© 2019, Banking and Finance Review

How Are Stock Repurchases Being Used? A long-term Study

Khaled Abdou[a] and Pia Gupta[b,1]

[a] Penn State University, Berks campus, USA
[b] California State University - Long Beach, USA

We investigate the long-term effect of companies' reuse of stock buybacks through three corporate events namely, stock options, mergers & acquisitions, and seasoned equity offerings. Specifically, our analysis focuses on two issues over a 3-year period following a repurchase announcement. First, we use a multivariate regression to analyze determinants of the long-term cumulative abnormal return (CAR) given companies' choice of event and degree of execution. Second, we use a multinomial logit analysis to identify the predictors of such events. We find that the repurchase technique, risk, company size, and revenue are significant in determining CAR, while the announced purpose for repurchase is not. Further, we document that increase in companies' risk, assets, and earnings favor reuse of buybacks through a single corporate event or a combination of corporate events.

JEL classification: G0, G1, G2, G4
Keywords: *stock repurchases, stock options, seasoned equity offerings, mergers & acquisitions*

1. Introduction

Stock repurchases have proliferated in the last three decades. According to data collected by Gumport (2002), share buybacks by S&P 500 companies accounted for nearly 70% of corporate cash distribution as of 2006, of which 95% were executed through open-market operations. Recently, stock repurchases have gained much attention from fund managers, activist investors, and even political candidates. A *Wall Street Journal* (*WSJ*) article[2] presents the opinion of the CEO of BlackRock Inc., which oversees $4.5 trillion in assets: "Companies invest too much in buybacks and too little in longer-term business growth." Democratic presidential candidate Hillary Clinton had echoed a similar view in 2016 and called for more timely and detailed disclosure of such events. Warren Buffett, however, defended buybacks in his annual letter to his stockholders, stating, "The subject of repurchases has come to a boil, some people have come close to calling them un-American—characterizing them as corporate misdeeds that divert funds needed for productive endeavors. That simply isn't the case."

[1] We would like to thank K. C. Chen, Joseph Farhat, Oscar Varela and the participants in conferences where earlier versions of this paper were presented, for their helpful comments. Of course, any errors are ours.
[2] "Is the Surge in Stock Buybacks Good or Evil?", Nov 22, 2015.

Activist investors pressure companies to perform buybacks as a means of returning cash to stockholders. Per the Wall Street Journal article noted above, total buybacks amounted to $516.72 billion during the first nine months of 2015. The trend of rising buybacks has continued over the last few years, as evidenced in a *WSJ* article[3] of December 2013 that stated that companies in the S&P 500 stock index repurchased shares that amounted to $128.2 billion in the third quarter of that year alone. The article further stated that companies increased buybacks by 15% as of a 12-month period ending September 2013.

The extant literature argues that stock buybacks allow executives greater flexibility over the timing of cash distribution (Grullon and Michaely, 2002; Oded, 2008; Sonika *et al.*, 2014) while offering a tax advantage to shareholders. Investors generally view repurchases positively, as they consider it a signal of undervaluation, indicating that a company is bullish on stock. They believe that repurchase programs will increase earnings per share[4] and return on equity (Gumport, 2006). Hence, it is not surprising that the topic of share repurchase has generated significant interest among academics and has been widely investigated from a variety of perspectives.

In corporate America, a repurchase announcement does not have to conform with the terms of the original announcement; i.e., once the company makes an announcement, the decision of how much and when to repurchase lies entirely at the company's discretion. Signaling models have been used to study the impact of repurchase announcements on stock returns and shareholder value (Ikenberry and Vermaelen, 1996; McNally, 1999). In addition, proceeds from repurchases have been used to fund acquisitions, bonuses, and stock option exercises (Kahle, 2002).

Keown, Martin and Petty (2017) question the impact of stock repurchases on shareholders when the purpose of the repurchase is to mitigate the effect of employee stock options. Using Qualcomm as an example, they allude to the lack of evidence in this area stating "*The jury is still out because we do not know whether the issuance of new shares will have a positive impact on the firm's performance and share value in the future*". Our paper adds to extant literature in the following ways: 1) We incorporate activities beyond the repurchase signal and measure the ex-post long-term performance of the company, conditional on the different uses of the repurchased stock, namely stock options, mergers and acquisitions, and seasoned equity offerings; and 2) We test the effect of several accounting measures on the company's decisions. As in Appendix 1, which summarizes the relevant literature, and based on our knowledge and extensive literature review, no study has analyzed this issue in such depth. It is important to note that the integration of all these events is contribution in itself, even if some aspects of each event have been investigated before individually (Dittmar,

[3] "Companies Binge on Share Buybacks", Dec 25, 2013.

[4] In this regard, the November 22, 2015, *WSJ* article draws attention to the fact that analysts and investors focus on per-share earnings instead of overall earnings. Because buybacks reduce the number of shares outstanding, post-buyback earnings per share tend to rise, at least in the short term.

2000). In support of our research question, which is based on the premise that stock repurchases may be used for reasons other than just signaling of underpricing, Fu and Huang (2016) note that " *Further evidence suggests that recent events are conducted more for business-operating reasons than for market timing, particularly repurchases to pay out cash and seasoned equity offerings (SEOs) to invest and improve profitability. Both the external market environment and internal firm factors contribute to the disappearance of abnormal returns after these two events.*"

We build a simplified decision tree that integrates the repurchase announcement with how the company utilizes the proceeds of the repurchase for three corporate activities: seasoned equity offerings (SEOs), acquisitions by stock swap, and fulfillment of stock option grants. We evaluate the complete transaction starting from the repurchase announcement to the reutilization of the repurchased stock, whereby the company buys back equity from the stockholders and resells to the market at some future date. We consider the transaction as "complete" if the company makes the repurchase announcement, implements the repurchase (in whole or in part), and resells the repurchased stock. We use 20-year data (from 1993 to 2013), which allows us to determine whether the completion of the transaction increases the value of the company in the long term (given that it is not binding on the company to complete the transaction). Alternatively, our model allows us to examine whether firms' use of the proceeds of the repurchase leads to increase in shareholder wealth.

The rationale for our hypotheses arises from two factors: 1) how the company utilizes the authority that it retains over the proceeds of the repurchase and 2) the impact on the long-term performance of the company of the utilization of the repurchased stock under different corporate action plans. The firm's ability to control the reselling mechanism allows us to measure the firm's long-term performance (and, hence, shareholder wealth), *conditional* on the activities undertaken by the company to use the repurchased shares. Thus, we do not treat these corporate actions as independent events but, rather, as extensions of the share repurchase program. We establish this by conducting long-term event studies over 3-year windows, i.e., the estimated life of the contract. In addition, we predict the withdrawal or completion of a repurchase program, for which we use a logit model.

The remainder of the paper is organized as follows. Section II presents the decision tree model. Section III provides a description of the data, testable hypotheses, and methodology. Section IV contains the findings of our research. Section V presents additional robustness checks, followed by the limitations of the study in Section VI. Finally, Section VII provides a summary and conclusion.

