatively undervalued firms suggests that originally more undervalued firms seem to send the signal more successfully than the less undervalued firms.

The remainder of the paper is organized as follows: section II reviews the related literature and provides hypothesis development. Section III discusses data and research design. Section IV presents the results. Section V provides additional tests and the results. Section VI concludes the paper.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Prior research provided numerous motivations regarding why firms repurchase their own stocks. For instance, some research studies suggest that firms repurchase their own stocks because they have excess cash to distribute (Jensen 1986, Stephens and Weisbach 1998). Results from Bagwell and Shoven (1988) and Opler and Titman (1996) indicate that firms may repurchase their own stocks to increase leverage ratio. Other research suggests firms use buyback as a takeover defense (Bagwell 1991), substitution of dividend (Grullon and Michaely 2002) and a means to counter the dilution of stock options (Fen and Liang 1997).

Probably the most popular theory regarding stock repurchase is signaling theory. Prior research provides evidence that management who held private information about the firm value and perceived undervaluation of the companies' equity are motivated to repurchase the firms' stocks. For instance, using market-to-book ratio as a measure of undervaluation, Dittmar (2000) indicates that firms buy back their own stocks when they are potentially undervalued.

Various studies support the undervaluation hypothesis. Some studies show that repurchase announcements generally result in favorable short and long-term returns for the firms announcing them. e.g. Ikenberry, Lakonishok and Vermaelen (1995, 2000) found a persistent positive abnormal return four years following the initial repurchase announcement. Lie (2005)'s study suggests that firms' operating performance is improved (in terms of earnings) following open-market repurchase announcement.

On the other hand, some studies provide evidence against the signaling and undervaluation theory. For example, Ikenberry (1995) provide evidence that the propensity for low book-to-market firms to announce buybacks is nearly the same as for high book-to-market firms. Gong, Louis and Sun (2008)

suggest that management manipulate earnings downward prior to repurchase announcement (hence implying that these repurchasing firms were not truly "undervalued"). Similarly, Brockman, Khurana and Martin (2008) suggest that managers tend to release more pessimistic earnings forecasts before an open-market share repurchases. According to Leng and Noronha (2013), firms in the US are not required to take subsequent action to implement their repurchase program and they find that the initial signal from repurchase announcement is rather ambiguous and that the market waits for the firm's subsequent actions, such as actual repurchase activities. Oded and Michel (2008) provide evidence that the common belief that the increased EPS associated with a stock repurchase creates value for shareholders is flawed.

Some industry practitioners suggest that instead of signaling, there can be other opportunistic motives to induce managers to make repurchases. For instance, David Trainer (Forbes, 2016) states that most Buybacks are not carried out to maximize shareholder value; instead they destroy value because companies' executives are responding to pressures to hit short-term earnings targets.

From the above literature review, it seems, as suggested by Schneider and Kohlmeyer (2015) that no single theory appears to fully explain managers' motive for buybacks. Yet we like to utilize the basic economic theory—"The Theory of the Firm" to explain such management behavior. The theories of the firms explains some of the fundamental questions related to the firm, such as its nature, existence, structure, and relationship to the market (Kantarelis, 2007). In neoclassical economics, the theory of the firm states that firms exist and make decisions to maximize profits. Hence, we would like to make a fundamental argument that managers will take stock buybacks if they expect the behavior will increase firm value. Thus our first null hypothesis is as follows:

H1: During the short window of stock repurchase announcement, the value of the firm does not increase.

Another basic yet useful framework that can be used to explain management's buyback behavior is cost-benefit analysis. This framework helps individuals make decisions between alternative courses of action based on the largest net benefits. Bierman (2008) mathematically proved that in the cost-benefit framework, if tax rate on dividends equals the tax rate on capital gains, share repurchase beats the cash dividend. Additionally, for shareholders who have the intention to hold the stocks for a relatively long term, stock repurchase provide another benefit of saving transaction costs related to reinvesting. Management, whose goal is to maximize the shareholder value, would choose stock repurchase over dividend distribution.

