

# **Taiwanese Firms' Motives for Repurchasing Shares\***

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**Abstract:** Taiwanese firms must follow strict regulations when implementing repurchase programs. In this paper, the factors affecting a firm's decision to announce a repurchase program are analyzed. A data set of 3,440 repurchase programs conducted by Taiwanese firms from 2000 to 2011 was collected. A repurchasing firm is characterized by a higher ratio of retained earnings to total equity, a lower leverage, and a larger size than an otherwise firm. The paper's findings support the life cycle theory of payouts, as well as current theory relating to repurchases. Further, while there exists a complementary relation between dividends and repurchases in the OTC market, there is no such effect in the main TWSE market. Finally, no evidence supporting the free cash flows hypothesis was found; that is, there is no correlation between the ratio of cash to total assets and the decision to repurchase.

**Key words:** dividends; life cycle; payout policy; repurchases; Taiwan **JEL codes:** G32, G35

## **1. Introduction**

On 19 March 2012, the largest corporation in the world (in terms of market value), Apple Inc., announced its first share repurchase program since 1997. According to the press statement released by the board of directors, the magnitude of the repurchase plan was US\$10 billion and it was expected to be executed over the subsequent three years. Consequently, during Apple's fiscal quarter ending 28 Sept 2013, the value of retired Apple stocks was US\$4.7 billion, while the aggregate dividends distributed by Apple were US\$2.8 billion. The former resulted in US\$3.05 per share of dividends and the latter resulted in US\$8.26 per share of repurchases in that quarter (Source: The Apple Info from http://www.apple.com/ and the Microsoft website http://www.microsoft.com/investor/).

If one relied on the dividends per share of Apple (suppose that its earnings was unknown) and the price/earnings ratio of Microsoft (roughly 14) to anticipate Apple's share price, then the anticipated price would have been US\$171 based on dividends per share. On the other hand, the anticipated price was US\$633 based on the total payouts per share (US\$11.31). The actual price of Apple ranged from US\$400 to US\$580 during the final

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six months of 2003. This fact demonstrates the predominant role of repurchases as a payout form. (Note that the current market value of Apple is around US\$450 billion, while that of Microsoft is around US\$300 billion. Moreover, Microsoft announced a new share repurchase program of US\$40 billion on 17 Sept 2013.)

In fact, the payout policy of Apple is not an anomaly at all, and this practice can be traced back a decade. Moreover, the significance of share repurchases has been well-recognized in academic circles. A cursory glance at research handbooks on finance indicates that the traditional term of "dividend policy" has been replaced by "payout policy." For example, the chapter written by Allen and Michaely (1995) is entitled "dividend policy", whereas its follow-up chapter, still written by Allen and Michaely, is entitled "payout policy" (Allen & Michaely, 2003). This change of terminology is best explained by the aggregate magnitude of share repurchases in the U.S. market being larger than that of dividends (Allen & Michaely, 2003; Kalay & Lemmon, 2007).

Before 1984, the annual aggregate dollar amount of repurchases in the U.S. was always below US\$10 billion; however, there was an upsurge in 1984, with an annual amount of nearly US\$30 billion (DeAngelo, DeAngelo & Skinner, 2000, p. 344). Thereafter, it steadily increased, reaching US\$233 billion in 2004, which substantially exceeded the corresponding value of dividends by 18%. The legislation of Rule 10b-18 of the Securities Exchange Act Release No. 19244 (Nov. 17, 1982) is held accountable for this prevailing tendency. Rule 10b-18 furnishes U.S. firms with explicit guidelines on buying back shares so as to safeguard against violating the anti-manipulative provisions of the Securities Exchange Act of 1934 (Grullon & Michaely, 2002). Just one year after the approval of Rule 10b-18, the aggregate value of repurchases tripled. Since then, the aggregate magnitude of share repurchases in the U.S. market has created consecutive record highs. The advantages of distributing earnings through repurchases over dividends include undervaluation signaling, a relatively lighter tax burden, and the maintenance of financial flexibility (See Allen & Michaely (2003) for a comprehensive survey).