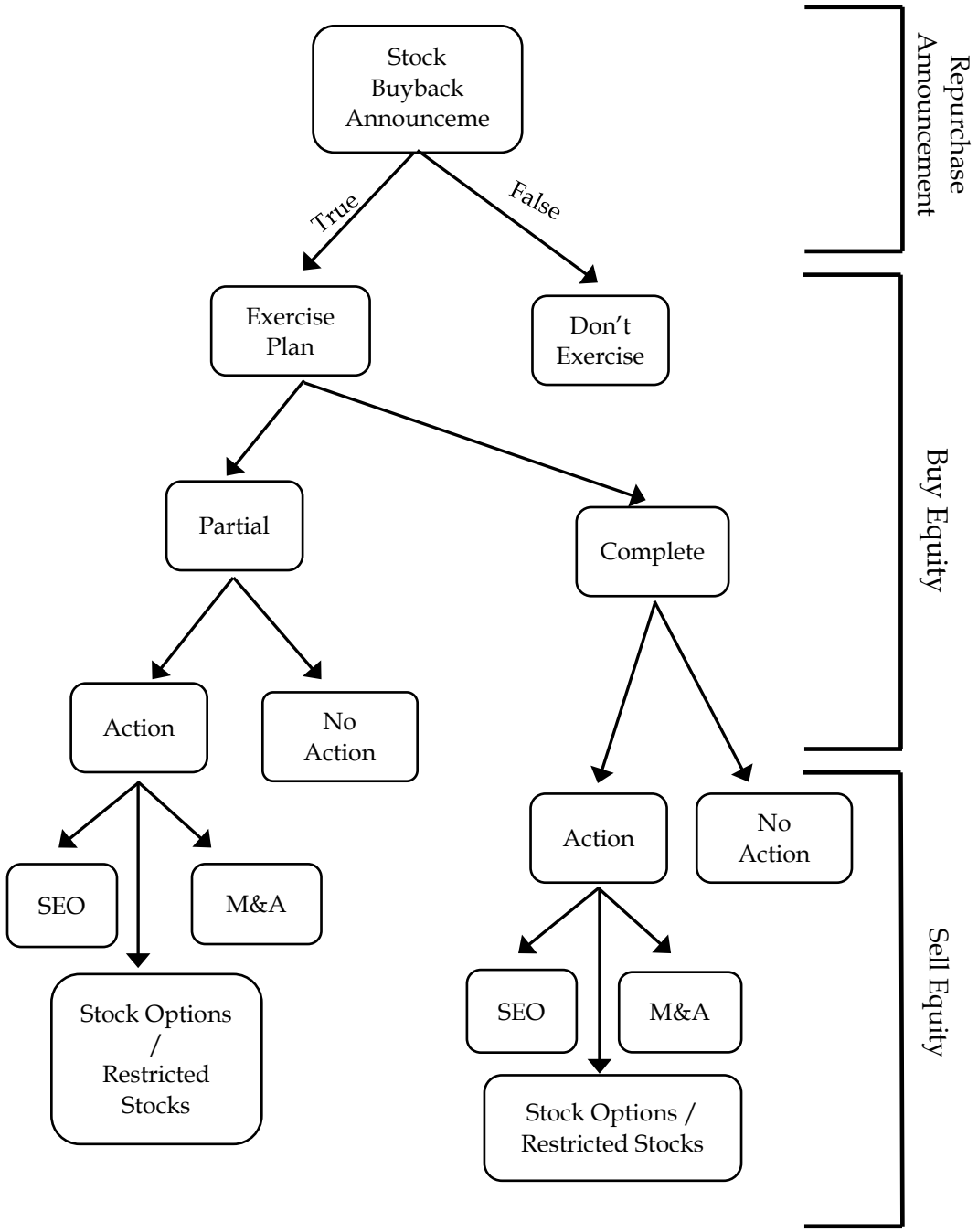
2. The Decision Tree Model

We design a decision tree that contains the possible actions that could be implemented by the company (Figure 1). The transaction begins with the company's announcing a stock buyback program. If the announcement signal is true,[5] the

[5] Oded (2005) discusses the negative costs that accrue to the company due to false signaling.

company initiates the process. Most repurchase programs are implemented, in phases, over time through open market purchases. During this period, the company retains two choices: It can either continue (extend) the repurchase, or it can stop after partial implementation of the program. In the final step, the company either returns the repurchased shares to the market, thus completing the transaction, or chooses not to do so.

Figure 1: Stock Buyback Decision-Tree



We break down the transaction into three stages. Stage 1: Make Repurchase Announcement, followed by Stage 2: Buyback equity, and finally Stage 3: Resell Equity to Market, which completes the transaction. In this study, we analyze the three corporate events (SEOs, acquisitions, and stock option exercises) that may be used after the repurchase announcement along with accounting and other repurchase-related variables to investigate these events' effect on the company's long-term stock returns.[6] Recall that the completion of the transaction is not binding on the company, and, hence, the company may choose not to execute Stage 3 at any point after Stage 2; i.e., we assume the completion of the transaction is independent of the implementation of the repurchase program. We want to emphasize here that our analysis accounts for the corporate events as part of the transaction from the announcement of the repurchase event up to the resell of the repurchased equity; they are not treated as isolated events.

Ikenberry *et al.* (1995) and Peyer and Vermaelen (2009) conduct studies on long-term performance of stocks that surrounds share repurchases. Ikenberry *et al.* study a sample of open market repurchases and find evidence of average abnormal 4-year returns of 12.1% after the initial announcement. This goes up to 45.3% for value stocks. Peyer and Vermaelen find evidence of significant long-run abnormal returns in the four years following a buyback announcement. The authors further suggest that investors are slow to correct their overreaction to the repurchase announcement.

Zhang (2005) investigates a sample of repurchase data from Hong Kong. He finds evidence of 3-year buy-and-hold abnormal returns of 20% following actual share repurchases for small and high book-to-market firms but, on average, no evidence of abnormal long-term returns. Overall, the evidence points toward long-term positive abnormal returns following completion of a repurchase program. Our study stands apart from these studies by proceeding beyond the repurchase event to examine whether the positive abnormal returns continue to persist if the company decides to reutilize the repurchased stock for the purposes of M&As, SEOs, or stock option exercises.

3. Data and Methods

Sample and Data

We use four databases for this research: the SDC database for share repurchases, M&As, and SEOs; Compustat for company fundamentals; CRSP for daily stock prices; and ExecuComp for stock options data. Our total sample covers over 20 years, from 1991 through 2013 from initial authorization date as shown in Figure 2. The figure shows how we used the different timeline from each data source to depict the three stages of the decision tree. We should mention here that SDC repurchase data report duplicate transactions.[7] We cleaned our sample by discarding the duplicates

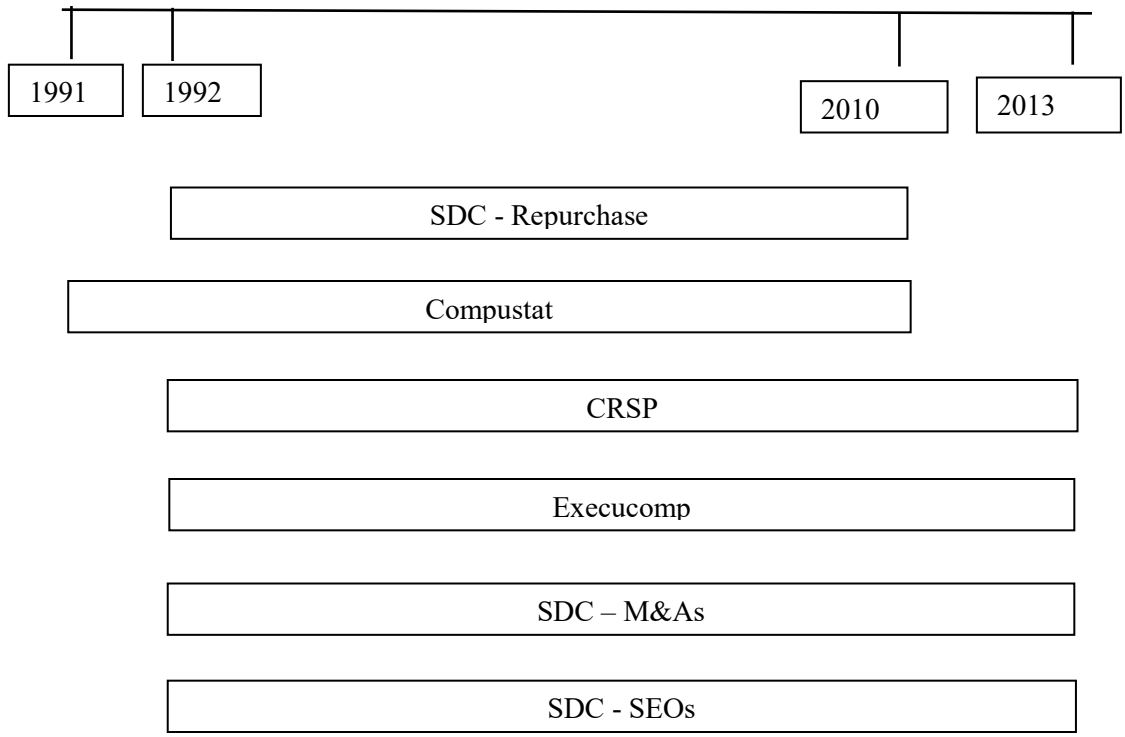
[6] Stages one and two of the decision tree are analyzed in Revisiting the Repurchase Event (Abdou and Gupta, working paper, 2018)

[7] See Banyi *et al.* (2008) for a discussion of this issue.

but only after cross-referencing with the Compustat variables of treasury stock and number of shares outstanding. We kept duplicate transactions only if we were able to verify them through Compustat. The final sample size is 5,310 observations (repurchase programs) after a series of cleaning procedures were applied to the original sample downloaded from the SDC. For example, the final sample excludes utilities and financial industries; however, it includes companies with reported industries only.[8] In addition, we manually checked for duplicates and deleted "suspicious" observations.[9] Furthermore, we lost observations after merging the SDC file with Compustat's accounting data and CRSP's stock price data.

