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WHY SHARE REPURCHASES ARE NOT A PANACEA FOR INCREASING SHARE PRICES

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ABSTRACT

This research examines factors deteriorating share price performance before and after repurchase announcements. We find share price performance before announcements can be attributed to operating performance and agency problems. But, operating performance is the primary factor determining undervaluation. We also find that, regardless of whether firms are undervalued before repurchase announcements, those that experience negative abnormal returns after repurchase announcements have inferior operating performance and lower buyback premiums. Our regression analysis shows that an improvement in future operating profits determines prosperous share price performance after repurchase announcements. Lack of investment, or those made with agency problems, better explain poor share-price performance.

JEL: G35, G14

KEYWORDS: Share Repurchase, Abnormal Returns, Operating Performance, Agency Problems

INTRODUCTION

Share repurchases have emerged as an important payout device in Taiwan since August 2000. However, the research on share repurchases in Taiwan is limited because most research focuses on repurchases in mature markets, such as the U.S. and U.K. One well-known motivation for announcing repurchases is that management expresses its disagreement with current share price performance (Brav, Graham, Harvey, and Michaely, 2005). Other studies advocate the signalling hypothesis and the free cash flow hypothesis. The former hypothesis predicts repurchase announcements as an intermediary to convey information about future improvement in earnings or profits (Grullon and Ikenberry, 2000). By contrast, the latter suggests that repurchases are carried out to disgorge excess free cash flow and mitigate agency problems existing in firms with fewer investment opportunities. The controversial propositions of previous studies and the versatile nature of share repurchases make us suspect that undervaluation preceding repurchase announcements is not merely a problem of mispricing. Instead, it may reflect investors' evaluation based on a certain under performance of repurchasing firms. For instance, undervaluation may result from agency problems existing in firms. Distributing excess cash flow by repurchase mitigates agency problems, which in turn increases future share price. Neglecting the existence of agency problems could lead to the conclusion that share repurchases convey information about undervaluation. Thus, discovering whether share price before repurchase announcements relates to firms' performance is helpful for understanding underlying reasons firms buy back. We presume that the share price relates to either operating performance or agency problems before repurchase announcements.

In addition, although good news is thought to be implicit in repurchase announcements, not all firms experience increases in share price after the announcements. Su and Lin (2012), who examine share repurchases in Taiwan, discover the long-term abnormal returns after repurchase announcements are negative. Little attention has been paid to the firms which experience negative abnormal returns after

repurchase announcements. This paper conjectures the phenomenon may result from either false information about future operating performance or the existence of agency problems.

Because repurchases are not expected to be a recurrent event, such as dividend announcements, firms that foresee a recession in or are less confident about future operating performance may mimic their competitors' payout policies and use repurchases to convey false signals (D'Mello and Shroff, 2000). Investors may not be capable of unravelling this information in the short term. However, a 12-month period should be enough for them to distinguish between true and false information. This research contrasts firms which have negative 12-month buy-and-hold abnormal returns after repurchase announcements with those which have positive abnormal returns to verify the conjecture. We expect to discover different firm characteristics existing between firms with positive and negative abnormal returns. Furthermore, we aim to identify determinants of share price after repurchase announcements.

We examine share repurchases announced by listed firms in Taiwan from 2000 to 2008. Our evidence shows that both operating performance and agency problems affect share price performance after repurchase, but the former factor primarily determines undervaluation. For both undervalued and non-undervalued firms, we found that those experiencing negative abnormal returns after repurchase had worse operating performance and buyback with lower premiums. The experience of positive abnormal returns after repurchase is more likely the reward for the improvement in operating profits. By comparison, lack of capital investments or those made by firms with agency problems deteriorates share price after repurchase, consistent with the free cash flow hypothesis. The rest of this paper is organised as follows: The next section reviews related literature on share repurchase. Next, we describe the data and the empirical method employed to detect factors affecting share price performance. The following section discusses the empirical results. The paper closes with some concluding comments.

LITERATURE REVIEW

Many empirical studies indicate that share repurchases that express management's disagreement with current prices successfully raise firm value afterwards. In the U.S. and Canadian markets, Ikenberry, Lakonishok, and Vermaelen (1995) and Ikenberry, Lakonishok, and Vermaelen (2000) find that positive long-term cumulative abnormal returns last for four years after share repurchases are announced, and their findings are more apparent for undervalued firms. In the U.K., Rau and Vermaelen (2002) and Oswald and Young (2004) show that abnormal returns following repurchases negatively relate to those preceding the announcements. In Taiwan, Chen, Kao, and Lin (2011) discover that undervaluation before repurchases is negatively associated with one-month and twelve-month abnormal returns after repurchase. Li and McNally (2003), Jagannathan and Stephens (2003), and Hatakeda and Isagawa (2004), among others, also provide evidence supporting the undervaluation hypothesis.

However, undervalued firms may announce share repurchases for other purposes. Both Dann, Masulis, and Mayers (1991) and Lie (2005) demonstrate an improvement in operating performance following repurchase announcements, supporting the signalling hypothesis. Lie and McConnell (1998) further present that the firms repurchased by Dutch auction have better operating performance than their competitors for five years following the repurchase. Evidence from Chen *et al.* (2011) indicates that improvement in operating profit explains both short- and long-term future abnormal returns. Hung and Chen (2010) find that undervalued firms with higher buyback prices experience better future operating performance for at least three years.

