Financial Reporting Alternatives for Stock Repurchases and Their Effects on Stock Repurchase Decisions

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ABSTRACT

Under current financial reporting standards, there are two financial reporting alternatives for stock repurchases: (1) “treasury stock repurchases” and (2) “retirement repurchases”. The primary difference between these two alternatives is that retirement repurchases may reduce reported retained earnings, whereas treasury stock repurchases do not. We examine whether these disparate effects on reported retained earnings influence firms’ stock repurchase decisions. We find that the total amount firms spend on treasury stock repurchases, relative to retirement repurchases, is larger and less sensitive to current-year earnings. Additionally, we find that firms are more likely to change accounting methods from retirement repurchases to treasury stock repurchases if reported retained earnings is relatively low and if doing so avoids a reported deficit in retained earnings. Our results suggest that firms’ stock repurchase decisions are, at least in part, influenced by financial reporting consequences.

Keywords: Financial reporting, stock repurchases, treasury stock, retained earnings

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1. Introduction

A stock repurchase occurs when a firm purchases shares of its own stock from its shareholders. Under current financial reporting standards (ASC 505-30-30 and IAS 32), there are two methods of accounting for stock repurchases: (1) "treasury stock repurchases", in which the firm holds the reacquired shares as treasury stock, and (2) "retirement repurchases", in which the firm retires the reacquired shares. In this study, we examine whether a firm's method of accounting for stock repurchases influences its stock repurchase decisions. Prior research finds evidence that financial reporting alternatives can influence a firm's economic decisions (e.g., Jackson et al. 2010; Jackson et al. 2009; Jackson 2008). We extend this research by examining whether this is true of financial reporting alternatives for stock repurchases.

The primary reason why a firm's method of accounting for stock repurchases might influence its stock repurchase decisions is that treasury stock repurchases and retirement repurchases differ in their effect on a firm's reported retained earnings. Specifically, when accounting for a stock repurchase as a retirement repurchase, the firm reports any amount paid in excess of the original issuance price of the reacquired shares as a reduction of retained earnings. In contrast, when accounting for a stock repurchase as a treasury stock repurchase, the firm reports the full amount paid as a reduction to total shareholders' equity as "treasury stock," which is a contra-equity account.

If we consider two otherwise equal firms that each use different methods of accounting for stock repurchases, the firm that accounts for stock repurchases as treasury stock repurchases would report a retained earnings balance that is greater than that of the firm that accounts for

stock repurchases as retirement repurchases. Recent academic research (e.g., Skinner 2008; Grullon and Michaely 2004) and popular press articles (e.g., Lazonick 2014a) document significant increases in stock repurchase activity. This trend combined with the dramatic financial statement impacts of the choice of accounting for stock repurchases suggest that these differences in reported retained earnings balances will be significant.

Anecdotally, The Home Depot, Inc., which accounts for stock repurchases as treasury stock repurchases, reported a retained earnings balance of $39.9 billion at the end of its 2017 fiscal year. However, we estimate that it would have reported a retained *deficit* of $4.6 billion if it had accounted for its stock repurchases as retirement repurchases.[1] In addition, Dell, Inc. reported over $3 billion of repurchases recorded as retirements in 2000 and 2001 and then switched in 2002 to the treasury stock method to account for over $2 billion of repurchases. Dell's 2002 retained earnings balance of $1.3 billion would have been negative without this change in method.

Our primary research question is whether a firm's stock repurchase decisions are influenced by whether it accounts for stock repurchases as treasury stock repurchases or retirement repurchases. We examine two attributes of stock repurchase decisions: (1) size – defined as the total amount paid to repurchase stock, and (2) sensitivity to earnings – defined as the extent to which the total amount paid varies with earnings. If firms believe that the amount they report for retained earnings is important, we posit that firms accounting for stock repurchases as retirement repurchases, all else equal, have an incentive to limit the reduction to

[1] We estimate Home Depot's hypothetical retirement repurchases retained earnings balance by allocating the balance in its treasury stock account between its paid-in capital and retained earnings accounts. This calculation is discussed further in the "Background" section.

retained earnings. Therefore, we hypothesize that treasury stock repurchases are larger in size and less sensitive to earnings than are retirement repurchases.

We test our hypotheses using a sample of Compustat firms that made stock repurchases from 1980 to 2016. We estimate a two-stage regression model to control for the self-selection bias attributable to the firm's choice of accounting method for stock repurchases (Greene 2003). In the first stage we estimate a probit regression of the firm's accounting method choice (i.e., treasury stock method vs retirement method) on the determinants of this choice. From this first stage regression we calculate the inverse mills ratio and include this ratio as a control variable in the second stage regressions to control for the firm's self-selection of accounting method.

To test the size hypothesis, our second stage is a regression of stock repurchase size on an indicator variable for treasury stock repurchases and economic factors that are associated with both the method of accounting for stock repurchases and stock repurchase size. This model allows us to examine the effect of the accounting method on the size of stock repurchases. We find, consistent with our expectations, that treasury stock repurchases are, on average, larger in size than retirement repurchases.

To test our sensitivity to earnings hypothesis, our second stage is a Lintner model regression for repurchases which examines the relation between repurchases and earnings. Our model includes an indicator variable for treasury stock repurchases and interaction terms with this indicator variable. This model allows us to examine the extent to which repurchase amounts vary with earnings and, specifically, the effect of the accounting method on this relation. We find, consistent with our expectations, that treasury stock repurchases are less sensitive to current-year earnings than retirement repurchases.

To address concerns that our results are attributable to firm-specific characteristics, we repeat the above tests on a sample of firms that accounted for a stock repurchase under one method in year *t-1* and under the other method in year *t* (e.g., retirement repurchase in year *t-1* and treasury stock repurchase in year *t*). Consistent with the results in our main sample, we find that stock repurchases are larger in size and less sensitive to earnings in the treasury stock repurchase years than in the retirement repurchase years. Collectively, our results suggest that firms that account for stock repurchases as retirement repurchases attempt to limit the reduction to reported retained earnings, whereas firms that account for stock repurchases as treasury stock repurchases are less restricted in their repurchase activity.