Figure 2: Data Sample Timeline

Figure 2 illustrates the timeline for each data source. The dates are based on the initial repurchase program authorization date. For example, we needed to look at variables t-1 from Compustat and t+1, t+2 and t+3 from CRSP; where t = the year 1992.



Research Design

We analyze the third stage of the decision tree in Figure 2 in two parts to establish our hypotheses for determinant tests. First, we expect company's risk and accounting variables to be determinants of long-term cumulative abnormal returns (CAR). Thus,

[8] Existing literature has demonstrated the significance of industry groupings, hence we elected it to be a part of the cleaning process (Chava and Jarrow, 2004; Akhigbe *et al*, 2003)

[9] We matched SDC data with Compustat data to check for changes in treasury stock in Compustat compared to the repurchase data in SDC.

in Part 1, we use multivariate regressions to estimate these determinants per the hypotheses outlined below:

Hypothesis 1a: The repurchase technique as part of acquiring the company's shares has a significant effect on long-term CAR.

Hypothesis 1b: Accounting variables such as revenues have a significant effect on long-term CAR.

Hypothesis 1c: Company's risk variables have a significant effect on long-term CAR.

We conduct a cross-sectional calendar month event study using the following market model:

$$R_{jt} = \propto_j + \beta_j R_{mt} + e_{jt}$$
$$A_{jt} = R_{jt} - (\hat{\propto}_j + \hat{\beta}_j R_{mt})$$
$$AAR_t = \frac{\sum_{j=1}^{N} A_{jt}}{N}$$
$$CAR_{T_1,T_2} = \frac{1}{N}\sum_{j=1}^{N}\sum_{t=T_1}^{T_2} A_{jt}$$

For the hypotheses tests, we cross-sectionally regress equally-weighted and value-weighted long-term (1, 2, and 3 years) CARs on a range of measures grouped by repurchase-related and other contributing factors as in equation (1). The repurchase-related measures include repurchase characteristics, uses of repurchased shares, technique of repurchase, sources of funds used for repurchase, and purpose of repurchase as specified by the company in a repurchase announcement. Other contributing factors include measures of risk, accounting, liquidity, price level, credit quality, and industry effect.

$$\begin{aligned} CAR_{T_1,T_2} = f(\beta_1 Constant + \beta_{2-5}\, Repurchase\ Characteristics\ + \\ \beta_{6-7}\, Uses\ of\ Repurchase\ + \beta_{8-12}\, Technique\ of\ Repurchase\ + \\ \beta_{13-19}\, Sources\ of\ Funds\ + \beta_{19-23}\, Purpose\ of\ Repurchase\ + \beta_{23-25}\, Risk\ Variables\ + \\ \beta_{26-36}\, Accounting\ Variables\ (t-1)\ + \beta_{37-47}\, Accounting\ Variables\ (t)\ + \\ \beta_{48-49}\, Liquidity\ + \beta_{50-53}\, Stock\ Price\ changes\ and\ Quality\ + \beta_{54-58}\, Industry + e) \end{aligned} \quad (1)$$

Second, we expect company risk and accounting variables to be predictors of the use of repurchased stock. Thus, in Part 2, we use multinomial logistic regression model to test the following predictions:

Hypothesis 2a: Accounting variables can play a significant role in predicting company's action or inaction post-repurchase announcement.

Hypothesis 2b: Company's risk variables play a significant role in predicting

company's action or inaction post-repurchase announcement.

Hypothesis 2c: Market conditions play a significant role in predicting company's action or inaction post-repurchase announcement.

We use the following equation to test the above hypotheses:

Multinomial Logistic Regression

$$Groups = f(\beta_1 Constant + \beta_{2-3}\, Risk\ Variables + \beta_{4-14}\, Accounting\ Variables\ (t-1) + \beta_{15-25}\, Accounting\ Variables\ (t) + \beta_{26-30}\, Stock\ Price\ changes\ and\ Quality + \beta_{31}\, Repurchase\ percentage + e) \quad (2)$$

We group the different events and designate the "no action" group as the base group. These groups are regressed on a range of measures organized by repurchase-related and other contributing factors. In the next step, we compute the marginal effects, which we report here.

4. Results

Multivariate Regression

Table 1 reports the descriptive statistics for the regression variables described in Appendix 2. We begin with Panel A: *Repurchase-related Factors*. Under *Repurchase Characteristics*, we note that on average approximately 80% of shares were repurchased. The two dummy variables in this category capture the percentage of programs completed (32%) and the percentage that was withdrawn (14%). The *Uses of Repurchase* category provides a summary of the mechanisms used to dispose of repurchased stock. Approximately 45% of the repurchased shares were used for fulfilling stock option grants, while 8% were used for the purposes of M&As. The variables listed under *Purpose of Repurchase* are the reasons reported by the company at the announcement. We observe that the most commonly reason cited is enhancement of shareholder value (15%). We also note that the preferred techniques of implementing repurchase programs are open market and negotiated transactions, while the top sources of funds for the repurchase come from companies' cash reserves and revolving lines of credit.

Next, we turn our attention to Panel B: *Other Contributing Factors*. We note a mean (median) total risk of 5.22 (5.00) for our sample. The mean (median) systematic risk is 0.93 (0.88), which indicates below-average market risk for the firms in our sample. For the accounting variables, we consider two sets of data: one in the year of the repurchase announcement ($T = 0$) and another in the year prior to the repurchase announcement ($T = -1$). Note that the mean market capitalization in $T = 0$ ($4,118 million) is greater than in $T = -1$ ($3,884 million), indicating higher valuation in the year of the repurchase announcement. We construct two dummy variables: The dividend payout dummy takes a value of 1 if the company pays a dividend, and 0 otherwise; the earnings per share (EPS) dummy takes a value of 1 if the company

Table 1: Descriptive Statistics for Regression Variables

Panel A: Repurchase- related Factors				
	N	**Mean**	**Median**	**Std Deviation**
Repurchase Characteristics:				
Percent Shares Repurchased	5310	79.80	77.71	490.96
Repurchase Completed Dummy	5310	0.32	0.00	0.47
Repurchase Withdrawn Dummy	5310	0.14	0.00	0.35
Uses of Repurchase				
Stock Options	5310	0.45	0.00	0.50
Mergers & Acquisitions	5310	0.08	0.00	0.28
Technique of Repurchase:				
Accelerated	5310	0.01	0.00	0.10
Negotiated	5310	0.06	0.00	0.24
Open Market	5310	0.47	0.00	0.50
Open Market/Negotiated	5310	0.41	0.00	0.49
Dutch Auction	5310	0.00	0.00	0.01
Sources of Funds:				
Bank Loan	5310	0.00	0.00	0.06
Borrowings	5310	0.02		0.14
Cash from Operations	5310	0.08	0.00	0.27
Cash Reserves	5310	0.12	0.00	0.32
Revolving Line of Credit	5310	0.12	0.00	0.32
Debt Securities	5310	0.00	0.00	0.07
Working Capital	5310	0.04	0.00	0.19
Purpose of Repurchase:				
Employee Benefit Plans	5310	0.02	0.00	0.15
Enhance Shareholder Value	5310	0.15	0.00	0.36
Stock Option Plan	5310	0.04	0.00	0.21
Undervaluation	5310	0.06	0.00	0.23
Conversion of Preferred Stock	5310	0.00	0.00	0.01
Panel B: Other Contributing Factors				
Risk Variables:				
Standard Deviation	2407	5.22	5.00	2.19
Systematic Risk(Beta)	2346	0.93	0.88	0.55

Table 1: Cont'd

	N		Mean		Median		Std Deviation	
Accounting Variables:	***T=0***	***T=-1***	***T=0***	***T=-1***	***T=0***	***T=-1***	***T=0***	***T=-1***
Assets	4869	4920	3772.15	3442.34	394.78	359.91	20803.48	18428.51
Assets	4869	4920	3772.15	3442.34	394.78	359.91	20803.48	18428.51
Working Capital	4869	4920	278.49	274.32	63.96	62.24	1187.94	1222.93
Revenue	4869	4920	3451.37	3118.84	403.03	364.59	15314.94	13922.32
Common Equity	4869	4920	1404.84	1276.16	198.85	188.16	5979.88	5231.40
Cash Holdings	4869	4920	296.53	270.88	39.73	38.99	1248.83	1195.95
Research & Development	4869	4920	61.18	54.67	0.00	0.00	373.22	327.77
Market-to-Book Ratio	4852	4885	2.95	6.13	1.99	2.24	9.10	129.88
Debt-to-Asset Ratio	4864	4914	0.45	0.44	0.45	0.44	0.23	0.22
Dividend Payout Dummy	5310	5310	0.39	0.39	0.00	0.00	0.49	0.49
EPS Dummy	5310	5310	0.76	0.78	1.00	1.00	0.42	0.42
Market Value	5310	5310	4118.00	3884.29	387.08	390.39	18030.60	17361.29