The cost /benefit framework also suggests that firms are more likely to take an action if the benefit from taking that action is greater than the cost. Signaling theory is based on asymmetric information and undervalution. Management's private information about the firms' true value and their beliefs of the firms' undervaluation motivate them to buy back their own stocks. This repurchase action, in turn, sends a signal to the market that the firms repurchasing their own stocks are undervalued. The potential greater benefit resulting from future price appreciation of these "undervalued" repurchasing firms (compared to buying back their own stocks at a relatively lower cost) induces these firms to repurchase their own stocks. Hence, our second null hypothesis is as follows:

H2: Firms that repurchase their own stocks are not relatively undervalued compared to their counterparts in the same industry.

Market value of firms is greatly influenced by institutional investors. Prior research indicates that sophisticated investors have more resources and expertise for gathering and processing information than individual investors. Such advantages enable the institutional investors to react to firms' decisions and behavior sooner. For example, using a sample of 1,262 firm-quarters covering 1987 to 1990, Gazzar (1998) analyzes the market reaction to earnings announcements and finds smaller market reactions for firms with higher institutional holdings. This result supports the view that institutional investors, having more incentives to develop private information and more advantages in gathering and processing financial

information, anticipate some content of the earnings announcement earlier than other individual investors, reducing the market reaction to earnings releases.

Scott (2014) confirms in their study that institutional investors are the second in terms of information accuracy for the firms next to firm insiders. Chemmanur and Li (2014) found that institutions are able to realize significant abnormal profits (net of commissions and trading costs) by trading in the equity of firms undergoing open-market repurchases, and the results are consistent with the notion that institutional investors are able to generate a significant information advantage for themselves about firms undergoing open-market repurchases. The above literature suggests that institutional investors are able to identify profitable opportunities faster compared to individual investors. If stock repurchase represents some insider information and signals undervaluation, then we expect the repurchasing firms gain more attention from institutional investors than the non-repurchasing firms, hence our third null hypothesis is as follows:

H_3 : Proportion of ownership by institutional investors for stock repurchase firms is not greater than that for non-stock repurchase firms in the same industry.

DATA AND RESEARCH DESIGN

Data and sample collection

We collect our buyback firms from LexisNexis Academic Universe (This dataset provides firms and their dates on which firms make repurchase announcement). Using COMPUSTAT, we are able to collect the firms that announced stock buyback and subsequently actually repurchased more than 5% their own shares during the year 2010-2015 (Number of shares repurchased in the current year equals prior year number of shares outstanding minus current year number of shares outstanding). Firms that made the repurchase announcement but did not actually repurchase their stocks are not included in our sample. As in previous studies, we exclude financial institutions and utilities companies from our sample as they were regulated during the sample period. In the meantime, we obtain a matched sample consisting of firms that did not make repurchases during the same period but have similar size (measured by total assets) as the repurchasing firms in the same industry. For the 263 repurchasing firms, we obtained 210 matched firms. After removing the outliers, we have 251 repurchasing firms and 196 matched firms (The repurchasing firms sample and the matched sample are smaller when the third hypothesis is tested as data for institutional ownership are limited).

Three Major Variables

We computed three major variables in this paper:

1) Cumulative abnormal returns (CAR) – cumulative abnormal returns are measured to test the 1st hypothesis during the announcement period. Specifically, we obtained CAR (-5,5) –i.e. 5 days before and 5 days after the announcement dates and CAR (-10, 60): 10 days before and 60 days after the announcement dates using the market model and market-adjusted model;

2) Market-to-Book Ratio (MTB): firms' total market value divided by total book value of equity measured in the quarter before repurchase announcement and post-announcement. This is the major variable we use to test our 2nd hypothesis. Lakonishok, Shleifer and Vishny (1994), Ikenberry et al (1995) find that value firms (firms with lower market-to-book ratio) are associated with abnormal returns in subsequent periods, suggesting that the Market-to-book ratio maybe used as an indicator of undervaluation. A lower MTB ratio from the repurchasing firms compared to the matched non-repurchasing firms implies undervaluation of the repurchasing firms from the market.

3) Institutional ownership (IO): measured as the percent (%) of institutional investors around the repurchase announcement. A higher percentage is related to a higher institutional ownership.