Taiwanese firms have been allowed to buy back their own shares since August 2000, following the amendment of Article 28 of the Securities and Exchange Act (SEA) and the implementation of the Regulations Governing Share Repurchase.<sup>1</sup> In the first year following the enacting of these regulations, about one quarter of firms listed on either the Taiwan Stock Exchange (TWSE) or the Gretai Securities Exchange (traditionally called the Over-the-Counter market, OTC)<sup>2</sup> announced share repurchase programs within the following five months. Substantially differing from the U.S. market, Taiwanese regulations mandate strict and detailed guidelines for the repurchasing process.

According to the regulations, when a firm's board of directors authorizes a repurchase program, it should submit a detailed report to both the Financial Supervisory Commission (FSC) and the Market Observation Post System (MOPS, a bulletin system accessible to the public)<sup>3</sup>. On expiration of the repurchase period, or within five days of completion of the program, the repurchaser is required to submit another report to both the FSC and the MOPS specifying the status of the repurchase program. In particular, the firm should provide an explanation for not fully executing the program if it does not buy back the number of shares as it has originally proclaimed to do. In contrast, Rule 10b-18 imposes much less strict regulations on U.S. firms. Rule 10b-18 requires that U.S. repurchasing firms should publicly announce the program, only use one broker or dealer on any single day, avoid

<sup>&</sup>lt;sup>1</sup> The contents of the Act and the Regulations are available at http://law.moj.gov.tw/.

<sup>&</sup>lt;sup>2</sup> However, both the market value of capital and the annual payout value of OTC-listed firms are less than 7% of the TWSE-listed firms. Their listing criteria are available at http://eng.selaw.com.tw/.

<sup>&</sup>lt;sup>3</sup> The MOPS is available at http://mops.twse.com.tw/. This system is similar to the EDGAR of the American SEC, whereas the FSC is the Taiwanese counterpart of the SEC.

trading on an uptick or during the last half-hour before the closing of the market, and limit the daily volume of repurchases to a specified amount (Allen & Michaely, 2003, p. 405).

In this paper, we retrieve the records of the 3,440 repurchase programs conducted by TWSE- and OTC-listed firms over the sample years from 2000 to 2011 from the Taiwan Economic Journal (TEJ) database. TEJ is the most prominent vendor providing economic and financial data in Taiwan. With respect to the sample size of Taiwanese share repurchases, this paper is the most comprehensive study yet undertaken. For example, Hung and Chen (2010) contained 1,145 events and others typically contain sample size of less than 1,000 events.

The object of this paper is to analyze the factors affecting a firm's decision to conduct a repurchase program. The findings show that a repurchasing firm is characterized by a higher ratio of retained earnings to total equity (RE/TE), a lower leverage with higher ratio of total equity to total asset (TE/TA) and a larger size (Log(TA), the logarithm of total assets), than other firms. Moreover, there is a moderate complementary relation between dividends and repurchases. That is, firms finance their share repurchases with funds that would otherwise have been channeled directly to the shareholders as dividends. It is extremely rare to find a repurchase for which there is no record of dividends having been paid over the previous year. Finally, no evidence was found in support of the free cash flows hypothesis; that is, the ratio of cash to total assets has no bearing on the repurchase decision.

The remaining part of the paper is organized, as follows. Section 2 gives a literature review, especially on studies related to Taiwan. Section 3 gives an overview of payout policy in Taiwan. Section 4 examines decisions concerning the repurchase of shares. Section 5 gives a brief conclusion.

### 2. Literature Review and Hypotheses

Miller and Modigliani (1961) established a cogent framework for studying corporate payout policy and show that the value of the firm is unaffected by payout policy in a perfect world without taxes or transaction costs. Shareholders need not care about a firm's payout policy, because their personal portfolio adjustments ("homemade dividends") can offset any decision at the firm level. If a firm decides to pay dividends, shareholders could use the funds to buy additional shares. Conversely, if a firm decides on a repurchase program, shareholders can sell shares to match the amount they would have received if dividends had been distributed.