Table 1: Cont'd

Liquidity Measures in Year Repurchase Completed:				
Cash	4221	400.93	49.60	2090.31
Working Capital	4221	344.00	71.94	1422.93
Percent Change in Price:				
Price change (t=-1)	4589	88.76	3.04	2279.74
Highest *minus* Lowest at T=0	4864	169.40	87.93	491.05
Stock Quality:				
S&P 500 Rating "A"	5310	0.09	0.00	0.28
S&P 500 Rating "B"	5310	0.46	0.00	0.50
Industry Effect:				
GIC Industrials	5310	0.17	0.00	0.37
GIC Technology	5310	0.24	0.00	0.43
GIC Consumer Discretionary	5310	0.22	0.00	0.42
GIC Consumer Staples	5310	0.05	0.00	0.22
GIC Telecommunication	5310	0.01	0.00	0.10

Notes: Table 1 reports the number of observations, mean, median and standard deviation of variables described in Appendix 2. T=0 indicates the year of repurchase, while T=-1 indicates year prior to repurchase.

announces positive EPS, and 0 if negative. Note that the percentage of firms that pay dividends (39%) and announce positive EPS (about 77%) remains consistent in *T = 0* and *T = -1*. Cash and working capital serve as proxies for the measure of liquidity in the year that the repurchase program is announced. Changes in price levels are computed as the percentage change from two years prior to repurchase (*T = -2*) to one year prior to repurchase (*T = -1*) and as the difference between the highest and lowest price in the year of repurchase (*T = 0*). Note that the mean percentage change from *T = -2* to *T = -1* is 88.76%, while the median percentage change is 3.04%, which is indicative of a high degree of volatility in years prior to a repurchase announcement. The mean (median) percentage change in the highest and lowest stock price in *T = 0* is 169% (88%).

Results for hypotheses 1a through 1c are presented in Tables 2 (a) and 2 (b), whereby equally-weighted and value-weighted 1-, 2-, and 3-year abnormal returns are regressed on repurchase-related variables and other contributing factors, respectively. When looking at Table 2 (a), Panel A: *Repurchase-related Factors*, we observe that the mechanisms used to complete the transaction have no predictive power for long-term cross-sectional abnormal returns.[10] Only M&A is marginally significant (at the 10% level), producing a decline of 0.094% in the 1-year CAR for a unit change in M&A activity. Of all the repurchase-related factors, the only variables that possess significant predictive powers are the techniques employed to implement a repurchase. In particular, 3-year (2-year) CARs decline by 0.66% (0.65%), for a one-unit increase in open market repurchases, and by 0.57% (0.60%), for a one-unit increase in open market/negotiated repurchases.

Overall, we interpret these results as evidence that share buybacks in isolation destroy value for stockholders over the long term. Our findings concur with the current cautionary tale in regard to buybacks. Recent articles from the *WSJ* and *Forbes* concern the proliferation of buybacks and how companies have aligned their behavior with the rest of the market in the past decade, repurchasing shares when they are overvalued and selling when they are undervalued.[11] This observation, coupled with the fact that the market recognizes that management could use the money for more productive purposes, such as research and development or product expansion to stimulate growth, lead to declining returns following stock buybacks.

Panel B of Table 2 (a) reports the results of other contributing factors, including risk, accounting variables, liquidity measures, change in stock price, stock quality, and industry effect. We detect a negative and significant relationship between total risk (proxied by the standard deviation) and long-term abnormal returns. Specifically, the estimated mean decrease is 0.35% for the 1-year CAR and 0.27% for the 2- and 3-year CARs for a one-unit increase in total risk. Although this result

[10] We do not include SEOs here to avoid multicollinearity issues. However, we have included SEOs in Section V under Robustness Checks.

[11] Beware the stock-buyback craze, *WSJ*, June 19, 2015; How stock buybacks destroy shareholder value, *Forbes*, Feb 24, 2016.

Table 2 (a): Determinants of Returns with Equally Weighted Index

Panel A: Repurchase- related Factors	**3-Year**	**2-Year**	**1-Year**
Repurchase Characteristics:			
Percent Shares Repurchased	-0.074	-0.084	-0.034
Repurchase Completed Dummy	-0.022	-0.037	-0.102
Repurchase Withdrawn Dummy	0.012	0.002	0.015
Uses of Repurchase:			
Stock Options	0.083	0.070	0.095
Mergers & Acquisitions	-0.093	-0.070	-0.094*
Technique of Repurchase:			
Accelerated	-0.143*	-0.145*	-0.087
Negotiated	-0.250*	-0.242*	-0.027
Open Market	-0.661**	-0.647**	-0.334
Open Market/Negotiated	-0.573**	-0.600**	-0.288
Dutch Auction	-0.181	-0.192	-0.05
Sources of Funds:			
Bank Loan	-0.047	-0.053	-0.052
Borrowings	0.012	-0.009	0.008
Cash from Operations	-0.032	-0.010	0.015
Cash Reserves	0.047	0.038	0.058
Revolving Line of Credit	-0.060	-0.031	-0.018
Debt Securities	0.023	0.052	0.021
Working Capital	0.028	0.016	0.007
Employee Benefit Plans	-0.046	-0.041	0.005
Enhance Shareholder Value	0.026	0.006	0.052
Stock Option Plan	0.009	0.005	0.035
Undervaluation	0.021	0.028	-0.025
Conversion of Preferred Stock	0.014	0.003	-0.005
Panel B*: *Other Contributing Factors			
Risk Variables:			
Standard Deviation	-0.271***	-0.271***	-0.350***
Systematic Risk(Beta)	0.158***	0.168***	0.121*

Table 2 (a): Cont'd

Accounting Variables:						
Year of Repurchase	***T=0***	***T=-1***	***T=0***	***T=-1***	***T=0***	***T=-1***
Assets	-0.852	0.751	-0.610	0.562	-2.510*	2.787*
Working Capital	-0.197	0.085	-0.002	-0.012	-0.431	-0.047
Revenue	2.461***	-1.677**	1.938**	-1.224*	2.548***	-2.231***
Common Equity	-0.429	0.021	-0.534	0.220	1.348	-1.577
Cash Holdings	0.148	-0.112	0.113	-0.156	0.271	-0.072
R& D	-0.941**	1.190***	-0.886*	1.097**	-0.962**	1.034**
Market-to-Book	0.014	0.000	0.005	0.034	0.166	-0.122
Debt-to-Asset	-0.185	0.127	-0.232	0.214	0.278	-0.308
Dividend Payout Dummy	0.283*	-0.261*	0.154*	-0.099	0.022	0.055
EPS Dummy	0.017	-0.156**	0.008	-0.169***	-0.055	-0.176***
Market Value	-1.470***	0.923	-1.100**	0.567	-0.99*	0.501

Table 2 (a): Cont'd

Liquidity Measures in Year Repurchase Completed:			
Cash	-0.280	-0.155	-0.300
Working Capital	0.305	0.079	0.484
Percent Change in Price:			
Price change (t=-1)	-0.072	-0.102	-0.085
Highest *minus* Lowest at T=0	0.112*	0.117*	0.129*
Stock Quality:			
S&P 500 Rating "A"	-0.053	-0.044	0.014
S&P 500 Rating "B"	-0.105	-0.041	0.02
Industry Effect:			
GIC Industrials	-0.094	-0.077	-0.062
GIC Technology	0.025	0.059	0.013
GIC Consumer Discretionary	-0.094	-0.046	-0.036
GIC Consumer Staples	-0.041	-0.042	-0.008
GIC Telecommunication	-0.024	-0.006	0.026
Observations	5310	5310	5310
Adjusted R^2	26.20%	23.30%	28.00%
F-Statistic	3.14***	3.24***	3.86***
Intercept	2.193***	1.687***	0.979***

Notes: Table 2(a) reports the results of a multivariate cross-sectional regression analysis. The dependent variable is an equally weighted market model CAR (Cumulative Abnormal Return) for the three time horizons; 3-year, 2-year and 1-year. The independent variables are defined in details in Appendix 2. t-statistics are reported between parentheses. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

appears to be against the general logic that higher risk should be rewarded with higher returns, it corroborates the findings of Haugen and Hines (1975) and the divergence of opinion theory developed by Miller (1977). Miller argues that the riskiest stocks are those for which there is greatest uncertainty or divergence of opinion. These stocks will be the most sensitive to changes in demand and will experience the largest price fluctuations, resulting in lower expected returns for riskier securities. The relationship between returns and systematic risk is, however, positive and significant. For a one-unit increase in beta, the predicted increase is 0.12% for the 1-year CAR, 0.17% for the 2-year CAR, and 0.16% for the 3-year CAR. These results agree with the assertion of the capital asset pricing model (CAPM) that capital markets reward only non-diversifiable, systematic risk.