The free cash flow hypothesis, on the other hand, proposes that repurchases are carried out to disgorge excess free cash flow and mitigate agency problems existing in firms with fewer investment opportunities. Nohel and Tarhan (1998) show that firms with agency problems have better operating performance after disgorging free cash flow by repurchases. Dittmar (2000) applies the Tobit Model and examines a number of potential motivations for repurchases. She suggests that repurchases are carried out to release information

about undervaluation and disgorge excess cash flow. Fenn and Liang (2001) confirm that firms with fewer investment opportunities pay higher dividends or repurchase more shares. Grullon and Michaely (2004) suggest that mature firms normally have less investment opportunities and excess free cash flow. They buy back to distribute excess cash flow and signal their maturation. Mitchell and Dharmawan (2007) examine the Australian market and propose that reducing agency costs is more likely the motivation for large firms and firms that buy back a high percentage of shares. By contrast, small firms tend to repurchase to signal undervaluation. Although some studies simultaneously examine more than one motivation for repurchases, most neglect the potential relation that may exist between the motivations. This research presumes that undervaluation before repurchase announcements may result from poor operating performance or agency problems. We further argue that, particularly in the long term, share repurchase is not always an effective device to increase share price. We presume that share price performance is determined by improvement in operating performance or the existence of agency problems after repurchase announcements rather than repurchases *per se*.

DATA AND METHODOLOGY

This paper examines repurchase programmes announced by firms listed on the Taiwan Stock Exchange (TWSE) from August 2000 to the end of 2008. Details of repurchase programmes were acquired from the Market Observation Post System (MOPS) affiliated with the TWSE. The Taiwan Economic Journal database (TEJ) provided financial data and share prices of the firms. During the eight-year period, there were a total of 1,920 repurchase programmes announced by 468 firms. The firms listed in the finance sector, Taiwan Depositary Receipts (TDRs), Real Estate Investment Trusts (REITs) and foreign companies whose financial statements are reported in foreign currencies and were dropped from the sample. For those firms that announced a repurchase twice or more in a financial year, this research only adopted the first announcement. The sample does not contain announcements that were not carried out afterwards. After applying the above criteria, 858 firm-year observations were retained in the sample. In addition, a match firm-year within the same industry section was assigned for each firm-year observation based on the other two criteria:

Criteria 1-$0.25 \times (\mathrm{TA}_{\mathrm{RP\ firm}}) \leq \mathrm{TA}_{\mathrm{Match\ firm}} \leq 2 \times (\mathrm{TA}_{\mathrm{RP\ firm}})$

$$Min(|EBITDA_{RP\ Firm} - EBITDA_{Match\ Firm}|)$$

where TA denotes the total assets at the end of the year before repurchase announcements. EBITDA is earnings before interest, taxes, depreciation and amortisation at the end of the year before repurchase announcements scaled by TA. The first criterion ensures that both repurchase firms and match firms have similar firm size. The second criterion minimizes the divergence of EBITDA before repurchase announcements because the variable simultaneously reflects firms' operating performance and, to some extent, cash flow before deducting non-cash items and spending for interest and taxes. We expect firms with the same industry sector, similar firm size and operating performance should perform similarly in share price returns.

This research splits the observations respectively based on the buy-and-hold abnormal returns for 12 months before and after repurchase announcements (hereafter $BHAR_i(-12,-1)$ and $BHAR_i(1,12)$, respectively). We employed two benchmarks to estimate BHARs. The first benchmark was return of the Taiwan Capitalization Weighted Stock Index (i.e. market return). The second was the return of match firms. BHARs were calculated as the difference between the buy-and-hold returns of repurchase firm and each of the benchmarks over the given period. We designated firms with negative $BHAR_i(-12,-1)$ as undervalued firms. Those with positive $BHAR_i(-12,-1)$ were non-undervalued firms. Panel A and Panel B of Table 1, respectively, present the numbers of observations and share price performance of the groups formed by the market-adjusted BHARs and the match-firm-adjusted BHARs (hereafter match-adjusted BHARs). Because

similar patterns are shown in the two panels, we only discuss Panel A to keep the discussion compact. Panel A shows that 617 out of 858 observations were designated as undervalued firms (Group A), while 241 observations were non-undervalued (Group B). Group A experienced -34.28% $BHAR_i(-12,-1)$ on average, and Group B experienced 20.25%. When forming the groups by match-adjusted $BHAR_i(-12,-1)$, Panel B shows that 505 firms were undervalued before repurchase. The number of undervalued firms dominated 58.86% of the full sample, but they were slightly less than those presented in Panel A. The non-undervalued firms accounted for the other 41.14% of observations.

Table 1: Summary Statistics

Panel A: Market- adjusted BHARs				
Groups	**Group A (Undervalued)**		**Group B (Non-undervalued)**	
	$BHAR_i(-12,-1) < 0$		$BHAR_i(-12,-1) > 0$	
N	617		241	
% of the Sample	71.91%		28.09%	
Mean	-0.3448		0.2025	
Median	-0.2941		0.1533	
Groups	1	2	3	4
	$BHAR_i(1,12) < 0$	$BHAR_i(1,12) > 0$	$BHAR_i(1,12) < 0$	$BHAR_i(1,12) > 0$
N	249	368	109	132
% of the Group	40.36%	59.64%	45.23%	54.77%
Mean	-0.2537	0.3168	-0.2326	0.2629
Median	-0.2054	0.2597	-0.2026	0.2111
Panel B: Match-adjusted BHARs				
Groups	**Group A (Undervalued)**		**Group B (Non-undervalued)**	
	$BHAR_i(-12,-1) < 0$		$BHAR_i(-12,-1) > 0$	
N	505		353	
% of the Sample	58.86%		41.14%	
Mean	-0.3862		0.3123	
Median	-0.3103		0.2357	
Groups	1	2	3	4
	$BHAR_i(1,12) < 0$	$BHAR_i(1,12) > 0$	$BHAR_i(1,12) < 0$	$BHAR_i(1,12) > 0$
N	237	268	157	196
% of the Group	46.93%	53.07%	44.48%	55.52%
Mean	-0.3577	0.3811	-0.3275	0.4044
Median	-0.2836	0.3348	-0.2576	0.3204