Testing Methodology

To test the 1st Hypothesis, we test the mean CAR for the repurchasing firms during different event windows;

To test the 2nd Hypothesis, we test the difference in Mean MTB for the repurchasing firms and the matched non-repurchasing firms.

To test the 3rd Hypothesis, we test the difference in Mean Institutional ownership for the repurchasing firms and the matched non-repurchasing firms.

EMPIRICAL RESULTS

Table 1 provides descriptive statistics for the repurchasing firms and matched sample of non-repurchasing firms from year 2010 to 2015. From this table, we can see that the repurchasing firms have similar total assets to the non-repurchasing firms. The table also shows that the repurchasing firms on average have lower market-to-book ratio (5.296) than the matched firms (16.68), which seems to be consistent with our 2nd hypothesis that the repurchasing firms are undervalued. Moreover, the institutional ownership from repurchasing firms is 68.3%, whereas the matched sample has a 63.2% institutional ownership, lower than the repurchasing firms.
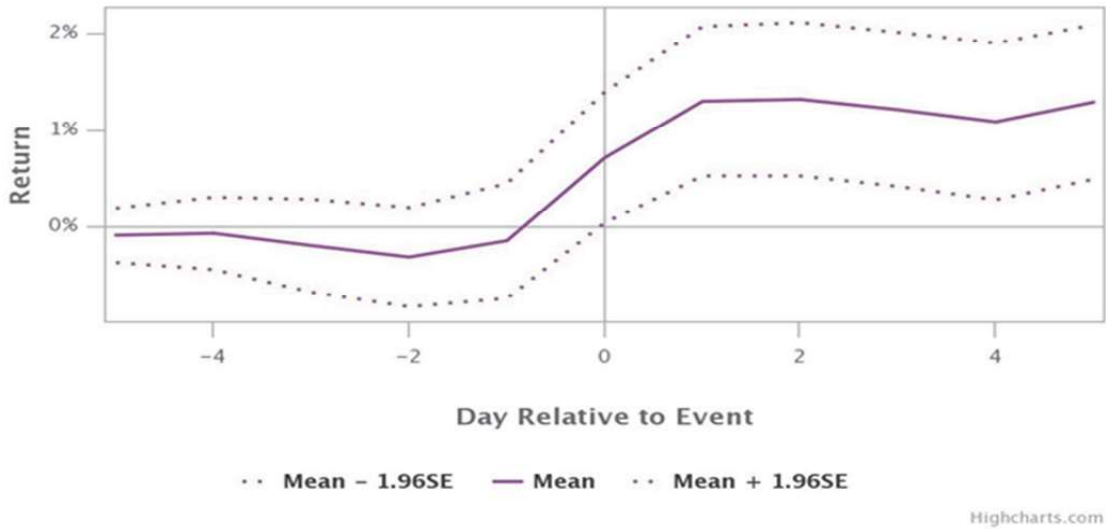
TABLE 1
DESCRIPTIVE STATISTICS

Total Assets					
	n	Mean	Std. Dev	Min.	Max
Repurchasing firms	263	25737.87	90742.91	6.177	923225.00
Matched firms	210	24188.23	93893.79	2.375	853828.59
Market-to-Book ratio					
Repurchasing firms	263	5.296	24.095	-12.437	290.471
Matched firms	210	16.68	150.01	-79.512	1539.98
Institutional Ownership					
Repurchasing firms	210	0.683	0.22	0.00015	0.988
Matched firms	138	0.632	0.26	0.00027	0.985

Figure 1 provides the cumulative abnormal returns for the repurchasing firms using market-adjusted model (Market model provides similar results). From this figure, we can see that the repurchasing firms have negative abnormal returns one day before the repurchasing announcement; they turn to positive thereafter (market model provides similar results). Figure 2 provides similar information for an event window of (-10, 60). The two figures show that the market values of the repurchasing firms increase following the announcement, thus rejecting the 1st null hypothesis.

FIGURE 1
CUMULATIVE ABNORMAL RETURN (-5, 5)

Cumulative Abnormal Return: Mean & 95% Confidence Limits

There are 244 events in total with non−missing returns.