Next, we consider how accounting variables both in the year of repurchase and the year prior to repurchase affect the long-term CARs. Note that revenue in the year of repurchase has a positive and significant impact on the CAR, while revenue in the year prior to repurchase has a significant but negative impact on the CAR. This result is consistent across the three CARs and can be explained as follows. The positive relationship between revenue and CAR in the year of repurchase supports the free cash flow hypothesis; i.e., the market rewards the stock because it believes that the company is not wasting cash on unprofitable ventures. The results for the year prior to repurchase suggest that a decline in revenue in the year before repurchase has a positive impact on the CAR in the year of repurchase (and beyond) and vice versa. This implies that the negative news associated with declining revenue is offset by a repurchase announcement in the subsequent year. The market considers the repurchase announcement as a signal that the company is not in any financial trouble and has sufficient resources to implement the program.

In contrast, if there is an increase in revenue in the year prior to repurchase, the impact on CAR is negative because now the market assumes that the company is using its earnings to buy back stock due to the lack of acceptable investment prospects. This finding reinforces our previous discussion on the proliferation of buybacks in recent years and growing shareholder skepticism toward buybacks. A similar argument may be extended to the behavior of the R&D variable. While a one-unit increase in R&D in the year of repurchase causes a decline in the CARs (0.94%, 0.89% 0.96% in 3-, 2-, and 1-year respectively), a one-unit increase in R&D in the year preceding the repurchase, causes the 3-, 2-, and 1-year CARs to rise by 1.19%, 1.10%, and 1.03% respectively. This demonstrates that the market views R&D investment as a signal of market value maximization (McConnell and Muscarella, 1985), whereas implementing stock buybacks diverts resources away from future stockholder wealth maximization and, instead, serves to increase the value of managers' short-term

holdings.[12,13]

We include two indicator variables in the accounting variables category for dividend payout and EPS. The dividend payout variable equals 1 if company pays a dividend, and 0 otherwise. The EPS variable equals 1 if EPS is positive, and 0 otherwise. Note that the dividend payout indicator is marginally significant (at 10% level) for the 3-year and 2-year CARs. Further, the relationship is positive in the year of repurchase, a 0.28 (0.15) increase in the 3-year (2-year) CAR for a one-unit change in dividend payouts, and negative in the year before repurchase, a 0.26 decrease in the 3-year CAR for a one-unit increase in dividend payouts.

We should mention here that analysts and academicians (Jensen, 1986; Grullon and Michaely, 2002) recognize dividends and repurchases as substitutes for each other in the distribution of capital gains. Because management retains much more discretionary power over repurchases than dividend payouts, the combination of the two events certifies the firm's financial strength. Alternatively, a dividend payout in the year prior to repurchase has a marginally negative impact on the 3-year CAR (insignificant for 2-year and 1-year CARs) in the year of repurchase. The low statistical significance (or insignificance, as in the case of the 1-year CAR) of the dividend payout indicator variable demonstrates the declining impact of dividend payouts on stock performance (Skinner, 2008).

In regard to the second indicator variable, EPS, we observe that there is a statistically significant link between earnings and excess returns in the year preceding a repurchase announcement. Specifically, for a one-unit increase in EPS, there is a 0.15 decrease in the 3-year CAR, a 0.16 decrease in the 2-year CAR, and a 0.17 decrease in the 1-year CAR. A plausible explanation is that, when positive earnings are followed by repurchase announcements, the market presumes that there is a lack of adequate investment opportunities and discounts the value of the stock. However, market reaction to an EPS announcement in the year of repurchase is consistently insignificant, indicating that news of a repurchase diverts the market's attention away from earnings.

The last statistically significant variable in this category is market value. In the year of a repurchase, a one-unit decline in market value prompts a 1.47 million increase in the 3-year CAR, a 1.1 million increase in the 2-year CAR, and a 0.99 million increase in the 1-year CAR. The lower the market value of the firm, the smaller and riskier the firm and the larger the degree of information asymmetry. Thus, a repurchase announcement serves to mitigate information asymmetry, leading to excess returns.[14] We observe that both statistical and economic significance increase

---

[12] See the detailed discussion, integrating behavioral-agency perspective by Sanders and Carpenter (2003), on the motives underlying management's decision to repurchase stock.

[13] Recent evidence of managers' utilizing buybacks for personal short-term gains is provided by executives cashing out own shares after unveiling buybacks following corporate tax cuts of 2017 (Source: CNN, *Executives are cashing in on the explosion in stock buybacks*, June 11, 2018)

[14] Freeman (1987) demonstrates that CARs of small firms exceed those of large firms.

with the length of the CAR, demonstrating that differences between riskiness of large and small firms become more pronounced over longer holding periods.

Table 2 (b): Determinants of Returns with Value Weighted Index

Panel A: Repurchase- related Factors			
	3-Year	**2-Year**	**1-Year**
Repurchase Characteristics:			
Percent Shares Repurchased	-0.088	-0.101	-0.052
Repurchase Completed Dummy	-0.045	-0.059	-0.124*
Repurchase Withdrawn Dummy	0.036	0.025	0.013
Uses of Repurchase			
Stock Options	0.074	0.065	0.090
Mergers & Acquisitions	-0.088	-0.080	-0.092
Technique of Repurchase			
Accelerated	-0.140*	-0.134*	-0.112
Negotiated	-0.242*	-0.243*	-0.080
Open Market	-0.697**	-0.688**	-0.445*
Open Market/Negotiated	-0.615**	-0.600**	-0.403
Dutch Auction	-0.199	-0.213	-0.126
Sources of Funds			
Bank Loan	-0.046	-0.043	-0.041
Borrowings	-0.015	-0.034	-0.014
Cash from Operations	-0.035	-0.007	0.024
Cash Reserves	0.030	0.036	0.042
Revolving Line of Credit	-0.083	-0.064	-0.028
Debt Securities	0.015	0.041	0.007
Working Capital	0.016	0.010	-0.010
Purpose of Repurchase			
Employee Benefit Plans	-0.056	-0.048	0.00
Enhance Shareholder Value	0.084	0.070	0.106*
Stock Option Plan	-0.004	-0.001	0.027
Undervaluation	0.021	0.013	-0.049
Conversion of Preferred Stock	0.006	0.003	-0.007
Panel B: Other Contributing Factors			
Risk Variables:			
Standard Deviation	-0.271	-0.048	-.141*
Systematic Risk (Beta in deciles)	0.188***	0.193***	0.174***

Table 2 (b): Cont'd

Year of Repurchase	*T=0*	*T=-1*	*T=0*	*T=-1*	*T=0*	*T=-1*
Assets	-0.871	0.786	-0.421	0.573	-2.740*	2.656*
Working Capital	-0.143	-0.024	0.066	-0.138	-0.253	-0.179
Revenue	2.138***	-1.314*	1.800**	-1.056*	2.398***	-1.997**
Common Equity	-0.259	-0.103	-0.556	0.112	1.552	-1.383
Cash Holdings	0.101	-0.109	0.018	-0.117	0.149	-0.058
R& D	-1.055**	1.328***	-0.985*	1.188***	-1.070**	1.169***
Market-to-Book	-0.007	0.014	-0.035	0.064	0.136	-0.074
Debt-to-Asset	-0.043	-0.019	-0.162	0.076	0.374	-0.342
Dividend Payout Dummy	0.241*	-0.217*	0.122	-0.058	0.008	0.063
EPS Dummy	0.066	-0.098	0.043	-0.123**	-0.020	-0.137**
Market Value	-1.500***	0.947	-1.251**	0.749	-1.109*	0.617

Table 2 (b): Cont'd

Panel C: Liquidity Measures in Year Repurchase Completed			
Cash	-0.333	-0.179	-0.273
Working Capital	0.358	0.127	0.406
Panel D: Percent Change in Price			
Price change (t=-1)	-0.072	-0.109	-0.097
Highest *minus* Lowest at T=0	0.109*	0.110	0.128*
Panel E: Stock Quality			
S&P 500 Rating "A"	-0.005	0.000	0.041
S&P 500 Rating "B"	-0.061	-0.015	0.047
Panel F: Industry Effect			
GIC Industrials	-0.124*	-0.098	-0.063
GIC Technology	-0.036	-0.001	0.007
GIC Consumer Discretionary	-0.131*	-0.081	-0.045
GIC Consumer Staples	-0.067	-0.070	-0.015
GIC Telecommunication	-0.043	-0.023	-0.007
Observations	5310	5310	5310
Adjusted R^2	21.60%	18.50%	20.70%
F-Statistic	3.02***	2.67***	2.92***
Intercept	1.465*	1.212*	0.616

Notes: Table 2 (b) reports the results of a multivariate cross-sectional regression analysis. The dependent variable is a value weighted market model CAR (Cumulative Abnormal Return) for three time horizons; 3-year, 2-year and 1-year. The independent variables are defined in details in Appendix 2. t-statistics are reported between parentheses. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Note that a company's cash holdings have no significant predictive power either in the year prior to or in the year of a repurchase announcement. This shows that the

market is not concerned about how much cash the company holds but, rather, how it utilizes the cash it generates (as evidenced by the predictive abilities of the variables, revenue, R&D, and EPS). This result also supports the study by Opler *et al.* (1999) that shows little evidence of cash holdings' having a large impact on payouts to shareholders.