Notes: The return of the Taiwan Capitalization Weighted Stock Index is the benchmark for the market-adjusted BHARs in Panel A. The return of the match firm in the same industry, with similar size and EBITDA performance is the benchmark for the match-adjusted BHARs in Panel B. N is the number of observations in each group.

This research further splits Group A and Group B based on whether their observations experienced negative BHARs after repurchase announcements (i.e. $BHAR_i(1,12)$). Panel A shows that 59.64% of the undervalued firms experienced positive BHARs of 31.68% in the 12 months after repurchase announcements (Group 2). By comparison, 40.36% of the undervalued firms continuously encountered negative BHARs of -25.37% (Group 1). We also found that 45.23% of the non-undervalued firms experienced negative BHARs afterwards (Group 3). The mean (median) $BHAR_i(1,12)$ for Group 3 was -23.26% (-20.26%), which was significantly different from zero (not shown in the table). The presence of Group 3 highlighted our primary question: why share repurchases do not always lift share price for repurchasing firms.

RESULTS AND DISCUSSION

Undervaluation and Firm Performance before Repurchase Announcements

This section examines whether undervaluation can be attributed to firm performance before repurchase announcements. If the undervaluation essentially results from the market's incorrect or irrational pricing, we predict that undervalued and non-undervalued firms have similar performance in operating profits, free cash flow, or capital expenditures. The examinations were carried out by contrasting both raw performance and match-adjusted performance. We computed match-adjusted performance as the difference between the performance of repurchasing firms and match firms. The examination of the match-adjusted performance took account of the fact that investors' evaluations of firm value may vary with changes in economy and industry conditions across years. For example, a drop in annual earnings is not favourable information, but it happens to a majority of firms in a recessionary period. In this scenario, one should compare a firm's performance to its competitors' when evaluating firm value. The change in operating profits over the four quarters before repurchase announcements ($\Delta OP_{i,t-1}$) was employed to measure operating performance, which was already known when firms announce share repurchases. Employment of the four-quarter financial items rather than year-end annual items helped reflect more recent firm performance. If undervaluation resulted from poor operating performance, non-undervalued firms were predicted to have higher $\Delta OP_{i,t-1}$ than undervalued firms.

In addition, change in free cash flow ($\Delta FCF_{i,t-1}$) and capital expenditures ($CE_{i,t-1}$) over the four quarters before repurchase announcements were employed to determine whether repurchasing firms suffer from agency problems. We compute free cash flow as cash flow from operating activities less net investment in fixed assets, interest payments, and taxes. Capital expenditures include net spending on long-term investment and fixed assets. Firms with fewer investment opportunities tend to have higher free cash flow and fewer capital expenditures. Without announcing repurchase and disgorging excess cash flow, management may abuse free cash flow and invest in negative NPV programs, decreasing firm value. If undervaluation results from agency problems, the free cash flow hypothesis predicts that undervalued firms should have higher $\Delta FCF_{i,t-1}$ and lower $CE_{i,t-1}$.

Table 2 shows that the main divergence between undervalued firms (Group A) and non-undervalued firms (Group B) was found amid the change in operating profits ($\Delta OP_{i,t-1}$). While non-undervalued firms experienced positive $\Delta OP_{i,t-1}$ of 0.0129, undervalued firms had negative $\Delta OP_{i,t-1}$ of -0.0091. The difference in match-adjusted $\Delta OP_{i,t-1}$ also suggests that non-undervalued firms outperformed undervalued firms in operating profits before repurchase announcements. In addition, Table 2 shows that non-undervalued firms had an increase in free cash flow (0.0172) that was significantly higher than the change in free cash flow of undervalued firms (-0.0023). However, no significant difference was found for match-adjusted $\Delta FCF_{i,t-1}$ between the two groups. We developed the following model to examine whether firm performance directly influences $BHAR_i(-12,-1)$:

$$BHAR_i(-12,-1)=\alpha+\beta_1\Delta OP_{i,t-1}+\beta_2\Delta FCF_{i,t-1}+\beta_3\Delta FCF_{i,t-1}*DQ+\beta_4 CE_{i,t-1}+\beta_5 CE_{i,t-1}*DQ+\varepsilon_{i,t-1} \quad (1)$$

where DQ is a dummy of Tobin's Q employed as a proxy for agency problems. Tobin's Q is calculated as the ratio of market to book value of total assets. The dummy variable takes the value of one when the Q ratio is smaller than one, an indication of agency problems, and zero otherwise. The inclusion of the interaction variables, $\Delta FCF_{i,t-1}*DQ$ and $CE_{i,t-1}*DQ$, examined whether the existence of agency problems with free cash flow or capital expenditures caused undervaluation before repurchase announcements. We respectively regressed market-adjusted $BHAR_i(-12,-1)$ on raw variables and match-adjusted $BHAR_i(-12,-1)$ on match-adjusted variables.