Later, researchers relax he assumption of a perfect market and consider the roles of taxes (e.g., Miller, 1977), asymmetric information (e.g., Miller & Rock, 1985), or agency problem (Jensen, 1986), etc. In particular, in the context of personal income tax, share repurchases should prevail over the payment of dividends. This feature has been noted by Bagwell and Shoven (1989). Consequently, an upsurge in share repurchases in the U.S. market has been observed, as documented by Allen and Michaely (2003) and other studies. Another disadvantage of paying dividends is the relatively higher processing cost, which includes fees for transferring cash, and the time cost of disbursing cash to shareholders.

In Taiwan, the period between the ex-dividend date and the payment date, as documented by Liu and Yin (2013), is typically 30 days. For some firms it can take as long as 125 days. Ogden (1984) shows that the period in the U.S. market typically ranges from 2 weeks to 5 weeks, with the average being 18 days. Consequently, Taiwanese investors suffer, on average, an additional cost equivalent to the potential interest revenue of 12 days. On the other hand, when a firm announces a repurchase program, investors can receive cash within two days by selling part of their shareholdings in that company. The typical effect of the announcement is for the prices of the shares to rise (Dittmar, 2000). The above fact demonstrates the financial flexibility advantage of repurchases from

another perspective different from Jagannathan, Stephens and Weisbach (2000). More importantly, there was no capital gains tax in Taiwan before 2013, and the income tax levied on dividends received by shareholders range between rates of 6% and 40%.

A firm's motive for buying back its shares is not purely about paying out earnings. There are a number of important studies on the motivations behind announcing repurchases. Dittmar (2000) examined the U.S. repurchase programs on a year-by-year basis from 1977 to 1996. The study found that repurchasers usually take advantage of undervaluation and, in later years, distribute excess funds. However, during some periods, firms also repurchased to alter the leverage ratio, fend off hostile takeovers, and counter the dilution effects of stock options. Kahle (2002) finds that managers of firms announcing repurchases attempt to maximize their own wealth through executive stock options and to fund employee stock options. Chan, Ikenberry and Lee (2004) examined the three potential motives for share repurchases: mispricing, disgorging free cash flow, and altering leverage. In the study's findings, the mispricing hypothesis is supported by the long-run market reaction, the free cash flow is modestly supported, and the altering leverage hypothesis gets no supporting evidence. Chan, Ikenberry, Lee and Wang (2010) find that managers in firms suspected of announcing repurchase programs in order to mislead investors have comparatively higher exposure to stock options.

A number of review papers studying share repurchases in the Taiwan market have been published. Lo, Wang and Yeh (2008) examine TWSE firms announcing share repurchases between 2000 and 2005. They show that repurchase firms are undervalued, with significantly negative cumulative abnormal returns for the 30 days prior to the announcement. In addition, the repurchase firms are less leveraged and have higher growth opportunities. Hung and Chen (2010) studied TWSE firms announcing repurchases between 2000 and 2006, and show that the price range announced by the firm conveys information about its future prospects. Both Liu (2008) and Liu and Chen (2010) studied market-reacting behaviors of repurchases over 2000-2005.

Liu (2008) shows that the market tends to overact to repurchase announcements and suggests that this phenomenon is probably due to the overconfidence and self-attribution bias of investors. On the other hand, Liu and Chen (2010) find that undervalued firms with greater agency problems are active repurchasers. The sample firms of both papers pool TWSE and OTC-listed repurchasers together. In contrast, Lee, Liu, Lu and Yin (2013) aim to differentiate between the principal reasons behind the decisions to repurchase shares by TWSE and OTC-listed firms. They find that TWSE-listed firms typically repurchase shares to reduce the number of outstanding shares, whereas the decision by OTC-listed repurchasers is more likely to do with transferring the shares bought to their employees.<sup>4</sup>