We repeat the multivariate analyses with the value-weighted CAR as a dependent variable as a robustness check. Our results, presented in Table 2(b), are consistent with those of the equally-weighted CAR, except for the total risk measured by the standard deviation. Unlike the case of the equally-weighted CAR, the total risk has no predictive power (only marginal significance for the 1-year CAR) for the value-weighted CAR. This is not surprising, as larger firms (with lower risk) dominate a value-weighted index. This implies that uncertainty or divergence of opinion for larger stocks is inconsequential and does not affect the CAR. Overall, our results indicate a degree of investor apathy toward stock buybacks and provide support for recent discussions in regard to this issue in business publication outlets, such as the *WSJ*.

Multinomial Logit Regression

The results of the analyses thus far suggest that, if companies complete the full transaction, they can add more to stockholder wealth (over a 3-year period from the year of a repurchase announcement) than if they did not proceed beyond the repurchase event (based on CAR results). This raises the following question: Can a company's characteristics predict transaction completion? In this stage of the empirical analysis, we test hypotheses 2a through 2c by using multinomial logit to address this question. We analyze the effect of the explanatory variables on the marginal utility of the choice of corporate action for completing the transaction relative to inaction, i.e., the company does not proceed beyond the repurchase and, hence, does not complete the transaction. We conduct the multinomial logit analysis for any single action as well as a combination of actions.

Table 3 presents the marginal effects of explanatory variables: firm risk, accounting characteristics, change in share price, firm's credit quality, and quantity of shares repurchased. The coefficients show the effect of the explanatory variables on the probability of undertaking the corporate action under consideration. Note that the coefficient for firm beta is positive and significant along with firm assets, EPS dummy, and percentage change in stock price, while coefficients for book value of common equity, R&D expenditure, debt-to-asset ratio, and dividend payout dummy are negative and significant. Thus, increase in systematic risk, firm assets, positive earnings announcements, and positive changes in stock price increase the probability of contract completion by the company using a single strategy or combination of strategies. Conversely, increases in the book value of common equity, R&D expenses, debt-to-asset ratio, and dividend payout decrease the probability of transaction completion.

Table 3: Multinomial Logit

	Inaction versus Action using any one choice or a combination		Inaction versus Action using any one choice only		Action using Stock Options versus Action using any other one choice or a combination	
Panel A: Risk Variables						
Standard Deviation	0.851		0.726		1.921	
Systematic Risk (Beta)	0.015**		0.015**		0.01	
Panel B: Accounting Variables						
Year of Repurchase	***T=0***	***T=-1***	***T=0***	***T=-1***	***T=0***	***T=-1***
Assets	0.491***	0.156	0.487***	0.221	0.372	-0.600*
Working Capital	-0.007	0.027	-0.010	0.030	0.018	-0.045
Revenue	0.087	-0.124*	0.081	-0.116	0.026	0.033
Common Equity	-0.561***	-0.076	-0.491***	-0.183	-0.619*	0.814**
Cash Holdings	0.016	0.02	0.110	0.021	0.02	-0.006
R & D	-0.081**	0.041	-0.115**	0.075	0.103	-0.104*
Market-to-Book	-0.014*	0.005	-0.010	0.009	0.008	0.018
Debt-to-Asset	-0.994***	-0.137	-0.859**	-0.416	-1.385*	1.680**
Dividend Payout Dummy	-0.151**	0.074	-0.167*	0.087	-0.024	0.016
EPS Dummy	0.128**	-0.029	0.138*	-0.029	0.027	-0.023
Market Value	-0.088	0.056	-0.090	0.039	0.100	-0.075
Panel C: Percent Change in Price						
Price change (t=-1)	0.000		0.00		0.000	
Highest *minus* Lowest at T=0	0.000**		0.000*		0.000	
Panel D: Stock Quality						
S&P 500 Rating "A"	0.081		0.118		0.286	
S&P 500 Rating "B"	-0.112***		-0.137***		0.115***	
Panel E: Repurchase Variable						
Percent Shares Repurchased	0.000		-0.001		0.001*	
Observations	802		709		634	
Pseudo R^2	26.16%		36.29%		23.36%	
Log likelihood function	-609		-342		-316	

Notes: Table 3 reports the multinomial logit analysis in which we divide the outcomes into different groups. The dependent variable in the first column uses the base group when a company does not engage in any action (stock options, M&As and SEOs) after the repurchase versus using any one choice or a combination of choices. In the second column, the base group is when a company does not engage in any action (stock options, M&As and SEOs) after the repurchase versus using any one choice. In the third column, the base group is when a company uses stock options after the repurchase versus using any one choice, or a combination of choices (M&As and SEOs). The independent variables are defined in details in Appendix 2. t-statistics are reported between parentheses. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Considering assets proxy for firm size (Moeller *et al*., 2004), we predict that larger firms are more likely to complete the entire transaction than are smaller firms. We further predict that, because beta can capture industry effects, firms in high beta industries are more likely to complete the full transaction than are firms in low beta industries. Moreover, firms with positive EPS announcements are likely to have higher growth opportunities and, hence, a higher stock price (Hovakimian *et al*., 2001). Such firms have incentive to enter into M&A deals, conduct SEOs, and fulfill option grants to take advantage of the higher stock price, thus completing the transaction. At the same time, such growth firms are likely to have lower dividend payout, which explains the negative coefficient that we obtain for the dividend payout dummy. We observe that, although the percentage change in price is statistically significant, it is not economically so.

The negative association between the debt-to-asset ratio and transaction completion agree with the findings of Hovakimian *et al.* (2001), who detected that stock repurchases play a much more significant role than do issuances in maintaining a target debt ratio. Thus, when companies implement repurchase programs to move toward a target debt ratio, they are much less likely to reissue those shares. Next, we take a look at common equity. One explanation for the negative coefficient for the total common equity can be provided from an accounting perspective. When shares are repurchased, they increase the firm's supply of treasury stock. In case the total common equity declines, the firm can introduce the treasury stock back into the market to raise the total common equity. Another explanation can be drawn from the findings of Barth *et al.* (1998), who find that an increase in book value combined with decrease in net income is a predictor of poor financial health. Applying similar logic to our results, which are the opposite, we can predict that negative common equity combined with positive EPS may be a predictor of good financial health and, hence, a motivation for companies to complete the full transaction.

The negative coefficient for R&D demonstrates that companies with larger expenses have a lower probability of completing the full transaction. This finding corroborates existing literature. Firms with large expenses are less likely to enter into M&A deals, as the success of such deals are directly associated with higher offer prices (Baker *et al*., 2012) and are thus, costlier. At the same time, according to the pecking order theory, if companies need to fund deficits, they are much more likely to do so by issuing debt rather than by issuing equity (Shyam-Sunder and Myers, 1999). Finally, turning to stock analyst ratings as a proxy for stock attractiveness, we observe that firms with average quality (rated "B")[15] are more likely to complete the reverse repo contract than are firms with the highest quality. This is probably because

[15] S&P analysts rate companies from "A" to "D," with "A" as the highest rating and "D" as the lowest. In addition, we combined any "+" or "-" to the letter associated with it. For example, "B-," "B+," and "B" were combined into "B." This stock rating is different from debt rating. We use stock rating because it is more relevant in this case than is debt rating. A limitation to this is that we depended on the S&P rating rather than following a larger group of analysts' rating for the stock.