As an additional analysis, we examine whether a firm's reported retained earnings is a factor in its decision to change its method of accounting from retirement repurchases to treasury stock repurchases. We examine a sample of firms that made a retirement repurchase in year *t-1* and either a retirement repurchase or treasury stock repurchase in year *t*. We identify firms that change (do not change) methods as those that make a treasury stock (retirement) repurchase in year *t*. We find that firms with lower reported retained earnings balances are more likely to change methods, and that firms are more likely to change methods if doing so would allow them to avoid reporting a deficit in retained earnings.[2]

Overall our results suggest that the retirement method constrains stock repurchase activity through its effect on a firm's retained earnings balance. The recent surge of large stock repurchase activity has sparked some to question whether stock repurchases are excessive and

[2] Our sample of firms that make a retirement repurchase in year t-1 and a repurchase of any method in year t consist of 7,893 firm year observations. Of this sample, we identify 67 instances of firms that make a stock repurchase large enough to cause a deficit in their retained earnings account. We note 20 of these instances in which the firm avoids the deficit by changing to treasury stock repurchases. While this is a small number of our observations, we note that the percentage of firms in this condition (30%) that change methods from retirement repurchases to treasury stock repurchases far exceeds that of the rest of the sample (9%).

harmful to the other stakeholders of the firm (e.g., creditors and employees) (e.g., Denning 2018; Hanauer 2015; Lazonick 2014b). If standard setters have similar concerns, then our findings suggest that eliminating the use of the treasury method and requiring the use of the retirement method to account for stock repurchases could possibly provide an inherent constraint on stock repurchase activity. However, it is important to note that the firms in our study have a choice of accounting method and therefore, our findings are not generalizable to a setting where firms don't have an accounting method choice. In other words, if firms were *required* to use the retirement method would they constrain their stock repurchase activity in the same way that they do when they *choose* the retirement method. To provide some additional analysis in this area we examine Massachusetts firms before and after the passage of the Model Business Corporation Act (MBCA). The MBCA eliminates the legal concept of treasury stock. While it does not specify accounting method choice, by removing the legal benefit of treasury stock, its passage provides an exogeneous shock which resulted in most firms adopting the retirement method after the MBCA was effective.[3]

We examine firms incorporated in Massachusetts which made multiple repurchases under the treasury method (retirement method) in the ten years before (after) 2004, the year in which the MBCA was effective. With a sample of 106 firm year observations (7 firms) we fail to find evidence that treasury stock repurchases are larger than retirement repurchases, but we find evidence that treasury stock repurchases are less sensitive to earnings. We note that more research is needed in this area to further examine whether requiring the retirement method would constrain stock repurchases.

2. Background

[3] In 2003, the year before the MBCA was effective, 94% of Massachusetts firms used the treasury method. However, in 2005, the year after the MBCA was effective, 83% of Massachusetts firms used the retirement method.

2.1 Prior literature on stock repurchases

A large body of academic research in accounting and finance examines the economic implications of stock repurchases. This research broadly finds that stock repurchases have partially supplanted traditional cash dividends as a means of distributing cash to shareholders (Skinner 2008; Brav et al. 2005; DeAngelo et al. 2004; Grullon and Michaely 2002; Fama and French 2001) and are used as a means of (1) signaling investors about firm risk and future profitability (Grullon and Michaely 2004; Ikenberry et al. 1995; Bartov 1991; Dann et al. 1991), (2) offsetting the dilutive effects of stock compensation (Bens et al. 2003), and (3) managing earnings to maximize management compensation (Hribar et al. 2006).

More recently, popular press articles have drawn attention to an increase in stock repurchase activity (e.g., Lazonick 2014a). This increase in repurchase activity has stimulated a debate on the costs and benefits of stock repurchases. Some argue that stock repurchases enrich shareholders at the expense of other stakeholders, such as employees, and starve the firm of capital needed to invest in research and development activities (e.g., Hanauer 2015; Lazonick 2014a). Conversely, others argue that stock repurchases are an efficient use of excess capital, and that claims of firms engaging in stock repurchases at the expense of profitable investment opportunities are overstated (e.g., Fried and Wang 2018).

We extend this literature by examining the economic implications of the financial reporting for stock repurchases. Current financial reporting standards (ASC 505-30-30 and IAS 32) make a distinction between two types of stock repurchases: (1) treasury stock repurchases, and (2) retirement repurchases. In general, treasury stock repurchases are recorded as debits to a contra-equity account to reflect a temporary reduction in shareholders' equity, whereas retirement repurchases are recorded as debits to paid-in capital and retained earnings to reflect a

permanent reduction in shareholders' equity (Spiceland et al. 2018; Sprouse 1957). In essence, the financial reporting distinction between these two types of stock repurchases is designed to reflect the firm's intent to either subsequently resell the shares (treasury stock repurchases) or permanently retire the shares (retirement repurchases).[4]

At first glance, it might appear that treasury stock repurchases and retirement repurchases represent two economically distinct transactions between the firm and its shareholders. However, this characterization is questionable for two reasons. First, there is no evidence to suggest that a firm's accounting method for stock repurchases faithfully represents its intent in practice. In a recent empirical study, Banyi and Caplan (2016) examine the determinants of the choice to account for stock repurchases as either treasury stock repurchases or as retirement repurchases. They find that while a firm's choice of stock repurchase accounting method is related to a number of firm characteristics (e.g., growth, market-to-book ratio), it is not necessarily indicative of the firm's intent to subsequently resell or permanently retire the reacquired shares.

Second, it is questionable as to whether the distinction between treasury stock repurchases and retirement repurchases is economically meaningful in the first place. Taking a legal perspective, Ballantine (1946) asserts that treasury shares are "…a masterpiece of legal magic, the creation of something out of nothing" (p. 537). He justifies this statement by arguing that a firm's reacquisition of its own shares effectively terminates the shares' underlying contracts because a firm cannot realistically possess a share of stock in itself. This termination of the underlying contract is evidenced by the fact that shares reacquired in treasury stock repurchases are excluded from contractual rights including voting and dividend rights.

[4] Ray (1962) argues that the accounting for treasury stock repurchases is desirable because it reflects the fact that "…the corporation is merely in the process of transferring the shares from one stockholder to another" (p. 754).

In light of these points, we take the position that the distinction between treasury stock repurchases and retirement repurchases is economically trivial, and that these two types of stock repurchases merely represent two distinct methods of accounting for economically similar transactions rather than two distinct types of transactions. If the treasury stock method and the retirement method represent two alternatives for reporting economically similar stock transactions, then it stands to reason that the method of accounting *should not* affect a firm's repurchase decisions. However, research shows that financial reporting alternatives can influence a firm's economic decisions (e.g., Jackson et al. 2010; Jackson et al. 2009; Jackson 2008). We extend this research to examine whether a firm's method of accounting for stock repurchases is related to its stock repurchase decisions.