The aforementioned papers primarily focus on issues concerning market reaction, not from the perspective of a firm's payout policy. Cheng (2005) investigates whether there substitute and/or stockholder tax saving effects exist for repurchases and dividends. Her sample contains announcements made by both TWSE firms (288 events) and OTC firms (29 events) over 2000-2002. She finds a strong complementary relationship between stock repurchases and cash dividends. Wang, Chen and Liu (2006) examine the effect of repurchases on dividend announcements over 2000-2004. They find that the stock prices of firms having made repurchases experience significantly higher returns than those having never announced repurchase programs. This is especially true when the paying firms announce cash dividends (in contrast to stock dividends and dual dividends). Hence, their result

<sup>&</sup>lt;sup>4</sup> The Regulations Governing Share Repurchase mandates the repurchasing firm to specify its purpose from one of the three standard motives: the 1st is canceling shares; the 2nd is transferring to employees; the 3rd is preparing for convertible securities.

also supports the complementary relationship between dividends and repurchases. This paper will revisit these issues under a different framework, and establish the following hypotheses.

Hypothesis 1 (Complementary Hypothesis): When a firm decides to conduct a repurchase program, it also tends to pay dividends, and vice versa.

Hypothesis 2 (Substitute Hypothesis): When a firm decides to conduct a repurchase program, it is unlikely to pay dividends, too, and vice versa.

DeAngelo, DeAngelo and Stulz (DDS, 2006) propose a life-cycle theory of dividend policy that incorporates the agency theory of Jensen (1986) and the investment opportunities theory of Fama and French (2001). According to the reasoning of DDS (2006), the ratio of retained earnings to total equity (RE/TE) is a logical proxy for the life-cycle stage of a firm. DDS (2006) found that US firms' propensity to pay dividends is highly associated with both RE/TE and RE/TA ratios. Chay and Suh (2009) also corroborate the life-cycle theory by analyzing a broad set of international sample firms. They examine the dividend policy of seven major developed markets in detail and also pay attention to other 26 countries as supplementary evidence to their study. Taiwan is one of the 26 markets. They run a regression on the pooled sample and found that Taiwan's dividend-paying firms are characterized by a higher RE/TE ratio.

By examining the payout policy of TWSE firms over 2000-2010, Liu, Chiou and Yang (2014) find that firms paying out cash (either through paying dividends or through conducting repurchase programs) are characterized by a higher ratio of RE/TE. It is noteworthy to point out that they exclude OTC firms from their sample and their results are dominated by dividend-paying firms (this fact will be clarified in Figure 1). Substantially differing from their approach, this study conducts a comprehensive investigation of share repurchases conducted by TWSE and OTC firms. When treating repurchases as payouts and following the rationale of DDS (2006), this study asserts that a repurchasing firm is more mature than other firms. Hence, the following hypothesis is considered.

Hypothesis 3 (Life-Cycle Hypothesis for Repurchases): When a firm becomes mature with higher RE/TE ratio, it is more likely to conduct repurchase programs.

Following Jensen's theory (1986), a firm should distribute free cash flows to the shareholders for mitigating agency cost. We treat the cash and cash equivalent to total assets as a proxy for free cash flow and establish the following hypothesis.

Hypothesis 4 (Cash Holding Hypothesis): When a firm has higher cash holdings with a higher ratio of cash to total assets, it is less likely to conduct repurchase programs.

This paper will explore these issues using both Logistic (logit) and Probit models.

#### **3. Descriptive Summary**

As shown in the red-dotted and the blue-dashed lines in Figure 1, around a quarter of firms conducted share repurchase programs when the repurchase regulations were enacted in 2000. The number then decreased over three consecutive years. The highest ratios (36% for both TWSE- and OTC-listed firms) occurred in 2008 and the lowest ratios (5% for both markets too) occurred in 2010. There was no significant upsurge in the number of firms conducting repurchases, except in 2004, 2008 and 2011. It is well known that the three incidences of upsurge were due to systematic market downturns and were attributed to the breakout of SARS (Severe Acute Respiratory Syndrome) in 2003, the U.S. sub-prime mortgage crisis in 2008, and the European debt crisis in 2011.