Table 2: Contrasting Firm Performance before Repurchase Announcements

		Group A		Group B		T	Z
		Mean	Median	Mean	Median		
Panel A: Groups formed by market-adjusted BHARs							
Raw Variables	$\Delta OP_{i,t-1}$	-0.0091	-0.0051	0.0129	0.0082	-7.245***	-7.567***
	$\Delta FCF_{i,t-1}$	-0.0023	-0.0028	0.0172	0.0125	-2.443**	-2.610***
	$CE_{i,t-1}$	0.0263	0.0119	0.0228	0.0108	0.856	-1.180
Panel B: Groups formed by match-adjusted BHARs							
Match-adjusted Variables	$\Delta OP_{i,t-1}$	-0.0186	-0.0101	0.0133	0.0078	-7.612***	-7.512***
	$\Delta FCF_{i,t-1}$	0.0039	0.0021	-0.0038	0.0036	0.679	-0.183
	$CE_{i,t-1}$	0.0009	0.0006	0.0008	-0.0001	0.018	-1.481

*Notes: The significance levels of the means and medians are based on two-tailed t-test and Wilcoxon signed rank test. The significance at 0.01, 0.05 and 0.1 levels are marked with ***, **, and * respectively.*

For the full sample, Table 3 shows that both operating performance and agency problems affected BHARs before repurchase announcements. The coefficient estimates for $\Delta OP_{i,t-1}$ in Columns 1 and 2 were 1.637 and 2.213, respectively, both of which are significant at one percent level. The strong effect found for $\Delta OP_{i,t-1}$ indicated that share price performance before repurchase is primarily associated with firms' operating performance. The negative coefficient estimates found for the interaction variables, $\Delta FCF_{i,t-1}$*DQ and $CE_{i,t-1}$*DQ, suggest that increases in free cash flow or capital expenditures associated with agency problems deteriorated BHARs before repurchase. For undervalued firms, Columns 3 and 4 show that change in operating profits ($\Delta OP_{i,t-1}$) appeared to be the primary factor determining $BHAR_i(-12,-1)$. Column 3 also shows the coefficient estimate for the interaction variable of $CE_{i,t-1}$*DQ was -0.968 and marginally significant, indicating the presence of agency problems hampers the positive effect of capital expenditures on share price before repurchase announcements.

Table 3: Determinants of Abnormal Returns before Repurchase Announcements

Variables	Expt. sign	Full Sample		Group A		Group B	
		(1)	(2)	(3)	(4)	(5)	(6)
$\Delta OP_{i,t-1}$	+	1.637***	2.213***	1.082***	1.987***	-0.696	0.855**
		(4.07)	(6.19)	(3.55)	(5.52)	(-1.17)	(2.56)
$\Delta FCF_{i,t-1}$	+	0.261	-0.003	-0.044	-0.095	0.573**	0.215
		(1.11)	(-0.02)	(-0.20)	(-0.49)	(2.01)	(0.89)
$\Delta FCF_{i,t-1}$*DQ	-	-0.793**	-0.300	-0.406	-0.133	-0.139	-0.023
		(-2.54)	(-0.94)	(-1.50)	(-0.46)	(-0.32)	(-0.08)
$CE_{i,t-1}$	+	0.175	-0.040	0.440	-0.078	0.378	0.713
		(0.51)	(-0.07)	(1.15)	(-0.19)	(1.36)	(1.40)
$CE_{i,t-1}$*DQ	-	-1.330**	0.154	-0.968*	0.033	0.686	-0.334
		(-2.49)	(0.23)	(-1.87)	(0.06)	(1.02)	(-0.35)
R^2		0.077	0.101	0.074	0.139	0.082	0.082
F- Statistics		5.80***	8.15***	4.41***	6.54***	1.84	2.25*
Observations		853	853	614	502	239	351

*Notes: For Column 1, 3, and 5, the dependent variable is market-adjusted BHARs and the explanatory variables are raw variables. For Column 2, 4, and 6, the dependent variable is match-adjusted BHARs, and the explanatory variables are match-adjusted variables which are the paired differences between the performance of the repurchase firms and the performance of their match firms. Expt. sign is the expected signs of coefficients based on the predictions of the hypotheses. The model is estimated by fixed-effect approach. Standard errors are robust to heteroscedasticity. The t-statistics are in parentheses. The significance at 0.01, 0.05 and 0.1 levels are marked with ***, **, and * respectively.*

The findings suggest that the market's irrational pricing or mispricing is unlikely the primary factor responsible for undervaluation. For non-undervalued firms, the change in match-adjusted operating profits and the change in free cash flow had a positive effect on BHARs before repurchase. Column 6 shows the coefficient for match-adjusted $\Delta OP_{i,t-1}$ was 0.855 with significance at the five percent level. The effect of

$\Delta OP_{i,t-1}$ for non-undervalued firms was not as explicit as that for undervalued firms. It may have resulted from the fact that investors normally react more strongly to bad news than to good news. Additionally, Column 5 shows that change in free cash flow was positively associated with BHARs before repurchase announcements. For non-undervalued firms, the increase in free cash flow does not cause agency problems which would deteriorate share price. The result implies that signalling for operating performance could be the primary purpose for non-undervalued firms to repurchase.