2.2 Financial reporting for stock repurchases

Under current financial reporting standards, treasury stock repurchases and retirement repurchases differ in how they are recorded and reported on the shareholders' equity section of the balance sheet. When a firm accounts for a stock repurchase as a treasury stock repurchase, the total amount paid is recorded as a debit to a "contra-equity" account ("treasury stock"), which serves as a reduction of *total* shareholders' equity. Because the reacquired shares retain their "issued" status, there is no change to the paid-in capital accounts (e.g., common stock and additional paid-in capital). In contrast, when a firm accounts for a stock repurchase as a retirement repurchase, the amount paid is allocated between debits to the paid-in capital accounts, and if necessary, a debit to retained earnings. If the total amount paid to repurchase the shares exceeds their original issuance price, the paid-in capital accounts are debited for the original issuance price and the excess of the amount paid over the original issuance price is

debited to retained earnings. Conversely, if the original issuance price exceeds the amount paid, the full cost is debited to the paid-in capital accounts.[5]

As an example, consider a stock repurchase in which the firm reacquires 100 shares of its common stock for $10 per share (total amount paid = $1,000). Assume the shares were originally issued for $6 per share (original issuance price = $600) and have a par value of $1 per share. If the stock repurchase is accounted for as a treasury stock repurchase, the firm makes the following journal entry:

Dr. Treasury stock ($10 x 100)	1,000	
Cr. Cash ($10 x 100)		1,000

Alternatively, if the stock repurchase is accounted for as a retirement repurchase, the firm makes the following journal entry:

Dr. Common stock ($1 x 100)	100	
Dr. Additional paid-in capital ([$6 – $1] x 100)	500	
Dr. Retained earnings ([$10 – $6] x 100)	400	
Cr. Cash ($10 x 100)		1,000

Although the effect of this stock repurchase on *total* shareholders' equity is the same regardless of whether the firm accounts for the repurchase as a treasury stock repurchase or as a retirement repurchase, the effect on the individual shareholders' equity accounts differs significantly. Most notably, accounting for the stock repurchase as a treasury stock repurchase results in a retained earnings balance that is, all else equal, $400 greater than the balance that would result from accounting for the stock repurchase as a retirement repurchase. In other words,

[5] Perhaps more accurately, the original issuance price is debited against the paid-in capital accounts that were credited upon issuance (i.e., common stock and additional paid-in capital) and the excess of the original issuance price over the amount paid is credited to another additional paid-in capital account that reflects paid-in capital from stock repurchase transactions (e.g., "additional paid-in capital – stock repurchases").

our example illustrates that a firm that accounts for stock repurchases as treasury stock repurchases, all else equal, will have a greater retained earnings balance than a firm that accounts for stock repurchases as retirement repurchases.

To illustrate the accumulation of this effect on retained earnings, we examine the balance sheet of a large publicly traded firm that regularly engages in stock repurchases: The Home Depot, Inc. ("Home Depot"). According to its 2017 Annual Report, Home Depot has repurchased approximately $22 billion of its own common stock over the three fiscal years from 2015 to 2017, and has accounted for these repurchases as treasury stock repurchases.[6] In Figure 1, we compare Home Depot's reported balance sheet, in which all stock repurchases are accounted for as treasury stock repurchases (Column A), with a recast balance sheet, in which all of its stock repurchases are accounted for as retirement repurchases (Column B).[7]

[INSERT FIGURE 1]

We note that total paid-in capital (i.e., the sum of the common stock and additional paid in capital accounts) reported on the retirement repurchase balance sheet ($6.7 billion) is lower than that reported on the treasury stock repurchase balance sheet ($10.3 billion). This difference reflects the distinction between issued shares held as treasury stock and unissued shares. Specifically, Home Depot has 1,780 issued shares under the treasury stock repurchases scenario, compared with only 1,158 issued shares under the retirement repurchases scenario. However,

[6] According to its consolidated statements of stockholders' equity, Home Depot repurchased $7 billion of its own common stock each in 2015 and 2016 and $8 billion in 2017.

[7] To recast Home Depot's balance sheet under the assumption that all stock repurchases are accounted for as retirement repurchases, we reallocate the $48.2 billion debit balance in the treasury stock account to the paid-in capital accounts and retained earnings. The amounts allocated to paid-in capital (retained earnings) reflect the accumulated amounts recorded as debits to paid-in capital (retained earnings) under the hypothetical assumption that Home Depot accounted for its stock repurchases as retirement repurchases. To calculate the amount allocated to the paid-in capital accounts, we estimate an average original issuance price per share for Home Depot's common stock ([Common stock + Additional paid-in capital]/Shares issued) and multiply it by the number of treasury shares. This amount is allocated between the common stock and additional paid-in capital accounts on the basis of par value. The remaining portion of the treasury stock balance is allocated to the retained earnings account.

Home Depot's number of *outstanding* shares is equal in both scenarios, as 622 of the 1,780 issued shares in the treasury stock scenario are held by the firm in treasury stock.

Perhaps the most striking difference between the two balance sheets is the retained earnings account, which demonstrates that the amount Home Depot paid to repurchase its shares significantly exceeded the price at which those shares were originally issued. Specifically, the treasury stock balance sheet reports a retained earnings *surplus* of $39.9 billion, whereas the retirement balance sheet reports a retained earnings *deficit* of $4.7 billion. Therefore, by accounting for its stock repurchases as treasury stock repurchases, Home Depot is able to report a retained earnings balance that is approximately $44.6 billion greater than it would report by accounting for its stock repurchases as retirement repurchases. To give some perspective, this difference slightly exceeds Home Depot's reported book value of total assets ($44.5 billion) and represents almost half of its reported net sales for the 2017 fiscal year ($100.9 billion).

Applying our research question to this example, we are interested in whether the $44.6 billion difference in Home Depot's reported retained earnings between the two methods influences its stock repurchase decisions. That is, are Home Depot's stock repurchases larger in size and less sensitive to current-year earnings because it accounts for stock repurchases as treasury stock repurchases rather than retirement repurchases?

2.3 Recent Trends

As further motivation for our study, we present preliminary data on stock repurchases to illustrate the growth in magnitude of stock repurchases and its effects on the financial statements over the years that comprise our sample (1980-2016). Figure 2 presents a graphical illustration of the increase in repurchase activity for all Compustat firms, excluding financial firms and utilities.

Repurchase activity increased during the mid-2000s, reaching a peak in 2007 of approximately $600 billion. While repurchase activity declined during the 2008-2009 Financial Crisis, it has nearly returned to its pre-Crisis levels (approximately $543 billion) as of 2016.