Table 4: Robustness Check - Determinants of Returns - replacing Stock Options with SEO

	3-Year (Equally-weighted Index)	3-Year (Value-weighted Index)
Panel A: Repurchase- related Factors		
Repurchase Characteristics:		
Percent Shares Repurchased	-0.066	-0.080
Repurchase Completed Dummy	-0.016	-0.039
Repurchase Withdrawn Dummy	0.020	0.045
Uses of Repurchase:		
SEO	-0.008	0.009
Mergers & Acquisitions	-0.090	-0.084
Technique of Repurchase:		
Accelerated	-0.077	-0.067
Negotiated	-0.087	-0.062
Open Market	-0.345***	-0.350***
Open Market/Negotiated	-0.261**	-0.273**
Sources of Funds:		
Bank Loan	-0.052	-0.052
Borrowings	0.006	-0.020
Cash from Operations	-0.039	-0.042
Cash Reserves	0.051	0.033
Revolving Line of Credit	-0.070	-0.096*
Debt Securities	0.021	0.013
Working Capital	0.029	0.018
Purpose of Repurchase:		
Employee Benefit Plans	-0.044	-0.056
Enhance Shareholder Value	0.028	0.085
Stock Option Plan	0.004	-0.007
Undervaluation	0.021	0.021
Conversion of Preferred Stock	0.016	0.008
Panel B: Other Contributing Factors		
Risk Variables:		
Standard Deviation	-0.275***	-0.043
Systematic Risk (Beta)	0.140***	0.172***

Table 4: Cont'd

Accounting Variables:				
Year of Repurchase	***T=0***	***T=-1***	***T=0***	***T=-1***
Assets	-0.763	0.529	-0.734	0.562
Working Capital	-0.207	0.081	-0.150	-0.031
Revenue	2.500***	-1.69**	2.201***	-1.350*
Common Equity	-0.553	0.251	-0.443	0.135
Cash Holdings	0.140	-0.132	0.095	-0.133
R&D	-0.817**	1.095***	-0.924*	1.227***
Market-to-Book	0.011	0.019	-0.015	0.034
Debt-to-Asset	-0.204	0.162	-0.070	0.015
Dividend Payout Dummy	0.279**	-0.252**	0.234*	-0.205
EPS Dummy	0.018	-0.149**	0.066	-0.091
Market Value	-1.410***	0.894*	-1.450***	0.928

Table 4: Cont'd

Liquidity Measures in Year Repurchase Completed:		
Cash	-0.288*	-0.335
Working Capital	0.300	0.350
Percent Change in Price:		
Price change (t=-1)	-0.070	-0.072
Highest *minus* Lowest at T=0	0.099*	0.096
Stock Quality:		
S&P 500 Rating "A"	-0.052	-0.006
S&P 500 Rating "B"	-0.102	-0.059
Industry Effect:		
GIC Industrials	-0.101	-0.130
GIC Technology	0.024	-0.038
GIC Consumer Discretionary	-0.097	-0.136*
GIC Consumer Staples	-0.045	-0.069
GIC Telecommunication	-0.002	-0.017
Observations	5310	5310
Adjusted R^2	25.60%	21.00%
F-Statistic	3.58***	2.98***
Intercept	1.686***	0.817

Notes: Table 4 reports the results of a multivariate cross-sectional regression analysis. Table 4 is a replication of earlier tests except we replace the dummy variable for stock options with SEOs as an independent variable. The dependent variable in the first column is an equally weighted market model CAR (Cumulative Abnormal Return) for the 3-year horizon. The dependent variable in the first column is a value weighted market model CAR (Cumulative Abnormal Return) for the 3-year horizon. The independent variables are defined in details in Appendix 2. t-statistics are reported between parentheses. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

B-ranked stocks are under pressure to raise stockholder wealth through appropriate corporate actions, while A-ranked stocks are already considered valuable. It is interesting to note that the coefficients for working capital and cash holdings, which proxy for cash flow, are insignificant, along with revenue and market value. Thus, cash flow and market capitalization do not appear to play a role in the decision-making process with regard to utilization of repurchased stock for a company.

5. Robustness Checks

In this section, we present the robustness checks used to confirm consistency of our results. Table 4 presents the results for the equally-weighted and value-weighted multivariate regressions by the replacement of stock options with SEOs in Panel A under *Uses of Repurchase*. For the sake of brevity, we present results for the 3-year period only. Overall, we detect no major differences in our results, using both equally-weighted and value-weighted indices when we replace stock options with SEOs. Further, in results not reported here,[16] we conduct stepwise multivariate regressions as an additional check. Again, we detect no significant differences from our original results. Finally, we conduct the multinomial logit analysis with a robust model and find that the original results hold.

6. Limitations

As with any empirical study, there are certain limitations. First, the study looks at 3-year, long-term returns. During these years, there could be other factors that affect the returns. There is, however, no way to conduct a long-term study and to control for every single factor (including a short period of time, such as 30 days). Nevertheless, we added a number of control variables and conducted robustness tests to mitigate any possible effects. Second, there could be a feedback loop for which we did not account. In other words, companies could have had a repurchase program 20 years ago and used their experience to execute the newer program, while other companies may not have had such an experience. This could result in an infinite loop. In addition, measuring a "past experience" effect would be highly subjective.

7. Summary and Conclusions

In this study, we investigate the reuse of acquired stock by firms along with accounting and repurchase-related variables to evaluate their impact on long-term shareholder value. We conduct multivariate regressions to investigate the factors that drive returns in a repurchase announcement. Surprisingly, we find that repurchase-related variables, such as quantity of repurchase, technique employed to conduct the repurchase, sources of funds used, and stated purpose of repurchase, have no impact, while risk and accounting variables, including revenue, cash flow, and size, seem to play significant roles in long-term returns. We also find that firm beta, assets, EPS,

[16] Results were omitted due to similarity to the original results. They are, however, available upon request.

and change in stock price favor contract completion (from announcing a repurchase to reuse of acquired stock), while book value of common equity and cash flow variables reduce the probability of contract completion.

Our study makes a significant contribution to existing literature through an analysis of the repurchase event from the "lifetime"[17] perspective that goes beyond the mispricing motive of repurchase, which is no longer the only criterion as documented by Fu and Huang (2016). To the best of our knowledge, this is the first study to investigate the different phases involved in one contract and has important implications for both academicians and professionals who study or deal in the stock market.

[17] For a 3-year period.

Appendix 1: Summary of selected literature related to paper contribution

Author(s)	Topic	Summary of Findings
Grullon and Michaely, 2002; Oded, 2008; Sonika *et al.*, 2014	Timing of cash distribution	Allow executives greater flexibility
Ikenberry and Vermaelen, 1996; McNally, 1999; Comment and Jarrell, 1991	Signaling theory	Stock undervaluation
Jensen, 1986	Free cash flow hypothesis	Mitigate agency conflicts
Ikenberry *et al.*, 1995; Peyer and Vermaelen, 2009	Share repurchase announcements – short term	Short-term positive abnormal returns
Ikenberry *et al.* (1995) and Peyer and Vermaelen (2009)	Share repurchase announcements – long term	Long-run abnormal returns (4 years)
Kahle, 2002	Repurchase decision and stock options - studied as separate events	Fund employee stock options; Substitution hypothesis – avoid negative impact on executive wealth
Fu and Huang, 2016	Repurchase and SEO – studied as separate events	Absence of long-run abnormal returns following repurchase and SEO announcements over last decade

Appendix 2: Variable Descriptions

Panel A: Repurchase-related Factors	*Variables related to the repurchase announcement*
Repurchase Characteristics:	
Percent Shares Repurchased	The dollar amount repurchased divided by the announced proposed amount
Repurchase Completed Dummy	A dummy variable equals 1 if the company materially completed the repurchase, zero otherwise.
Repurchase Withdrawn Dummy	A dummy variable equals 1 if the company officially announced withdrawing the repurchase, zero otherwise.
Uses of Repurchase	
Stock Options	A dummy variable equals 1 if the company uses the repurchase (or part of it) in awarding stock options to executives, zero otherwise.
Mergers & Acquisitions	A dummy variable equals 1 if the company is engaged in a merger or acquisition with stock swap (or partial stock swap) within 3 years after the repurchase transaction, zero otherwise.
SEOs	A dummy variable equals 1 if the company is engaged in seasoned equity offering within 3 years after the repurchase transaction, zero otherwise.
Technique of Repurchase:	
Accelerated	A dummy variable if the company is using an accelerated technique to complete the repurchase, zero otherwise.
Negotiated	A dummy variable if the company is using a negotiated buy technique to complete the repurchase, zero otherwise.
Open Market	A dummy variable if the company is completing the repurchase through an open market buyback, zero otherwise.
Open Market/Negotiated	A dummy variable if the company is completing the repurchase through a combination of an open market/negotiated buyback, zero otherwise.
Dutch Auction	A dummy variable if the company is using a Dutch auction technique to complete the repurchase, zero otherwise.
Sources of Funds:	
Bank Loan	A dummy variable if the company is using a bank loan to fund the repurchase, zero otherwise.
Borrowings	A dummy variable if the company is borrowing to fund the repurchase, zero otherwise.
Cash from Operations	A dummy variable if the company is using its cash from operations to fund the repurchase, zero otherwise.
Cash Reserves	A dummy variable if the company is using its cash reserves to fund the repurchase, zero otherwise.
Revolving Line of Credit	A dummy variable if the company is using its revolving line of credit to fund the repurchase, zero otherwise.