Factors Affecting Share Price after Repurchase Announcements for Undervalued Firms

As the findings in Table 3 suggest that poor performance in operating profits is the primary factor causing undervaluation before repurchase announcements, we presumed that undervalued firms announced repurchases to signal better prospects for future operating performance. The experience of negative BHARs after repurchase announcements was a penalty for failing to achieve the announcements signalled performance. The marginal and negative interaction effect found for capital expenditures and agency problems in Table 3 also indicates that the continuous existence of agency problems could also be the factor determining share price after repurchase.

According to the signalling hypothesis, we presumed that firms with negative abnormal returns after repurchase announcements (Group 1) have worse operating performance than those with positive abnormal returns (Group 2). Post-announcement operating performance was measured by the changes in operating profits over the four quarters after repurchase announcements (including the event quarter). The change in free cash flow ($\Delta FCF_{i,t}$) and the capital expenditures ($CE_{i,t}$) over the four quarters after repurchase announcements were employed to examine the free cash flow hypothesis.

After repurchase, Group 1 was predicted to retain more free cash flow and have less capital expenditure, both of which may cause agency problems and a decline in share price. In addition, we contrasted buyback premium ($PM_{i,t}$) and repurchase ratio ($RP_{i,t}$) to find out whether increases in cash payouts by repurchase could please investors and lift share price for a 12-month period. Buyback premium ($PM_{i,t}$) was calculated by subtracting one from the ratio of the average buyback price to the announcement day share price. Repurchase ratio ($RP_{i,t}$) was calculated as the ratio of payouts on repurchase to market capitalisations on the announcement day.

A different extent of undervaluation may affect BHARs after repurchase. To control for this effect, we contrasted $BHAR_i(-12,-1)$ to ensure the two groups had similar return performance before repurchase announcements. Table 4 shows the main differences between the two groups existed in the change in operating profits after repurchase announcements ($\Delta OP_{i,t}$) and buyback premium ($PM_{i,t}$). Although both Group 1 and Group 2, on average, experienced a decline in operating profits after repurchase, Group 1 had worse performance. The divergence becomes larger when $\Delta OP_{i,t}$ is adjusted by the performance of match firms. Group 2 clearly outperformed Group 1 in the change in market-adjusted operating profits after repurchase announcements. Higher mean and median buyback premiums ($PM_{i,t}$) were also found for Group 2, regardless of whether the groups were formed by market- or match-adjusted BHARs. In addition, Table 4 shows that Group 2 had a larger median $\Delta FCF_{i,t}$ (0.0220) and higher median match-adjusted $CE_{i,t}$ (0.0013) than Group 1. The latter result is consistent with the free cash flow hypothesis prediction.

To discover whether differences between the two groups directly affected share price performance after repurchase announcements, we developed the following regression model:

$$BHAR_i(1,12)=\alpha+\gamma_1\Delta OP_{i,t}+\gamma_2\Delta FCF_{i,t}+\gamma_3 CE_{i,t}+\gamma_4 CE_{i,t}*DQ+\gamma_5 BHAR_i(-12,-1)+\gamma_6 PM_{i,t}+\gamma_7 RP_{i,t}+\varepsilon_{i,t} \quad (2)$$

where the change in operating profits after repurchase announcements ($\Delta OP_{i,t}$) was predicted to have a positive effect on $BHAR_i(1,12)$ if share repurchases were announced to signal future operating performance. On basis of the free cash flow hypothesis, we presumed that disgorging free cash flow by repurchase and high capital expenditures would mitigate agency problems and result in an share-price increase. Inclusion of the interaction variable of capital expenditure and agency problem ($CE_{i,t}$*DQ) was to examine whether investments of a firm with agency problems have negative effects on share price after repurchase. The inclusion of $BHAR_i(-12,-1)$ examined whether undervaluation was followed by a bounce back in share price after repurchase. Buyback premium ($PM_{i,t}$) and repurchase ratio ($RP_{i,t}$), on the other hand, were included to examine whether increasing cash payouts by repurchase could successfully lift share price. Market-adjusted and match-adjusted $BHAR_i(1,12)$ were respectively regressed on raw and match-adjusted explanatory variables.

Table 4: Contrasting Firm Performance after Repurchase Announcements – Undervalued Firms

		Group 1		Group 2		T	Z
		Mean	**Median**	**Mean**	**Median**		
Panel A: Groups Formed by Market-Adjusted BHARS							
Raw Variables	$\Delta OP_{i,t}$	-0.0170	-0.0125	-0.0028	0.0000	-4.521***	-5.201***
	$\Delta FCF_{i,t}$	0.0152	0.0064	0.0268	0.0220	-1.299	-2.183**
	$CE_{i,t}$	0.0210	0.0093	0.0197	0.0087	0.361	-0.228
	$BHAR_i(-12,-1)$	-0.3479	-0.2924	-0.3427	-0.2991	-0.246	-0.145
	$PM_{i,t}$	0.2505	0.1911	0.3710	0.2869	-3.277***	-3.176***
	$RP_{i,t}$	0.0291	0.0223	0.0283	0.0227	0.384	-0.129
Panel B: Groups Formed by Match-Adjusted BHARS							
Match-adjusted Variables	$\Delta OP_{i,t}$	-0.0249	-0.0158	0.0102	0.0055	-6.044***	-6.670***
	$\Delta FCF_{i,t}$	-0.0042	-0.0082	0.0008	0.0069	-0.315	-0.616
	$CE_{i,t}$	-0.0051	-0.0017	0.0014	0.0013	-1.256	-2.269**
	$BHAR_i(-12,-1)$	-0.3869	-0.3078	-0.3855	-0.3110	-0.047	-0.297
	$PM_{i,t}$	0.3149	0.2457	0.3936	0.3219	-1.883*	-2.271**
	$RP_{i,t}$	0.0263	0.0189	0.0292	0.0223	-1.304	-1.420