Stock repurchase activity has reached such a magnitude that it has caused some firms to have a negative balance in total stockholder's equity (i.e., cumulative repurchase dollars exceed the total capital contributed by shareholders as well as all earnings retained by the firm since its inception). Figure 3 illustrates the increase in the number of these firms during our sample period.[8] In 1980, we note three firms reporting negative shareholders' equity as a result of its repurchase activity, whereas in 2016, we note 85 such firms. While, these numbers are not affected by the accounting method used for stock repurchases, it does provide a glimpse of how the repurchase dollars reported on the balance sheet can make up a significant proportion of the stockholder's equity balance, and this proportion is growing over time.[9]

Next, we turn our attention specifically to firms which use the treasury stock method. Figure 4 illustrates the impact of the cumulative stock repurchases on the average treasury stock balance. Specifically, we note a significant increase in firms' reported treasury stock balances (as a percentage of total assets) from approximately 0.6% in 1980 to approximately 14% in 2016. This 2016 statistic supports the notion that a firm's use of the treasury stock method does not necessarily imply an intent to reissue stock in the near term, as it is doubtful that firms, on

[8] To identify these firms, we add back the cumulative amount of a firm's stock repurchases over the sample period to its reported shareholders' equity. A firm is included in this graph if its reported shareholders' equity is negative and its adjusted shareholders' equity, after adding back its cumulative stock repurchases, is positive.

[9] In addition, the growth in repurchase firms with the negative book value of equity can affect future accounting research in two ways. First, accounting researchers often exclude firms with a negative book value of equity. It is commonly thought that this condition is caused by a retained earnings deficit, and is therefore primarily restricted to smaller, less profitable firms. However, we find that firms with negative stockholder's equity due to stock repurchases includes large firms with significant increases in the stock price over the life of the firm. If the trend presented in Figure 3 continues, then researchers excluding firms with negative book value of equity will need to consider if the sample restriction should apply to these firms as well. Second, a negative book value of equity implies that the debt to equity ratio will be negative. If the trend in Figure 3 continues, it is possible that the usefulness of the debt to equity ratio will diminish.

average, plan to reissue stock totaling 14% of its assets in the near term. To provide further support for this notion, we examine the number of shares held in treasury stock. A firm's shares held in treasury stock are commonly thought to represent shares which will be used to fulfull the share requirements of contingently issuable shares. In untabulated analysis we find that for our sample, the average number of shares held as treasury stock are more than 52 times the number of contingently issuable shares.

As noted previously, the two accounting methods for stock repurchases differ in their effect on retained earnings. We use Home Depot as an example of a firm that reports retained *earnings* under the treasury stock method but would report a retained *deficit* if it used the retirement method. In Figure 5 we examine the prevalence of firms over our sample period for which, like Home Depot, the accounting method for repurchases affects whether the firm reports a retained earnings or deficit. We note that this condition was virtually non-existent in 1980. However, we note 111 firms in this condition in 2016. We acknowledge this retained earnings/deficit condition is not commonplace amongst firms using the treasury stock method, however, we interpret the trend presented in Figure 5 as evidence of the growing significance in the difference between the two methods of accounting for stock repurchase.

3. Hypotheses Development and Empirical Design

The retained earnings balance reported on a firm's balance sheet represents the accumulation of its undistributed profits (or losses) (Spiceland et al. 2018). In general, the retained earnings balance provides an indication of the firm's ability to make distributions to its shareholders and/or service its debt obligations. For example, DeAngelo et al. (2006) find that a firm is more likely to pay dividends when its retained earnings as a percentage of total equity is

relatively high, whereas Rankine and Stice (1997) note that reductions in retained earnings can restrict a firm's ability to make future distributions to its shareholders in compliance with debt covenants and state corporation laws. Hill et al. (2018) provide evidence suggesting that a firm's retained earnings as a percentage of total assets is negatively associated with its risk of insolvency.

We theorize that, in general, firms have an incentive to report accounting numbers that reflect an ability to pay dividends and service debt obligations, and therefore, an incentive to maximize its reported retained earnings balance. Because retirement repurchases often result in a reduction to retained earnings, whereas treasury stock repurchases do not, we theorize that firms making retirement repurchases, relative to firms making treasury stock repurchases, will have an additional incentive to minimize the resulting reduction to its retained earnings balance. We predict that this incentive will be reflected in firms' stock repurchase decisions in two ways. First, we predict that treasury stock repurchases will be greater in size (i.e., total amount paid) than retirement repurchases. Second, we predict that amounts paid for treasury stock repurchases, relative to amounts paid for retirement repurchases, will be less sensitive to current-year earnings. With respect to the second prediction, we conjecture that increases to retained earnings resulting from current period earnings, all else equal, are likely to increase the amount by which firms are willing to report reductions to retained earnings from retirement repurchases. In other words, amounts paid for retirement repurchases are more likely to fluctuate with current-year earnings than are amounts paid for treasury stock repurchases. Consequently, our testable hypotheses are stated in the alternative form as follows:

H1: Amounts paid for treasury stock repurchases are greater than amounts paid for retirement repurchases

H2: Amounts paid for treasury stock repurchases are less sensitive to earnings than amounts paid for retirement repurchases

To test our first hypothesis, we estimate the relation between the stock repurchase accounting method and stock repurchase size with the following regression equation:

$$REPURCHASE_t = \lambda_0 + \lambda_1 TREASURY_t + \Sigma\lambda_k CONTROLS + \varepsilon_t \quad (1)$$

Where $REPURCHASE_t$ equals the total amount paid for stock repurchases in year *t* scaled by the book value of assets at the end of year *t-1*, $TREASURY_t$ equals one if the repurchases are treasury stock repurchases and zero if the repurchases are retirement repurchases, and *CONTROLS* represents an array of control variables, which we discuss below. H1 predicts that the λ_1 coefficient in Equation (1) will be positive and significant. Consistent with Skinner (2008) and Fama and French (2001) we measure the amount a firm pays for stock repurchases net of the amount it receives from stock issuances ("net repurchases"). For observations in which the stock issuances exceed stock repurchases, we set net repurchases equal to zero. For treasury stock repurchases, net repurchases equals the net increase in the firm's treasury stock balance, whereas for retirement repurchases, net repurchases equals the difference between the total paid for stock repurchases and the total received from stock issuances.

We include control variables in Equation (1) that reflect firm characteristics that are likely related to stock repurchase size. Based on prior research we predict that larger firms, more profitable firms, and firms with more cash on hand are likely to make larger repurchases, and that firms paying traditional cash dividends and firms financed by debt are likely to make smaller repurchases (Lie 2005; Grullon and Michaely 2002). Therefore, we include size (*LN_MKT*), retained earnings (*RET_EARN*), operating income (*OP_INCOME*), non-operating income (*NON_OP_INCOME*), the standard deviation of operating income (*STDEV_OP_INCOME*), available cash (*CASH*), cash dividends paid (*DIVID_RATIO*), and leverage

(*DEBT_TO_EQUITY*) as control variables in Equation (1). Banyi and Caplan (2016) find that a firm's stock repurchase accounting method choice is not random and is related to a number of firm characteristics. Therefore, we control for the determinants of firms' choice of accounting method with the inverse Mills ratio (*MILLS*) from a selection model we discuss in detail in the "Empirical Results" section.