·· Mean − 1.96SE   — Mean   ·· Mean + 1.96SE

Highcharts.com

FIGURE 2
CUMULATIVE ABNORMAL RETURN (-10, 60)

Cumulative Abnormal Return: Mean & 95% Confidence Limits

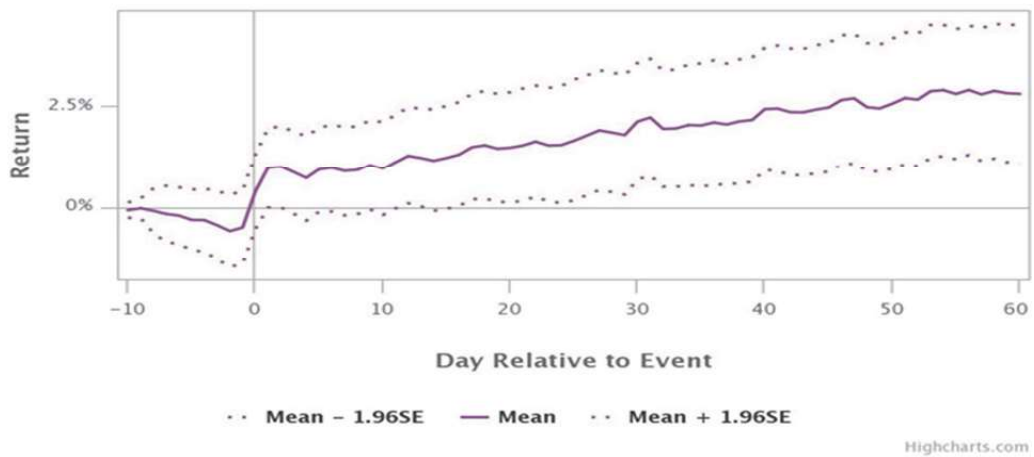There are 235 events in total with non−missing returns.

·· Mean − 1.96SE   — Mean   ·· Mean + 1.96SE

Highcharts.com

Table 2 provides result for the 1st hypothesis. The table shows that repurchasing firms on average earn a statistically significant positive abnormal return of 1.3% during the (-5,5) event window. For event window (-10, 60), the significant positive abnormal return is 2.8% on average, consistent with the empirical evidence from the prior studies that the average announcement price impact (companies traded on the US stock exchanges) is 3% (Ikenberry, Lakonishok, and Vermaelen 1995, and Grullon and Michaely 2002).

TABLE 2
CUMULATIVE ABNORMAL RETURN AND BUY AND HOLD RETURN FOR THE REPURCHASING FIRMS DURING (-5,5) AND (-10,60)

Day Relative to Event	Mean Cumulative Abnormal Return	Mean Total Return	Mean Abnormal Return	Standardized Cross-sectional t-statistics for Abnormal Return	Mean CAR (At the end of Event Window)	t-statistic for CAR (at the end of event window)
-5	-0.001	0.000	-0.001	-0.204		
-4	-0.001	0.000	0.000	-0.226		
-3	-0.002	-0.001	-0.001	-0.507		
-2	-0.003	-0.001	-0.001	-0.682		
-1	-0.001	0.003	0.002	1.281		
0	0.007	0.011	0.009	3.482		
1	0.013	0.005	0.006	2.340		
2	0.013	-0.001	0.000	0.383		
3	0.012	-0.001	-0.001	-0.890		
4	0.011	-0.002	-0.001	-0.588		
5	0.013	0.002	0.002	2.146		
Event window (-5,5)					0.013	3.387***
Event window (-10, 60)					0.028	3.603***

Table 3 provides result for the 2nd hypothesis by comparing the mean market-to-book ratio for the repurchasing firms and the matched non-repurchasing firms (After removing the outliers). Mean MTB ratio for the repurchasing firms is 2.72, which is higher than the mean MTB ratio for the matched sample of 2.571, however, the difference is not significant, hence, our second hypothesis is not rejected, i.e. we cannot reject the null hypothesis that the value of the stock of the repurchase firms is not relatively undervalued compared to the average value of the non-repurchasing firms in the same industry.