Figure 2 presents the time-series trends of the aggregate dollar amount of repurchases conducted by TWSE-

and OTC-listed firms. Among the TWSE-listed firms, the highest value (TW\$93 billion, where US\$1 = TW\$30, or so, and the exchange rate is relatively stable) occurred in 2008 and the lowest value (TW\$12 billion) occurred in 2009; OTC-listed firms reveal exactly the same pattern and the counterpart values are TW\$13 billion and TW\$0.8 billion. The significant drop of both the proportion and the dollar amount of repurchases in 2009 reflects the economic recovery of that year.



Figure 1 Proportions of TWSE- and OTC-listed Firms Paying Dividends and Making Repurchase Programs over 2000-2011



Figure 2 Aggregate Value of Repurchases Conducted by TWSE- and OTC-listed Firms over 2000-2011

These results collaborate with many prior studies that the main motive behind share repurchases is undervaluation (Dittmar, 2000; Chan, Ikenberry & Lee, 2004). However, the overall trends are in sharp contrast to the U.S. market, since neither the number of repurchasers, nor the dollar amount of repurchases revealed any sign of considerable upsurges after the legislation of repurchase regulations in 2000.

In contrast, the proportions of firms paying dividends strictly increased over 2000-2010, as shown in the solid lines in Figure 1. The proportion of TWSE firms paying dividends was 77% in 2008 and fell to 62% in 2009; however, it reached a historical high of 78% in 2011. The proportion of OTC firms paying dividends reached its record high of 64% in 2007 and dropped to 52% in 2009. It rallied to 62% in 2010. These results show a marked contrast to the U.S. market, since the proportion of U.S. firms paying dividends has fallen dramatically in recent years, as documented by Fama and French (2001) and Skinner (2008).

In the study of Liu and Yin (2013) on the Taiwan stock market, they have shown that dividends always contribute more than 80% to the value of total payouts (including distributing dividends and making repurchases), and it comprised more than 92% after 2008. Figure 1 of this article reveals the reason behind the phenomenon. Taiwanese firms' propensity to pay dividends is increasing, whereas their propensity to conduct repurchase programs is stagnant. The increasing tendency of paying dividends conforms to the developing economy of Taiwan. Hence, it is interesting and worthwhile to examine the mechanism behind Taiwanese firms' decisions to conduct repurchase programs.

#### 4. Decisions to Repurchase Shares

When the board of directors of a company announces a repurchase program, it is quite likely that it will announce multiple programs in a calendar year. The fiscal business cycle is one year and the general assembly of shareholders holds once a year. According to the Company Law of Taiwan, the dividend-paying decision must be recognized by the general assembly of shareholders. Hence, in order to identify the factors affecting a firm's decision to announce repurchase programs, it is inappropriate to identify sample events based on the announcements of repurchase programs. Rather we should identify a repurchase event as a firm-year, that is, the event that some firm announce repurchase programs within a calendar year.

Variables	RE/TE		TE/TA	TE/TA		Cash/TA		Log(TA)		
Panel A. Means and (medians) of the variables for TWSE firm-years over 2000-2011.										
None	-0.540	(-0.003)	0.532	(0.543)	0.065	(0.033)	3.69	(3.65)	3,204	
Dividends	0.269	(0.249)	0.652	(0.653)	0.100	(0.062)	3.83	(3.74)	5,371	
Repurchase	0.181	(0.175)	0.641	(0.638)	0.092	(0.058)	3.85	(3.79)	1,459	
Repurchase only	0.061	(0.068)	0.613	(0.609)	0.066	(0.046)	3.84	(3.80)	423	
Panel B. Means and Medians of the variables for OTC firm-years over 2000-2011.										
None	-1.260	(-0.050)	0.494	(0.562)	0.107	(0.062)	3.15	(3.10)	2,786	
Dividends	0.251	(0.237)	0.645	(0.650)	0.138	(0.089)	3.20	(3.15)	3,157	
Repurchase	0.172	(0.169)	0.646	(0.644)	0.137	(0.089)	3.29	(3.23)	840	
Repurchase only	0.036	(0.070)	0.609	(0.594)	0.108	(0.079)	3.30	(3.24)	266	