To test our second hypothesis, we estimate the relation between current period earnings and changes in stock repurchase size following a model introduced by Lintner (1956) ("Lintner model") and revised by Skinner (2008). The Lintner model estimates the sensitivity of dividends to earnings as follows:

$$\Delta D_t = \alpha_0 + \alpha_1 ADJ\_EARN_t + \alpha_2 D_{t-1} + \varepsilon_t \quad (2)$$

Where ΔD_t represents the change in total dividends from year *t-1* to year *t*, ADJ_EARN_t represents net income less 60% of special items for year *t*, and D_{t-1} represents total dividends in year *t-1*. A positive coefficient on ADJ_EARN_t demonstrates that dividend payments are revised in response to earnings. Skinner (2008) revises the Lintner model to include stock repurchases and examine the sensitivity of total shareholder payouts (i.e., dividends plus share repurchases) to earnings as follows:

$$\Delta Pay_t = \beta_0 + \beta_1 ADJ\_EARN_t + \beta_2 Pay_{t-1} + \varepsilon_t \quad (3)$$

Where ΔPay_t represents the change in total shareholder payments from year *t-1* to year *t* and Pay_{t-1} represents total shareholder payments in year *t-1*. A positive coefficient on ADJ_EARN_t demonstrates that total shareholder payments are revised in response to earnings. We extend Skinner (2008) by examining the earnings sensitivity of stock repurchases, exclusive of dividends, and whether this sensitivity differs between treasury stock repurchases and retirement repurchases.

We test the difference in earnings sensitivity between treasury stock repurchases and retirement repurchases with the following regression model:

$$\Delta REPURCHASE_t = \Omega_0 + \Omega_1 ADJ\_EARN_t + \Omega_2 REPURCHASE_{t-1} + TREASURY_t * (\Omega_3 + \Omega_4 ADJ\_EARN_t + \Omega_5 REPURCHASE_{t-1}) + \Omega_6 MILLS + \varepsilon_t \quad (4)$$

Where $\Delta REPURCHASE_t$ is the difference between the amount paid for stock repurchases in year *t* and the amount paid for stock repurchases in *t-1*. H2 predicts that amounts paid for treasury stock repurchases are less sensitive to current-year earnings than are amounts paid for retirement repurchases, which implies that the Ω_4 coefficient in Equation (4) will be negative and significant.

4. Sample Data

As noted in Skinner (2008) stock repurchases were not economically significant prior to 1980. We therefore begin our sample in 1980. Using the annual Compustat file, we select U.S. dollar firm years that have a stock repurchase during the sample period (1980 – 2016) and delete firm years that lack the necessary data for our independent variables. Consistent with prior research on stock repurchases (e.g., Skinner 2008; Lie 2005; Fama and French 2001) we exclude financial and utility firms since their shareholder payments can be affected by regulation. We also delete firm years with lagged assets (year *t-1*) less than $1 million. Our resulting sample consists of 45,119 firm year observations (9,335 firms). Unlike the dependent and independent variables that require financial information for year *t-1* and year *t*, *PAST_RETURN* requires stock price information at the beginning of year *t-2* and is only available for 40,764 firm year observations (8,053 firms). Due to this additional data requirement and resulting sample reduction, we do not require this variable for our primary analysis and present models which

include this variable as a robustness check. We winsorize our continuous variables at the 1st and 99th percentiles.

Panel A of Table 1 presents descriptive statistics for our sample partitioned between treasury stock repurchases (31,321 firm year observations, 6,804 firms) and retirement repurchases (13,798 firm year observations, 4,349 firms). Compared to firms using the retirement method, firms using the treasury stock method are larger (difference in mean *LN_MKT* = 0.196; t-statistic = 7.536), are less profitable (difference in mean *OP_INCOME* = -0.013; t-statistic = -8.758), have lower leverage (difference in mean *DEBT_TO_EQUITY* = -0.026; t-statistic = -2.472), and payout less in dividends (difference in mean *DIVID_RATIO* = -0.026; t-statistic = -5.540). While H1 predicts that treasury stock repurchases are *larger* than retirement repurchases, these descriptive statistics show that treasury stock repurchases, on average, are *smaller* than retirement repurchases (difference in *REPURCHASE* mean = -0.010; t-statistic = -17.126). However, Panel B of Table 1 shows that many of our variables are correlated with one another, thus requiring multivariate analysis to empirically examine our hypotheses. For example, the size of the repurchase (*REPURCHASE*) is positively associated with firm profitability (Pearson correlation = 0.18; Spearman correlation = 0.24) and negatively associated with firm leverage (Pearson correlation = -0.16; Spearman correlation = -0.32). Therefore, univariate tests do not control for the selection of the repurchase method nor the economic determinants of stock repurchases.

INSERT TABLE 1 HERE

5. Empirical Results

5.1 First-stage Probit Regression

The method used to account for stock repurchases is a firm choice. To control for the self-selection bias created by the endogeneous nature of the firm's accounting method choice, we perform a two-stage regression analysis. Our first stage regression models this choice as follows:

$$TREASURY_t = \Gamma_0 + \Gamma_1 MTB_{t-1} + \Gamma_2 DIL\_SHARES_{t-1} + \Gamma_3 CHG\_DIL\_SHARES_t + \Gamma_4 LN\_MKT_t + \Gamma_5 DEBT\_TO\_EQUITY_{t-1} + \Gamma_6 EP\_RATIO_{t-1} + \Gamma_7 CASH_{t-1} + \Gamma_8 BEFORE2004 + \Gamma_9 MBCA + \varepsilon_t \quad (5)$$

Where MTB_{t-1} represents the ratio of market value of assets to book value of assets at the end of year *t-1*, DIL_SHARES_{t-1} equals the number of contingently issuable shares divided by the number of outstanding shares calculated at the end of year *t-1*, $CHG\_DIL\_SHARES_t$ equals the change in *DIL_SHARES* from year *t-1* to year *t*, LN_MKT_t equals the natural log of the market value of common stock at the end of year *t*, $DEBT\_TO\_EQUITY_{t-1}$ equals the book value of debt divided by the market value of common stock at the end of year *t-1*, EP_RATIO_{t-1} equals diluted earnings per share excluding extraordinary items divided by price per share at the end of year *t-1*, $CASH_{t-1}$ equals the annual decile rank (between 0 and 1) of the ratio of cash and short-term investments scaled by the book value of total assets measured at the end of year *t-1*, *BEFORE2004* equals 1 for fiscal years ending before 2004, and 0 otherwise, and MBCA equals 1 for firm year observations in which the MBCA was in effect for the respective state of incorporation in year *t*.