TABLE 3
MARKET-TO-BOOK RATIO FOR REPURCHASING FIRMS AND THE MATCHED SAMPLE

t-Test: Two-Sample Assuming Unequal Variances
After Removal of the Outliers Second Time)

	Repurchased Firms	Matched Firms	
Mean	2.728	2.571	
Variance	5.559	5.084	
Observations	251	196	
Hypothesized Mean Difference	0		
Df	427		
t Stat	0.713		
P(T<=t) one-tail	0.238		not significant
t Critical one-tail	1.648		
P(T<=t) two-tail	0.477		not significant
t Critical two-tail	1.966		

Table 4 provides the empirical result for our third hypothesis. The table shows that the average institutional ownership for the repurchasing firms is 68.4%, significantly higher than that for the matched non-repurchasing firms, which is 63.2%, consistent with our conjecture that institutional investors seem to be better able to identify and take the market opportunities, and that repurchasing firms on average obtain more attention from the institutional investors than their counterparts do, therefore rejecting the third null hypothesis that proportion of ownership by institutional investors for stock repurchase firms is not greater than that for non-stock repurchase firms in the same industry.

TABLE 4
INSTITUTIONAL OWNERSHIP (IO) FOR REPURCHASING FIRMS
AND THE MATCHED SAMPLE

t-Test: Two-Sample Assuming Unequal Variances		
(for Institutional Ownership Percentage)		
	Repurchase Firms	Matched Firms
Mean	0.684	0.632
Variance	0.048	0.068
Observations	210	138
Hypothesized Mean Difference	0.000	
Df	258	
t Stat	1.914	
P(T<=t) one-tail	0.028*	significant
t Critical one-tail	1.651	
P(T<=t) two-tail	0.057	
t Critical two-tail	1.969	

ADDITIONAL TESTS

So far the empirical test results support the first and the third hypotheses. To further examine our second hypothesis, we conduct additional tests and expect to gain some insights.

First, we calculated the average market-to-book ratio for the repurchasing firms and use the ratio as the industry MTB ratio benchmark. Then we divide the 251 repurchasing firms into two groups: Group 1 ("G1")--firms with higher-than-industry average MTB (HTA MTB repurchasing firms, referred to as "overvalued sample") and Group 2 ("G2")--firms with lower-than-industry MTB (LTA MTB repurchasing firms, referred to as "undervalued sample"). We obtained 91 relatively overvalued firms in the first group (G1) and 160 relatively undervalued firms for the second group (G2).

Table 5 provides the mean, minimum and maximum MTB ratio for G1 (relatively "overvalued") firms and G2 (relatively "undervalued") firms for the quarters around and after the pre-announcement quarter, with Qt-1 representing the quarter before the announcement quarter and Qt0 representing the announcement quarter. Table 5 covers pre-announcement quarter, announcement quarter and the following 11 quarters, a total of 13 quarters (We did not use the data for the following quarters as observations reduce dramatically). Figure 3 provides a more intuitive view of the comparison of MTB for these two groups of firms. The figure clearly shows two very different pattern of MTB ratio following the repurchase announcement. For G1 (overvalued firms) subsample, MTB ratios are very volatile over the 13 quarters, while for G2 (undervalued firms), MTB shows a very smooth upward pattern. The combined results suggest that the relatively undervalued firms, although still more undervalued for the following 13