Table 1 Descriptive Statistics for Firm-years Categorized According to Payout Policy

Note: None denotes firms neither repurchasing nor paying dividends. Firms in the Repurchase only row are included in the Repurchase row. RE denotes retained earnings.

Table 1 presents means and medians for firm-years categorized according to payout policy. *None* denotes the group of firm-years that neither distribute dividends nor announce repurchase programs. Firms in the *Repurchase only* row are included in the *Repurchase* row but do not pay dividends. Firms (in both markets) that give no pay outs have the lowest values of RE/TE, TE/TA, Cash/TA and size (Log(TA)). These results are intuitive-appealing and are consistent with prior studies (Fama & French, 2001; DDS, 2006).

Next, we restrict our observation to firm-years that pay dividends or announce repurchase programs. Firms that announce repurchase programs, but do not pay dividends within a calendar year have the lowest values of RE/TE, TE/TA and Cash/TA among firms that pay out. Financial flexibility inherent in repurchase programs should be welcomed by such firms, with lower ratios of RE/TE, TE/TA and Cash/TA. These firms are neither sufficiently ready to pay regular dividends nor bear the stress of future dividend omission. On the other hand, firms paying dividends have the highest RE/TE, TE/TA and Cash/TA (except the mean of TE/TA for OTC firms). This result is consistent with prior studies. Finally, note that a firm buying back shares tends to be larger in size, as shown in the column of Log(TA), which is consistent with the findings of Dittmar (2000).

Before proceeding to perform Logistic (logit) models to examine a firm's repurchase decision, this paper will examine the correlation matrices of these explanatory variables in Table 2. No collinear between any two variables is revealed, with the P-value of Pearson correlation tests always less than 5%.

In addition to the variables shown in Table 2, a dummy variable of prior dividend decision into the binary decision models is included. Table 3 presents the results of the Logistic (logit) models to examine a firm's repurchase decision. Panel A1 (B1) of Table 3 examines a TWSE (OTC) firm's decision to repurchases; while Panel A2 (B2) examines a TWSE (OTC) firm's decision to conduct repurchase program only (without paying dividends in the same calendar year). The independent variable is 0 if a repurchase firm also pays dividends within a calendar year, and 1 if not. It is well known that a firm's dividend policy tends to be sticky and its managers tend to be reluctant to cut future dividends once the payment of dividends has been initiated (Lintner, 1956). Consequently, one can examine the complementary/substitute hypothesis between paying dividends and performing repurchases. Specifically, how a firm's repurchase decision has been conditioned by its dividend-paying decision in the previous year.

Markets		Correlations for T	WSE firms		Correlations for OTC firms			
Variables	RE/TE	TE/TA	Cash/TA	RE/TE	TE/TA	Cash/TA		
TE/TA	0.202			0.208				
Cash/TA	0.056	0.306		0.029	0.408			
Log(TA)	0.075	-0.126	-0.113	0.080	-0.268	-0.205		

 Table 2
 Correlation Matrices of Firm-Year Variables over 2000-2011

The probability of the event Y = 1, i.e., payout by a firm with characteristics vector X, is assumed to follow the standard Logistic model (Greene, 2013, p. 688),

$$\Pr(Y=1) = \frac{1}{1 + e^{-X\beta}}$$
(1)

where X is a vector of explanatory variables including constant, RE/TE, TE/TA, Cash/TA, Log(TA) and constant.