*Notes: $BHAR_i(-12,-1)$ is twelve-month buy-and-hold returns adjusted by market returns (Panel A) or returns of the match firms (Panel B). Match-adjusted variables are the paired differences between the performance of the repurchase firms and the performance of their match firms. The significance levels of the means and medians are based on two-tailed t-test and Wilcoxon signed rank test. The significance at 0.01, 0.05 and 0.1 levels are marked with ***, **, and * respectively*

Table 5 shows that, for the full sample, the change in operating profits ($\Delta OP_{i,t}$) had significant and positive effects on $BHAR_i(1,12)$. The coefficients for $\Delta OP_{i,t}$ in Columns 1 and 2 were 2.060 and 2.435, both of which were predominant in explaining $BHAR_i(1,12)$ for the full sample. The effect of capital expenditures ($CE_{i,t}$) for those firms with existing agency problems was inconclusive. Column 2 in Table 5 shows that match-adjusted $CE_{i,t}$ appeared to induce positive BHARs after repurchase announcements. For firms with existing agency problems, match-adjusted BHARs decreased with match-adjusted $CE_{i,t}$. On the other hand, Column 1 shows that the interaction variable $CE_{i,t}$ *DQ is positively associated with market-adjusted $BHAR_i(1,12)$. This finding is contrary to the prediction of the free cash flow hypothesis. In addition, the negative relation between BHARs before and after repurchase announcements indicated that more negative abnormal returns before the announcements are followed with a larger reverse afterwards.

For undervalued firms, the change in operating profits ($\Delta OP_{i,t}$) is the only factor that simultaneously affects $BHAR_i(1,12)$ for both Group 1 and Group 2. The coefficient for $\Delta OP_{i,t}$ in Column 4 is 1.253 with significance at the ten-percent level. The effect suggests that undervalued firms experience a decline in share price after repurchase announcements partially due to their poor operating performance. Column 4

also presents that coefficient estimates for the change in match-adjusted free cash flow ($\Delta FCF_{i,t}$) and match-adjusted $CE_{i,t}$ *DQ were -0.368 and -1.975, both of which were significant at the ten percent level. These findings suggest that while agency problems exist in undervalued firms, increases in free cash flow and high capital investment are likely to decline BHARs after repurchase announcements. The evidence is consistent with the prediction of the free cash flow hypothesis. In addition, the significantly negative coefficient for repurchase ratio ($RP_{i,t}$) in Column 4 implies that without decent operating performance, management cannot please investors by increasing the repurchase ratio.

Table 5: Determinants of Abnormal Returns after Repurchase Announcements – Undervalued Firms

Variables	Expt.	Full Sample		Group 1		Group 2	
	sign	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta OP_{i,t}$	+	2.060***	2.435***	1.009	1.253*	1.339*	1.103**
		(4.65)	(5.74)	(1.56)	(1.86)	(1.81)	(2.12)
$\Delta FCF_{i,t}$	-	0.199	-0.080	0.026	-0.368*	0.290*	0.077
		(1.41)	(-0.59)	(0.11)	(-1.70)	(1.77)	(0.26)
$CE_{i,t}$	+	-0.782	1.374***	-1.193	0.765	0.592	-1.427
		(-1.35)	(2.68)	(-1.28)	(0.92)	(1.12)	(-0.67)
$CE_{i,t}$ *DQ	-	1.201**	-1.489*	1.485*	-1.975*	-0.997	2.402
		(2.21)	(-1.69)	(1.94)	(-1.81)	(-0.81)	(0.94)
$BHAR_i(-12,-1)$	-	-0.286***	-0.046	-0.164	-0.126	-0.184	-.0414
		(-5.98)	(-0.83)	(-1.27)	(-0.91)	(-1.12)	(-0.31)
$PM_{i,t}$	+	0.010	-0.008	-0.117	0.162	0.141	0.154*
		(0.22)	(-0.18)	(-1.36)	(1.14)	(1.53)	(1.66)
$RP_{i,t}$	+	-0.390	0.904	0.846	-5.053**	1.859	0.276
		(-0.64)	(0.91)	(1.47)	(-2.53)	(1.63)	(0.16)
R^2		0.127	0.120	0.157	0.214	0.118	0.146
F- Statistics		11.66***	6.59***	4.18***	2.41**	1.87*	1.64
Observations		853	853	248	236	366	266

*Notes: For column 1, 3, and 5, the dependent variable is market-adjusted BHARs and the explanatory variables are raw variables. For Column 2, 4, and 6, the dependent variable is match-adjusted BHARs, and the explanatory variables are match-adjusted variables. Expt. sign is the expected signs of coefficients based on the predictions of the hypotheses. The model is estimated by fixed-effect approach. Standard errors are robust to heteroscedasticity. The t-statistics are in parentheses. The significance at 0.01, 0.05 and 0.1 levels are marked with ***, **, and * respectively.*