Appendix 2: Variable Descriptions (Continued)

Debt Securities	A dummy variable if the company is issuing debt securities to fund the repurchase, zero otherwise.
Working Capital	A dummy variable if the company is using its working capital to fund the repurchase, zero otherwise.
Purpose of Repurchase:	
Employee Benefit Plans	A dummy variable if the company's announced objective of a repurchase is for the employee benefit plan, zero otherwise.
Enhance Shareholder Value	A dummy variable if the company's announced objective of a repurchase is to enhance shareholder value, zero otherwise.
Stock Option Plan	A dummy variable if the company's announced objective of a repurchase is for the stock benefit plan, zero otherwise.
Undervaluation	A dummy variable if the company's announced objective of a repurchase is to address undervaluation of stock, zero otherwise.
Conversion of Preferred Stock	A dummy variable if the company's announced objective of a repurchase is for conversion of preferred stock, zero otherwise.
Panel B: Other Contributing Factors	
Risk Variables:	
Standard Deviation	Based on Compustat's standard deviation decile groups, where 10 is the highest group.
Systematic Risk (Beta)	Based on Compustat's beta decile groups, where 10 is the highest group.
Accounting Variables:	
Assets	Company's total assets (for t=1; the year of announcement and t=-1; the year prior to announcement).
Working Capital	Company's working capital (for t=1; the year of announcement and t=-1; the year prior to announcement).
Revenue	Company's total revenue or total sales (for t=1; the year of announcement and t=-1; the year prior to announcement).
Common Equity	Company's common equity (for t=1; the year of announcement and t=-1; the year prior to announcement).
Cash Holdings	Company's total cash holdings (for t=1; the year of announcement and t=-1; the year prior to announcement).
Research & Development	Company's total research and development expense (for t=1; the year of announcement and t=-1; the year prior to announcement).
Market-to-Book Ratio	Company's market-to-book ratio calculated as market value divided by book value (for t=1; the year of announcement and t=-1; the year prior to announcement).

Appendix 2: Variable Descriptions (Continued)

Debt-to-Asset Ratio	Company's debt-to-asset ratio calculated as total debt divided by total assets (for t=1; the year of announcement and t=-1; the year prior to announcement).
Dividend Payout Dummy	A dummy variable if the company's dividend payout is positive, zero otherwise (for t=1; the year of announcement and t=-1; the year prior to announcement).
EPS Dummy	A dummy variable if the company's earnings per share is positive, zero otherwise (for t=1; the year of announcement and t=-1; the year prior to announcement).
Market Value	Company's market value (for t=1; the year of announcement and t=-1; the year prior to announcement).
Liquidity Measures in Year Repurchase Completed:	
Cash	Company's total cash (year of completing the repurchase).
Working Capital	Company's total working capital (year of completing the repurchase)..
Percent Change in Price:	
Price change (t=-1)	Price change the year prior to announcement.
Highest *minus* Lowest at T=0	Price change between highest and lowest close the year of announcement.
Stock Quality:	
S&P 500 Rating "A"	Standard and Poor's stock rating as the highest buy recommendation "A"
S&P 500 Rating "B"	Standard and Poor's stock rating as second highest buy recommendation "B"
Industry Effect:	
GIC Industrials	A dummy variable if the company GIC's industry classification is "industrials", zero otherwise.
GIC Technology	A dummy variable if the company GIC's industry classification is "technology", zero otherwise.
GIC Consumer Discretionary	A dummy variable if the company GIC's industry classification is "consumer discretionary", zero otherwise.
GIC Consumer Staples	A dummy variable if the company GIC's industry classification is "consumer staples", zero otherwise.
GIC Telecommunication	A dummy variable if the company GIC's industry classification is "telecommunications", zero otherwise.

References:

Akhigbe, Borde and Whyte, 2003, Does an Industry Effect Exist in Initial Public Offerings, *The Financial review*, 38, 531-551.

Baker, H. Kent, Dutta, Shantanu, Saadi, Samir, Zhu, PengCheng, 2012, Are Good Perfermers Bad Acquirers?, *Financial Management*, 41, 95-118.

Banyi, M., Dyl, E., Kahle, K., 2008, Errors in estimating share repurchases, *Journal of Corporate Finance*, 14, 460-474.

Barth, Mary E., Beaver, William H., Landsman, Wayne R., 1998, Relative Valuation Roles of Equity Book Value and Net Income as a Function of Financial Health, *Journal of Accounting and Economics*, 25, 1-34.

Chava and Jarrow, 2004, Bankruptcy Prediction with Industry Effects, *Review of Finance*, 8, 537–569.

Comment, Robert, and Gregg A. Jarrell, 1991, The relative signaling power of Dutch auction and fixed-price self-tender offers and open market share repurchases, *Journal of Finance*: 46, 1243-1271.

Dittmar, Amy, 2000. "Why Do Firms Repurchase Stocks?", *Journal of Business*, 73, 331-355.

Freeman, R., 1987, The association between accounting earnings and security returns for large and small firms, *Journal of Accounting and Economics*, 9, 195-228.

Fu, F., and S. Huang. 2016. "The Persistence of Long-Run Abnormal Returns Following Stock Repurchase and Offerings." *Management Science*, 62, 964-984.

Grullon, G., and R. Michaely. 2002. "Dividends, Share Repurchases, and the Substitution Hypothesis." *Journal of Finance*, 57, 1649–1684.

Gumport, 2006, The Next, Great, Corporate Scandal: Potential Liability of Corporations Engaged in Open Market, 10B-18 Buybacks; A Minority View; Case Histories; Summary of Published Studies; Direction of Future Research, papers.ssrn.com

Haugen, R. and Hines, A.J., 1975, Risk and the rate of return on financial assets, Some old wine in new bottles, *Journal of Financial and Quantitative Analysis*, 10, 775-784.

Hovakimian, A., Opler, T., Titman, S., 2001; The Debt-Equity Choice, Journal of *Financial and Quantitative Analysis*, 36, 1-24.

Ikenberry and Vermaelen, 1996, The Option to Repurchase Stock, *Financial Management*, 25, 9-24.

Ikenberry, D. L., J. Lakonishok, and T. Vermaelen. 1995. Market Underreaction to Open Market Share Repurchases. Journal of Financial Economics 39:181–208.

Jensen, 1986, Agency Cost of Free Cash Flow, Corporate Finance, and Takeovers, *American Economic Review*, 76, 323-329.

Kahle, K.M., 2002, When a buyback isn't a buyback: open market repurchases and employee options, *Journal of Financial Economics*, 63, 235-261.

Keown, A., Martin, J. and Petty, J., 2017, Foundations of Finance, Ninth Edition, Pearson.

Miller, E., 1977, Risk, Uncertainty, and Divergence of Opinion, *Journal of Finance*, 32,

1151-1168.

McNally, W.,1999, Open Market Stock Repurchase Signaling, *Financial Management*, 28, 55-67.

Moeller, S., Schlingemann, F., Stulz, R., 2004, Firm size and the gains from acquisitions, *Journal of Financial Economics*, 73, 201-228.

Oded, J., 2005, "Why Do Firms Announce Open-Market Repurchase Programs?" *Review of Financial Studies*, 18, 271-300.

Oded, 2008, Stock Repurchases and the EPS Enhancement Fallacy, *Financial Analysts Journal*, 64, 62-75.

Opler, T., Pinkowitz, L., Stulz, R., Williamson, R., 1999, The determinants and implications of corporate cash holdings, *Journal of Financial Economics*, 52, pp 3-46.

Peyer U. and Vermaelen T (2009). The nature and persistence of buyback anomalies. *Review of Financial Studies*, 22, 1693–1745.

Sanders, G. and Carpenter, M., 2003, Strategic satisficing? A behavioral-agency theory perspective on stock repurchase program announcements, *Academy of Management Journal*, 46, 160-178.

Shyam-Sunder, L. and Myers, S., 1999, Testing static tradeoff against pecking order models of capital structure, *Journal of Financial Economics*, 51, 219-244.

Skinner, D., 2008, The evolving relation between earnings, dividends, and stock repurchases, *Journal of Financial Economics*, 87, 582-609.

Sonika R., Carline N., Shackleton, M., 2014, The Option and Decision to Repurchase Stock, *Financial Management*, 43, 833-855.