In Panel A1 (B1) of Table 3, the dependent variable is y = 1 if a firm buys back shares and y = 0 otherwise. The significant positive coefficients of RE/TE in Panel A1 and B1 of Table 3 are supportive of the Life-Cycle Hypothesis for Repurchases. A significant positive coefficient of TE/TA was found in both Panel A1 and B1 of Table 3. That is, firms conducting repurchase programs are characterized by high RE/TE (supporting Hypothesis 3) and high TE/TA (low leverage). The latter result is consistent with the finding of Dittmar (2000) and Chan, Ikenberry and Lee (2004).

The insignificant coefficients of Cash/TA suggest that there is no association between a firm's repurchase decision and its cash holding. This implies that the Cash Holding Hypothesis is not supported. A firm buying back

shares tends to be larger in size, as evidenced by the significant positive coefficient of Log(TA). This is also consistent with prior studies (Dittmar, 2000).

When the coefficient of the prior dividend dummy in Panel A1 (B1) of Table 3 is positive, it suggests a complementary relation between dividends and repurchases for TWSE/OTC firms. When the opposite occurs, it suggests a substitute relation. The significant positive coefficient of the prior dividend dummy (0.284) in Panel B1 supports the complementary hypothesis in the OTC firms. Yet, any conclusion on the complementary/substitute hypotheses for the TWSE firms cannot be drawn, based on its insignificant coefficient in Panel A1 of Table 3.

Variables	Constant	RE/TE	TE/TA	Cash/TA	Log(TA)	Prior dividend	Pseudo	do No. of firm-	
						dummy	R-square	y = 0	y = 1
Panel A1:	TWSE firms repurchasing $(y = 1)$ versus firms not repurchasing $(y = 0)$ .								
	-3.126	0.543	0.873	-0.012	0.232	-0.020	0.016	7,539	1,459
	(-12.0)***	(4.54)***	(4.35)***	(-0.04)	(4.29)***	(-0.29)			
Panel A2:	TWSE firms repurchasing only $(y = 1)$ v.s. repurchasing and paying dividends $(y = 0)$ .								
	2.475	-11.49	-1.21	-2.76	0.062	-1.73	0.387	1,036	423
	(3.39)***	(-12.8)***	(-2.16)**	(-2.58)*	(0.42)	(-11.1)***			
Panel B1:	el B1: OTC firms repurchasing $(y=1)$ versus firms not repurchasing $(y=0)$ .								
	-5.848	0.86	1.386	0.141	0.890	0.284	0.052	5,369	840
	(-14.5)***	(5.05)***	(5.07)***	(0.47)	(9.14)***	(3.13)***			
Panel B2:	OTC firms r	epurchasing onl	vidends $(y = 0)$ .						
	3.536	-14.10	-0.415	-1.363	-0.301	-1.468	0.409	574	266
	(3.31)	(-10.8)***	(-0.57)	(-1.28)	(-1.19)	(-7.13)***			

 Table 3
 Logistic Models Testing a Firm's Decision to Repurchase Shares within a Calendar Year over 2000-2011

Note: Panel A1 (B1) examines a TWSE (OTC) firm's decision to buy back shares. Panel A2 (B2) examines a repurchasing TWSE (OTC) firm's decision not to distribute dividends.

Looking at Panel A2 and B2 of Table 3, the corresponding sample firm-years of the models are those firms that announce repurchase programs within a calendar year. The dependent variable is y = 0 if a repurchase firm also pays dividends within a calendar year and y = 1, otherwise. The significant negative coefficients of the prior dividend dummy in Panel A2 and B2 are obviously attributed to the persistence of dividend-paying behavior. That is, if a firm has ever paid dividends, it is unlikely for the repurchasing firm to refrain from paying dividends, even though conducting a repurchase program in the same year. This result partially validates the Complementary Hypothesis, although it is rejected by observing Panel A1 of Table 3 for the TWSE firms.