quarters, exhibit more consistent increases over the period. The less undervalued firms (or the relatively more overvalued firms) are still relatively more overvalued, yet market perception of their values is less consistent and stable.
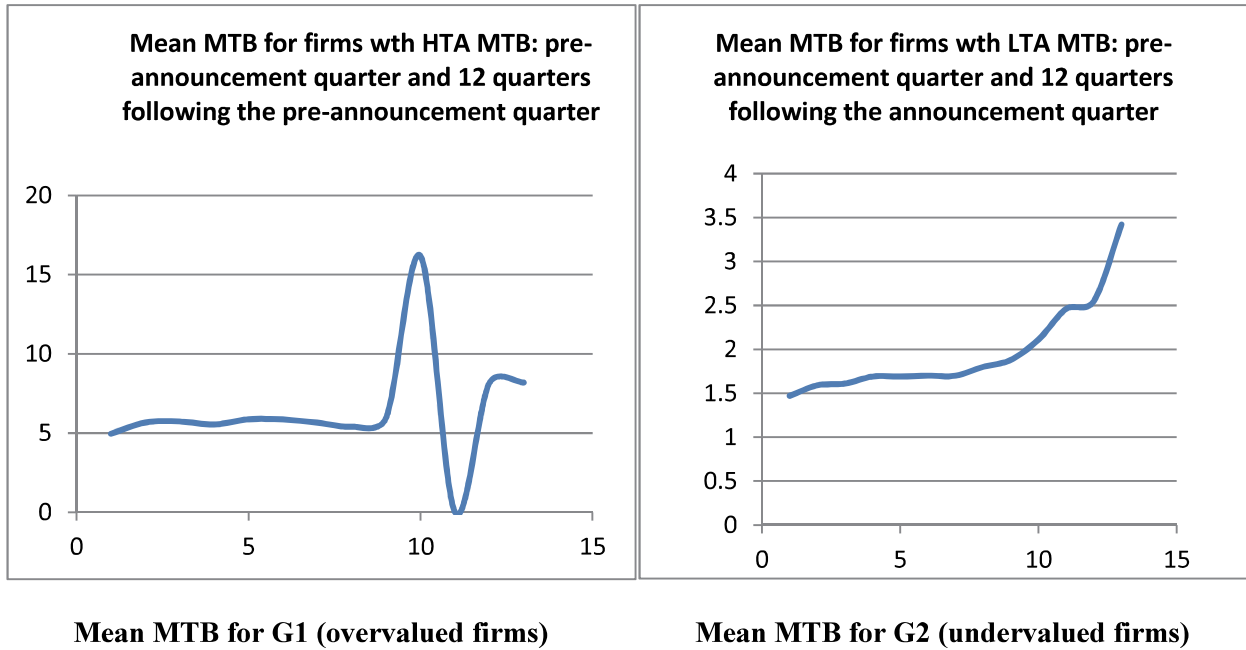
TABLE 5
MTB PERFORMANCE COMPARISON BETWEEN G1 (OVERVALUED FIRMS) AND G2 (UNDERVALUED FIRMS)

		Qt-1 (n=90, 160)	Qt0 (n=90, 160)	Qt1 (n=90, 159)	Qt2 (n=90, 159)	Qt3 (n=90, 159)	Qt4 (n=86, 155)
	Mean	4.96	5.67	5.73	5.55	5.87	5.86
G1	Min	2.57	1.54	1.59	-12.44	-14.84	-11.25
	Max	13.28	27.88	23.34	19.65	22.01	27.88
	Mean	1.47	1.59	1.61	1.69	1.69	1.7
G2	Min	0.25	0.26	0.26	0.25	0.29	0.24
	Max	2.56	11.47	9.59	5.3	6.44	4.67

	Qt5 (n=81, 147)	Qt6 (n=76, 141)	Qt7 (n=70, 135)	Qt8 (n=63, 123)	Qt9 (n=62, 114)	Qt10 (n=55, 103)	Qt11 (n=48, 105)
	5.66	5.41	5.97	16.175	0.006	8.15	8.19
G1	-9.47	-9.02	-9.49	-8.2	-299.1	-10.39	-10.15
	23.34	18.42	28.56	505	18.139	87.04	52.63
	1.7	1.8	1.88	2.11	2.46	2.55	3.42
G2	0.27	0.27	0.25	0.24	0.27	0.26	0.38
	4.55	5.16	5.69	30.72	59.92	62.24	151.79

FIGURE 3
MEAN MTB FOR G1 (OVERVALUED) FIRMS AND G2 (UNDERVALUED) FIRMS

Mean MTB for firms wth HTA MTB: pre-announcement quarter and 12 quarters following the pre-announcement quarter

Mean MTB for firms wth LTA MTB: pre-announcement quarter and 12 quarters following the announcement quarter

Mean MTB for G1 (overvalued firms)   **Mean MTB for G2 (undervalued firms)**

We conducted two additional tests: The first one tests the difference in mean MTB for the above two subsamples (overvalued sample G1 and undervalued sample G2) 4, 8 and 12 quarters after the pre-announcement quarter. The specific model we use for the test is as follows:

$$M1(t_4, t_8, t_{12,}) = M2(t_4, t_8, t_{12,})\qquad\qquad(1)$$

Results (not presented in the paper) show that firms with G2 still have significantly lower MTB than G2 firms 4, 8 and 12 quarters after the pre-announcement quarter. Our second test involves testing the two subsamples (G1: overvalued firms and G2: undervalued firms) separately. Specifically, we test the following three models for each of the two subsamples.