Columns 5 and 6 present a more prominent effect of the change in operating profits ($\Delta OP_{i,t}$) for Group 2 than for Group 1. Buyback premium ($PM_{i,t}$) and the change in free cash flow ($\Delta FCF_{i,t}$) were the other positive factors that affected $BHAR_i(1,12)$, but the effects were weaker than $\Delta OP_{i,t}$. The evidence for Group 2 suggests that improvement in operating performance is the primary factor leading to positive returns after repurchase, while increases in free cash flow and buyback premium also favour share price. Combined with the findings in Table 3, the evidence for undervalued firms implies that operating performance is the primary factor determining share price after repurchase. The evidence supports our initial presumption, which suggested that repurchases announced by undervalued firms may either signal improvement in operating performance or the release of false information. Apparently, firms which did not have satisfying operating performance were penalised with negative BHARs after repurchase. In addition, we found the free cash flow hypothesis was only capable of explaining share price performance for Group 1. Group 2, which experienced positive BHARs after repurchase. This finding was well predicted by the signalling hypothesis.

Factors Affecting Share Price after Repurchase Announcements of Non-Undervalued Firms

We repeated the examinations and estimated Model 2 for non-undervalued firms. Particularly for non-undervalued firms that experienced positive BHARs before repurchase announcements, we attempted to discover the factors causing disappointing share price performance after repurchase announcements. Table 6 demonstrates that Group 3, which experienced negative BHARs after repurchase announcements, had worse operating performance than Group 4. Group 3 not only experienced a decline in operating profits (-0.0166) but also a decline in adjusted operating profits (-0.0138). It is unlikely that Group 3 announced repurchases to signal improvement in operating profits. Instead, it seemed to be releasing false information

or trying to please investors with repurchase payouts. Even if Group 3 repurchased to please investors, Group 4 on average paid a buyback premium ($PM_{i,t}$) of 0.6080, which was much higher than the 0.3128 of Group 3. For Group 3, the costs of repurchase perhaps were too high to mimic.

Table 6: Contrasting Firm Performance after Repurchase Announcements – Non-Undervalued Firms

		Group 3		Group 4		T	Z
		Mean	Median	Mean	Median		
Panel A: Groups Formed By Market-Adjusted Bhars							
Raw Variables	$\Delta OP_{i,t}$	-0.0166	-0.0093	0.0000	0.0024	-2.699***	-3.687***
	$\Delta FCF_{i,t}$	0.0049	0.0042	-0.0032	0.0033	0.622	-0.051
	$CE_{i,t}$	0.0241	0.0084	0.0261	0.0128	-0.312	-0.086
	$BHAR_i(-12,-1)$	0.2197	0.1811	0.1882	0.1403	1.432	-1.420
	$PM_{i,t}$	0.3828	0.3365	0.6080	0.4761	-3.481***	-2.970***
	$RP_{i,t}$	0.0278	0.0178	0.0286	0.0227	-0.266	-0.620
Panel B: Groups Formed By Match-Adjusted Bhars							
Match-adjusted	$\Delta OP_{i,t}$	-0.0138	-0.0141	0.0136	0.0128	-4.983***	-5.374***
Variables	$\Delta FCF_{i,t}$	0.0069	-0.0106	0.0073	0.0015	-0.026	-0.446
	$CE_{i,t}$	-0.0064	0.0000	0.0065	0.0004	-1.901*	-1.408
	$BHAR_i(-12,-1)$	0.3022	0.2199	0.3205	0.2385	-0.623	-0.297
	$PM_{i,t}$	0.3541	0.2946	0.4345	0.2931	-1.520	-1.823*
	$RP_{i,t}$	0.0289	0.0205	0.0301	0.0251	-0.439	-1.210

*Notes: $BHAR_i(-12,-1)$ is twelve-month buy-and-hold returns adjusted by market returns (Panel A) or returns of the match firms (Panel B). Match-adjusted variables are the paired differences between the performance of the repurchase firms and the performance of their match firms. The significance levels of the means and medians are based on two-tailed t-test and Wilcoxon signed rank test. The significance at 0.01, 0.05 and 0.1 levels are marked with ***, **, and * respectively.*

Table 7 presents the factors determining share price performance after repurchase announcements for non-undervalued firms. Columns 1 and 2 show that the change in operating profits after repurchase announcements ($\Delta OP_{i,t}$) was not the primary factor responsible for negative $BHAR_i(1,12)$ for Group 3. Instead, the negative $BHAR_i(1,12)$ can be attributed to the change in free cash flow ($\Delta FCF_{i,t}$) and capital expenditures ($CE_{i,t}$). Column 2 demonstrates that $\Delta FCF_{i,t}$ was positively associated with $BHAR_i(1,12)$, which implies a decline in free cash flow would cause a share price decrease after repurchase announcements. Moreover, the coefficient estimates for $CE_{i,t}$ in columns 1 and 2 are 0.883 and 1.823, respectively. The latter estimate was significant at one-percent level.