Based on prior research (Banyi and Caplan 2016) we expect the treasury method to be positively associated with growth opportunities (*MTB*), dilutive shares (*DIL_SHARES*), the change in dilutive shares (*CHG_DIL_SHARES*) and negatively associated with debt financing (*DEBT_TO_EQUITY*), the earnings to price ratio (*EP_RATIO*), cash holdings (*CASH*), and repurchases made before the 2004 changes in repurchase disclosure requirements

(*BEFORE2004*). We also expect that the treasury method will be negatively associated with *MBCA* since the MBCA eliminates the legal concept of treasury stock.

Table 2 presents the first-stage regression results from a probit estimation of Equation 5, including fiscal year fixed effects. In all of the regression analyses presented herein we present standard errors clustered by firm and robust to heteroscedasticity. All significant coefficients are in the predicted direction. In addition, the pseudo R-squared is 0.141. In untabulated analysis we test the significance of the pseudo R-squared by comparing the log-likelihood ratio of this first stage model with an intercept only model and find that the pseudo R-squared is statistically significant (p-value < 0.001). We use this first stage regression to calculate the inverse mills ratio (*MILLS*) to control for the selection of accounting method choice in our second stage regressions.[10]

INSERT TABLE 2

5.2 Second Stage Regression Results – Full Sample and Single Method Firms

Table 3 presents an OLS regression analysis of Equation 1. Our regression results include fixed effects for fiscal year and state of incorporation, which we obtain from Compustat.[11] Columns (A) and (B) present regression results for all firms in our sample. Columns (C) and (D) present results for firms that do not change their method of accounting for stock repurchases from its initial year in Compustat through 2016 (i.e., "single method firms").

[10] The inverse mills ratio calculated as $\phi(Z_{i\gamma})/\Phi(Z_{i\gamma})$ for a treasury stock method firm and $-\phi(Z_{i\gamma})/(1 - \Phi(Z_{i\gamma}))$ for a retirement method firm where ϕ and Φ are the standard normal probability density function and standard normal cumulative density function, respectively, Z is the predicted value from the first stage regression presented in Table 2 for firm *i* and year *t*.

[11] Our sample includes 3,765 firm year observations that are foreign corporations (presented in US dollars), and therefore not incorporated in a US state. Of this group, the most highly represented country is Canada (399 firm year observations). We include fixed effects for Canadian firms and, collectively, all other foreign firms. We include these firms in our sample because our hypothesis and predictions apply to these firms regarding the effect of treasury versus retirement repurchases. However, as a robustness check, in untabulated analyses, we confirm that our results are robust to excluding these firm year observations from our sample.

Some firms change their accounting method for repurchases over time. We exclude these firms from the regression analysis presented in Columns (C) and (D), and we examine these firms separately in subsequent analyses. For each sample, we first present the results of our primary model, and then as a robustness check we include *PAST_RETURN* as an additional control variable.

The variable of interest is *TREASURY*, which identifies treasury stock repurchases. We find, consistent with expectations, that the coefficient on *TREASURY* is positive and significant for both the full sample of firms and the single method firms (t-statistics: 4.554, 4.082, 4.872 and 4.341). We interpret this result as evidence that the total amount paid for treasury stock repurchases is, on average, greater than the total amount paid for retirement method repurchases, which supports H1.

Regarding our control variables, we find consistent with expectations, that the size of the repurchase is positively associated with firm size (*LN_MKT*), retained earnings (*RET_EARN*), firm profitability (*OP_INCOME* and *NON_OP_INCOME*), the standard deviation of operating income (*STDEV_OP_INCOME*) and available cash (*CASH*). We also find that the size of the repurchase is negatively associated with the firm's dividend payments (*DIVID_RATIO*) and leverage (*DEBT_TO_EQUITY*). Lastly, we find that self-selection variable, *MILLS*, is statistically significant in all four specifications (t-statistics: -5.995, -5.516, -5.776 and -5.245) which confirms the need to control for firm choice to correct for selection bias.

INSERT TABLE 3

Table 4 presents an OLS regression analysis of Equation 4. Column (A) presents regression results for all firms in our sample, and Column (B) presents results for the single method firms. As noted in Skinner (2008), the coefficient on *ADJ_EARN* is the earnings

coefficient which reflects the extent to which payouts are adjusted to absorb the variation in earnings. Consistent with prior research, we find that the coefficient on *ADJ_EARN* is positive and significant (t-statistics: 14.026 and 11.061), and the coefficient on *REPURCHASE_PY* is negative and significant (t-statistics: -34.811 and -26.561). We interact these variables with the indicator variable *TREASURY*. Of particular interest to our study is the interaction of *ADJ_EARN* and *TREASURY* which represents the difference in the earnings coefficient for treasury stock repurchases, compared to retirement repurchases. Consistent with our expectations, we find that the coefficient on this interaction term, *ADJ_EARN_X_TREASURY*, is negative and significant (t-statistics: -7.671 and -7.000). We interpret this coefficient as evidence that treasury stock repurchases are less sensitive to earnings than retirement repurchases, which supports H2.

INSERT TABLE 4

5.3 Second Stage Regression Results – Accounting Method Changes

We now turn our attention to those firms that change accounting methods to test our hypotheses. Table 5 presents the total number of times the firms in our sample change their method of accounting for stock repurchases. Of the 9,335 firms in our sample, 6,491 firms are single method firms (which we presented separately in Tables 3 and 4), and 2,844 firms change their accounting method at least once. Most of the firms in our sample that change accounting methods only do so once (2,123 firms) from the time they first appear in the Compustat dataset to 2016. However, there are some firms in our sample that change accounting methods multiple times (721 firms). One firm in our sample changed its accounting method nine times over the 34 years from when it first appeared in the Compustat dataset, 1985, to 2016. 22 of the firm year observations for this firm have sufficient data to be included in our sample.