Model 1: $MTB_{t+4} = a + \beta * MTB_t$ $\qquad\qquad$ (2)

Model 2: $MTB_{t+8} = a + \beta * MTB_t$ $\qquad\qquad$ (3)

Model 3: $MTB_{t+12} = a + \beta * MTB_t$ $\qquad\qquad$ (4)

Table 6 provides results for the above tests. Coefficients (β) in both model 1 and model 2 are statistically significant for both G1 (overvalued firms) and G2 (undervalued firms), with coefficients for G2 being greater than those for G1 in both models; moreover, the adjusted R values are also greater for the three models for G2 than for the three models for G1, suggesting that relatively more undervalued firms (before repurchasing behavior) are more likely to gain consistent market recognition of firm value. Coefficients (β) in models 3 are insignificant.

TABLE 6
ADDITIONAL TEST OF MTB FOR G1 (OVERVALUED) FIRMS AND G2 (UNDERVALUED) FIRMS

		G1 (overvalued firms)					G2 (undervalued firms)				
	N	Adj. R	F value	Intercept (a)	Slope (b)	N	Adj. R	F value	Intercept (a)	Slope (b)
Model 1	89	0.265	33.05	1.406	0.900***	158	0.575	213.53	-0.1996	1.292***
			(<0.001)	(0.1141)	(<0.001)			(<0.001)	(0.15)	(<0.001)
Model 2	69	0.060	5.43	3.424	0.534**	134	0.509	139.88	-0.217	1.446***
			(0.02)	(0.007)	(0.023)			(<0.001)	(0.2519)	(<0.001)
Model 3	46	-0.022	0.00	8.133	0.0366	105	-0.002	0.8	-0.1353	2.474
			(0.951)	(0.014)	(0.951)			(0.3727)	(0.9744)	(0.3727)

Note: Overvalued firms (G = 1)---firms with MTB higher than the industry average and Undervalued firms (G = 2)---firms with MTB lower than the industry average. Models used for the tests: Models: 1) $MTB_{t+4} = a + \beta*MTB_t$; 2) $MTB_{t+4} = a + \beta*MTB_t$; 3) $MTB_{t+4} = a + \beta*MTB_t$

CONCLUSION

This paper examined the firms that repurchased their own stocks during the year 2010-2015 and revisited the reasons why firms made repurchases using the "theory of the firms" and cost-benefit analysis framework and made an attempt to identify the differences that exist among repurchasing firms.

Empirical results support our first hypothesis and suggest that there is a significant positive market reaction to stock repurchase announcement (mean CAR (-5,5) = 1.3%; mean CAR (-10, 60) = 2.8%). Further, the negative CAR for these repurchasing firms before announcement turn into positive mean CAR after the announcement and there is a post-announcement drift suggesting the market underreaction to repurchase announcement.

We do not find that firms that made repurchases have lower market-to-book ratio than the matched firms with similar size in the same industry, suggesting that undervaluation may not be the sole reason for firms to repurchase, consistent with the findings of some prior research (Ikenberry et al 1995).

Further tests suggest that significant differences exist among repurchasing firms and that the repurchasing firms do not gain similar perception from the market in long-term performance. Specifically, more undervalued firms (Firms with originally Lower than average MTB) exhibit more consistent and solid increase in market value than the firms with less undervalued firms during the 12 quarters following the pre-announcement quarter, and their increase is faster than that of the less undervalued firms. Less undervalued firms (firms with originally Higher than average MTB) also show

increase in perceived firm value over the same period, however, the increase is less stable than that of the more undervalued firms.

Empirical results also support our third hypothesis that firms that repurchased their own stocks generally have higher institutional ownership than firms that did not make repurchases.

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