The positive effect found for $\Delta FCF_{i,t}$ and $CE_{i,t}$ may imply that investors prefer firms in Group 3 to retain more free cash flow for future investment. Relatively, the coefficient estimates for the interaction variable, $CE_{i,t}$ *DQ, were -2.751 and -0.109. In Column 1, the prominent and negative interaction effect indicates that investments made by firms with existing agency problems were important factors causing negative BHARs after repurchase announcements. In addition, the positive coefficient of $BHAR_i(-12,-1)$ in Column 2 suggests that worse share price performance before repurchase announcements would generate more negative BHARs after the announcements. By comparison, the positive $BHAR_i(1,12)$ of Group 4 were primarily determined by the change in operating profits ($\Delta OP_{i,t}$) and capital expenditures ($CE_{i,t}$). Consistent with signalling hypothesis predictions, Column 3 shows that an increase in operating profits resulted in positive abnormal returns after repurchase announcements. In addition, for firms in Group 4, it seems that high capital expenditures were not what investors looked forward to, as the coefficient estimate for capital expenditures in Column 4 was negatively associated with $BHAR_i(1,12)$. Column 4 also shows that an increase in free cash flow had little effect on $BHAR_i(1,12)$. Both of the results opposed the prediction of the free cash flow hypothesis.

Implications of the evidence for non-undervalued firms are twofold. The signalling hypothesis was appropriately predicted Group 4 but not Group 3. Although members of Group 3 were found to have inferior operating performance to those of Group 4 and their competitors, the change in operating performance was not the primary factor leading to negative abnormal returns after repurchase. The free cash flow hypothesis better predicted Group 3. High capital expenditures could remedy the poor share price performance after

repurchase announcements, but those spent by firms with existing agency problems could decrease share price.

Table 7: Determinants of Abnormal Returns after Repurchase Announcements – Non-Undervalued Firms

Variables	Expt. Sign	Group 3		Group 4	
		(1)	(2)	(3)	(4)
$\Delta OP_{i,t}$	+	-0.155	0.786	2.884***	1.783
		(-0.47)	(1.34)	(3.73)	(0.85)
$\Delta FCF_{i,t}$	-	0.690	0.609***	0.391	0.789*
		(1.47)	(4.12)	(1.02)	(1.85)
$CE_{i,t}$	+	0.883	1.823***	-1.413	-3.274***
		(1.16)	(3.50)	(-0.67)	(-3.36)
$CE_{i,t}$ *DQ	-	-2.751***	-0.109	2.948	1.452
		(-2.87)	(-0.17)	(1.12)	(0.73)
$BHAR_i(-12,-1)$	+	-0.140	0.448***	0.220*	0.353
		(-1.33)	(3.00)	(1.87)	(1.63)
$PM_{i,t}$	+	0.103	-0.058	-0.007	-0.114
		(1.19)	(-1.08)	(-0.12)	(-0.82)
$RP_{i,t}$	+	0.624	-0.847	-0.994	-0.271
		(0.36)	(-0.47)	(-0.91)	(-0.17)
R^2		0.398	0.486	0.314	0.200
F- Statistics		6.94***	12.39***	4.04***	2.98
Observations		108	156	131	195

*Notes: For Column 1, 3, and 5, the dependent variable is market-adjusted BHARs and the explanatory variables are raw variables. For Column 2, 4, and 6, the dependent variable is match-adjusted BHARs, and the explanatory variables are match-adjusted variables. Expt. sign is the expected signs of coefficients based on the predictions of the hypotheses. The model is estimated by fixed-effect approach. Standard errors are robust to heteroscedasticity. The t-statistics are in parentheses. The significance at 0.01, 0.05 and 0.1 levels are marked with ***, **, and * respectively.*

CONCLUSIONS

While share repurchases have been wildly considered a useful device to lifting share price, this research examines why some firms do not experience an increase in share price after announcing repurchases. We presume that pre-announcement undervaluation is not necessarily due to investors' mispricing. The undervaluation could result from poor operating performance or agency problems. Similarly, we presume that poor future operating performance or the continuous existence of agency problems could be determinants which make some repurchasing firms experience poor share price performance after repurchase announcements. By examining 1,920 repurchase announcements released by 468 firms during the period of 2000 to 2008, this research contrasts the operating performance, free cash flow and capital expenditures before and after repurchase announcements. Furthermore, regression models are formed to directly examine whether the variables explain long-term abnormal returns before or after repurchase announcements. Our findings indicate that, before repurchase announcements, undervaluation primarily results from poor operating performance. The existence of agency problems also has marginal and negative effect on the share price. The findings, therefore, support our presumption that undervaluation is not merely a problem of mispricing, so share repurchase announcements may convey additional information other than management's disagreement with current share price.

Furthermore, regardless of whether firms are undervalued before repurchase announcements, those that experience negative abnormal returns after the announcements tend to have worse operating performance and lower buyback premiums. For undervalued firms, poor operating performance, as well as agency problems and high repurchase ratio, are responsible for negative abnormal returns after repurchase. Positive abnormal returns after repurchase announcements are primarily explained by improvement in operating profits. For non-undervalued firms, it seems that investors prefer more free cash flow retained for future investments. However, investments made with the presence of agency problems become the primary factors causing negative abnormal returns after repurchase announcements. While this research tried to comprehensively examine potential factors affecting share price and abnormal returns before and after repurchase announcements, there are still other motivations for repurchase announcements which merit

further consideration. This research focuses on undervaluation, signalling and free cash flow hypothesis. Other factors, such as increases in earnings per share or debt ratio after repurchases, may also affect share price performance (Brav *et al.*, 2005). In addition, the repurchase approach could also convey different information which in turn influences subsequent share price (Louis and White, 2007). However, share repurchases in Taiwan are only carried out by open-market repurchases, which is another limitation of this research. Future research is suggested to take account these factors when examining the determinants of share price performance around repurchase announcements.

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