INSERT TABLE 5

Firms that change its method of accounting for repurchases provide us with a natural setting whereby we can match a firm's repurchase under one accounting method to its repurchase under the other accounting method to test our hypotheses (i.e., we can use the firm as its own control). One impediment to the validity of this match is the length of time between the repurchases under different methods (e.g., a treasury stock repurchase in 1990 and a retirement method repurchase in 2010). To overcome this concern, we construct our sample with firms that make repurchases in two consecutive years under different methods. For example, a firm makes a retirement (treasury stock) repurchase in year *t-1* and a treasury stock (retirement) repurchase in year *t*. For firms with multiple accounting method changes during the sample period, we only include the firm year observations from the first accounting method change in our sample period. As a result, each firm included in this test is represented twice: one firm year observation with a retirement repurchase and one firm year observation with a treasury stock repurchase. Our resulting sample for this test consists of 578 firms, 1,156 observations.[12]

We re-estimate the regressions presented in Tables 3 and 4 for this sample. The results are presented in Tables 6 and 7. We find, consistent with our expectations, that the coefficient on *TREASURY* in Table 6 is positive and significant (t-statistics: 7.213 and 7.308) and that the coefficient on *ADJ_EARN_X_TREASURY* in Table 7 is negative and significant (t-statistic = -2.194). These results indicate that when a firm makes consecutive stock repurchases under different accounting methods, the treasury stock repurchase is larger in magnitude and is more sensitive to earnings than the retirement repurchase. These findings support H1 and H2.

[12] The majority of these firms (503 out of 578) are changing from the retirement method to the treasury stock method. In untabulated analyses, we separately examine firms changing from the retirement method to the treasury stock method (1,006 firm year observations) and our inferences remain the same. When we examine firms changing from the treasury stock method to the retirement method (150 firm year observations), we obtain statistically insignificant results, presumably due to the low sample size.

INSERT TABLE 6

INSERT TABLE 7

5.4 Determinants of Accounting Method Changes

Overall all results are consistent with the notion that the retained earnings balance provides an inherent constraint on stock repurchases accounted for under the retirement method. However, since the accounting method for stock repurchases is a firm choice, it is possible that a firm which uses the retirement method and has a low retained earnings balance, might choose to change its accounting method for repurchases rather than restrict its repurchase amount. If a firm's change from the retirement method to the treasury method is motivated by the retained earnings balance, we would interpret this as additional evidence consistent with our hypotheses (i.e., further evidence that the retained earnings balance constrains retirement method purchases).

To empirically examine whether a firm's change in accounting method from the retirement method to treasury method is motivated, at least in part, by its retained earnings balance we identify within our sample, firms that have a retirement repurchase in year *t-1* and a repurchase of either type (retirement or treasury stock) in year *t*. The firms that use the treasury stock method (retirement method) in year *t* are firms that changed (did not change) their accounting method for repurchases. For this subset of firms, we estimate the following regression:

$$CHG\_METHOD_t = \vartheta_0 + \vartheta_1 RET\_EARN_t + \vartheta_2 AVOID\_NEG\_RE_t + \vartheta_3 MULTIPLE_t + \vartheta_4 CONTROLS + \varepsilon_t \quad (6)$$

Where CHG_METHOD_t equals one if the firm changes from the retirement method to the treasury method in year *t*, and zero if the firm continues to use the retirement method in year *t*, RET_EARN_t equals the decile rank (between zero and one) of the retained earnings balance at

the end of year *t* scaled by the book value of assets at the end of year *t* (we adjust both the retained earnings balance and the book value of assets for current year repurchases), $AVOID\_NEG\_RE_t$ equals one if the firm can avoid a negative retained earnings balance by accounting for current year repurchases under the treasury stock method instead of the retirement method, and zero otherwise, $MULTIPLE_t$ equals one if the firm has previously changed its accounting method of accounting for stock repurchases, and zero otherwise, and *CONTROLS* represent the independent variables in Equation 5 (i.e., determinants of accounting method choice).[13] It is important to note that Equation (6) is an empirical model of firm choice (i.e., to change or not change methods) similar to the model presented in Equation (5) and is not a treatment effects model such as the models presented in Equations (1) and (4). Therefore, we do not include the inverse mills ratio as a control variable in this empirical model.

We expect that a low retained earnings balance and the ability to avoid a negative retained earnings balance will motivate a firm to change from the retirement method to the treasury stock method. Therefore, we predict that ϑ_1 will be negative and ϑ_2 will be positive.

Table 8 presents the results for the regression estimation of Equation (6). Our sample for this analysis includes 7,893 firm year observations. The untabulated mean of *CHG_METHOD* is 0.09. In other words, 9% (91%) of our observations represent firms that changed (did not change) accounting method. Consistent with expectations, we find that the coefficient on *RET_EARN* is negative and significant (t-statistic: -7.366), and the coefficient on *AVOID_NEG_RE* is positive and significant (t-statistic: 4.418). We interpret these results as evidence, consistent with our hypotheses development, that the retained earnings balance

[13] We include *MULTIPLE* based on the notion that if a firm has previously changed its accounting method that it will be more likely to change accounting method again. In untabulated analysis, we find that our results are robust to excluding this variable, and also to exclude firms with multiple accounting method changes.

constrains retirement method repurchases. However, we caution against the conclusion that firms changing accounting method to avoid a negative retained earnings balance is a common occurrence. Of the 7,893 firm year observations included in this analysis, we identify 67 instances of firms that make a stock repurchase large enough to cause a deficit in their retained earnings account. The firm changes (does not change) accounting method in 20 (47) of these instances. Therefore, in our sample, 30% of the firms that could have avoided a negative retained earnings balance by changing accounting methods actually did so. It seems that firms most commonly keep the stock repurchase method which they originally adopted.

INSERT TABLE 8

5.5 Exogenous Shock to Accounting Method Choice

Overall our results suggest that the retained earnings balance provides an inherent constraint on retirement method repurchases which does not exist for treasury stock repurchases. It is possible that standard setters would be interested in these results as an indication that an elimination of the treasury stock method could possibly provide an inherent constraint on "excessive" stock repurchases. However, we acknowledge the limitation of our study in addressing this specific question. The firms in our study have a choice in accounting method, and it is unclear whether a requirement to use the retirement method would result in similar constraints of repurchase amounts. To provide some additional analysis in a setting that is more akin to a *requirement* to use the retirement method, we examine firms incorporated in the state of Massachusetts before and after the effective date of the MBCA. The MBCA does not require firms use the retirement method, however, it does remove the legal benefit of treasury stock.[14] In practice, the Massachusetts MBCA significantly reduced the use of the retirement method. For

[14] Chapter 156D, Section 6.31a of Massachusetts General Laws for Corporations states, "A corporation may acquire its own shares and shares so acquired constitute authorized but unissued shares."

example, 94% (83%) of the repurchases made the year before (after) the effective date of the Massachusetts MBCA were accounted for using the treasury stock (retirement) method. Therefore, the effective date of the MBCA (July 1, 2004) represents an exogeneous shock which resulted in most firms adopting the retirement method.[15]

We examine firms incorporated in Massachusetts that used the treasury method before the MBCA and the retirement method after the MBCA, and we exclude fiscal years which include the effective date of the MBCA since the repurchases in these fiscal years could be either before or after the MBCA. We also require firms make multiple repurchases before and after the MBCA to increase the power of our tests.[16] Specifically, we require that firms make at least 5 treasury stock repurchases from 1994-2003 and at least 5 retirement repurchases from 2005-2014.[17] Our resulting sample consists of 106 firm year observations (7 firms).