The significant negative coefficients of RE/TE in Panel A2 and B2 of Table 3 further uphold the Life-Cycle Hypothesis for Repurchases. That is, if a repurchasing firm is more mature with a higher RE/TE ratio, it is unlikely for it to refrain from paying dividends. Both the theoretical and empirical results of DDS (2006) are strongly supported by our findings. If a firm becomes mature with a higher ratio of RE/TE, it is very likely to pay dividends, even if it has conducted repurchase programs.

For justifying the robustness of the results of Table 3 derived from Logistic models, Table 4 presents a counterpart of Table 3 based on Probit model (Greene, 2013, p. 688). The probability of the event Y = 1, i.e., payout by a firm with characteristics vector X, is assumed to be,

$$\Pr(Y=1) = \Phi(X\beta) \tag{2}$$

where  $\Phi$  is the cumulative distribution function of standard normal distribution and X is a vector of explanatory

variables including constant, RE/TE, TE/TA, Cash/TA, Log(TA) and constant. Table 4 presents a replicate of Table 3 but resulting from Probit models. Through comparing the two Tables, we find that the significance levels of all explanatory variables are exactly the same.

Variables	Constant	RE/TE	TE/TA	Cash/TA	Log(TA)	Priordividend	Pseudo	No. of	firm-years	
	Constant					dummy	R-sq	y = 0	y = 1	
Panel A1:	TWSE firms repurchasing $(y = 1)$ versus firms not repurchasing $(y = 0)$ .									
	-1.836	0.322	0.497	-0.016	0.133	-0.007	0.016	7,507	1,459	
	(-12.5)***	(4.73)***	(4.45)***	(-0.1)	(4.33)***	(-0.191)				
Panel A2:	anel A2: TWSE firms repurchasing only $(y = 1)$ v.s. repurchasing and paying dividends $(y = 0)$ .									
	1.406	-6.272	-0.698	-1.473	0.037	-1.063	0.388	1,036	423	
	(3.39)***	(-13.6)***	(-2.22)**	(-2.51)**	(0.43)	(-12.04)***				
Panel B1:	OTC firms repurchasing $(y = 1)$ versus firms not repurchasing $(y=0)$ .									
	-3.319	0.479	0.738	0.099	0.503	0.155	0.054	5,286	840	
	(-14.8)***	(5.22)***	(5.0)***	(0.58)	(9.13)***	(3.21)***				
Panel B2:	OTC firms repurchasing only $(y = 1)$ v.s. repurchasing and paying dividends $(y = 0)$ .									
	1.921	-7.030	-0.191	-0.910	-0.165	-0.953	0.401	574	266	
	(3.16)***	(-11.9)***	(-0.47)	(-1.57)	(-1.13)	(-8.16)***				

Table 4 Probit Models Testing a Firm's Decision to Repurchase Shares within a Calendar Year over 2000-2011

Note: Panel A1 (B1) examines a TWSE (OTC) firm's decision to buy back shares. Panel A2 (B2) examines a repurchasing TWSE (OTC) firm's decision not to distribute dividends.

## 5. Conclusion

The traditional term of "dividend policy" has been replaced by "payout policy" due to the growing magnitude of share repurchases. Taiwanese firms have been allowed to buy back their own shares since August 2000. The object of this paper is to analyze the factors affecting a firm's decision to announce a repurchase program. This paper concludes that a repurchaser is characterized by a higher ratio of retained earnings to total equity (RE/TE), a lower leverage with a higher ratio to total equity to total assets (TE/TA), and a large size (Log(TA)). There exists a complementary relation between dividends and repurchases among the OTC firms, whereas there is no sign of either complementary or substitute effects among the TWSE firms.

Among repurchasing firms, one is highly unlikely to find a repurchase where there is no record of paying dividends over the preceding year. The theory of DDS (2006) is verified from a different perspective, i.e., a mature firm (with a high RE/TE ratio) has a high tendency to pay out dividends, even if it has conducted repurchase programs. Finally, no evidence was found to support the free cash flows hypothesis; in other words, the ratio of cash to total assets has no association with the repurchase decision.

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