Tables 9 and 10 present the regression estimations of Equations (1) and (4), respectively, for this sample.[18] In Table 9 we fail to find evidence that treasury stock repurchases are larger than retirement repurchases. However, we note that no coefficients (only three coefficients) are statistically significant in Column A (Column B), suggesting that the lack of significant results

[15] We choose the state of Massachusetts for this test because it is the only state that meets our three criteria: 1) It has sufficient observations per calendar year. Our full sample of all firms includes an average of 20 Massachusetts observations for each calendar year. Only 11 other states provide this magnitude of observations. 2) It passed the MBCA, or an equivalent, which removes the legal benefit of treasury stock. Only 3 of the 11 states have similar clauses. 3) It passed the MBCA late enough in our sample period that it allows for multiple years of observations before the MBCA to allow us to compare the repurchase decisions in the pre- and post-MBCA periods. The similar statutes in place for California were enacted prior to 1980. Therefore, we have no pre-MBCA years for California.
[16] Our full sample of all firms includes an average of 20 Massachusetts observations for each calendar year. When we restrict our sample to firms that made treasury stock repurchases before the MBCA and retirement repurchases after the MBCA, we have an average of 8 observations for each calendar year. Therefore to generate sufficient sample size for this analysis we extend the time period under examination to 10 years before and 10 years after the MBCA. However, with this long time period we introduce the possibility that for a given firm the observations are disproportionate in the pre and post-MBCA periods (i.e., our sample can be severely unbalanced) which makes us less likely to find significant results, or less likely that any significant results would be attributable to the MBCA.
[17] Our results are robust to requiring either 3 or 4 repurchases in the pre- and post-MBCA periods.
[18] Since this is an examination of the effect of an exogeneous shock to the firm's accounting method rather than the effect of firm choice, we do not include the inverse mills ratio in the estimations presented in Tables 9 and 10. However, in untabulated analyses, we confirm that the inclusion of the inverse mills ratio in these analysis yields results that are quantitatively and qualitatively similar.

for our variable of interest, *TREASURY*, could be attributable to the overall low power of the test. In Table 10, however, we do find that treasury stock repurchases are less sensitive to earnings (t-statistic: -2.766). We interpret this finding as a preliminary indication that when firms are compelled to change their accounting method for repurchases, they also revise their stock repurchase decisions. However, we acknowledge the need for more research in this area.

INSERT TABLE 9

INSERT TABLE 10

6. Conclusion

In this study, we examine the effect of the financial reporting alternatives for stock repurchases on the amounts that firms pay out to repurchase shares. Unlike the treasury stock repurchases, retirement repurchases typically result in a reduction to retained earnings. Based on this distinction between the two methods, we predict that the retained earnings balance will constrain retirement repurchases. Specifically, we predict that treasury stock repurchases will be larger and less sensitive to earnings. We find evidence consistent with our expectations.

Due to the growing popularity of stock repurchases and the concern by some in the popular press that stock repurchases can be harmful to certain stakeholders such as creditors and employees, these findings are likely interesting to standard setters in that they suggest that the retirement method, through its effect on the retained earnings balance, provides an inherent constraint to stock repurchases. However, we caution against generalizing our findings, which are an examination of firm choice, to a setting which eliminates firm choice. Rather we suggest that this study highlights the need for more research in this area.

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Appendix A
Variable Definitions

Repurchase Variables:

NET_REPURCHASES = The change in the treasury stock balance (Compustat item: TSTK) from year *t-1* to year *t*. If this change is zero or missing, net repurchases equals stock purchases (Compustat item: PRSTKC) less stock issuances (Compustat item: SSTK). If net repurchases are negative, then we set net repurchases to zero.

REPURCHASE = *NET_REPURCHASES* in year *t* scaled by the book value of assets at the end of year *t-1* (Compustat item: AT)

REPURCHASE_PY = *REPURCHASE* for year *t-1*

CH_REPURCHASE = $REPURCHASE_t$ less $REPURCHASE_{t-1}$

Accounting Method Variables:

TREASURY = 1 for treasury stock repurchases; 0 otherwise. For firms with *NET_REPURCHASES* greater than 0 in year *t*, we designate the repurchase as a treasury stock repurchase if the firm has an increase in the treasury stock balance (Compustat item: TSTK) from year *t-1* to year *t*.

CHG_METHOD = 1 for firms changing accounting method for share repurchases in year *t*; 0 otherwise. We designate firms as changing accounting method if their repurchase method in year *t-1* and year *t* is different (e.g., a retirement repurchase in year *t-1* and a treasury stock repurchase in year *t*).

CUMULATIVE_CHANGES = the total number of times that a firm has changed accounting methods (i.e., *CHG_METHOD* = 1) from their first year in Compustat through the end of year *t*

MULTIPLE = 1 if *CUMULATIVE_CHANGES* is greater than 1; 0 otherwise

Retained Earnings Variables:

TS_RE = Ending retained earnings balance (Compustat item: RE) "as if" the current year repurchase is accounted as a treasury stock repurchase. For observations with treasury stock repurchases, *TS_RE* equals the retained earnings

balance at the end of year *t*. For observations with retirement repurchases, *TS_RE* equals the retained earnings balance at the end of year *t* plus *NET_REPURCHASES*.

RET_RE = Ending retained earnings balance (Compustat item: RE) "as if" the current year repurchase is accounted as a retirement repurchase. For observations with treasury stock repurchases, *RET_RE* equals the retained earnings balance at the end of year *t* less *NET_REPURCHASES*. For observations with retirement repurchases, *RET_RE* equals the retained earnings balance at the end of year *t*.

RET_EARN = the decile rank, between 0 and 1, of the retained earnings balance at the end of year *t* adjusted for current year repurchases scaled by the book value of assets at the end of year *t* adjusted for current year repurchases. (*TS_RE* divided by *ADJ_ASSETS)*

AVOID_NEG_RE = 1 if *TS_RE* is greater than 0, *RET_RE* is less than 0 and the retailed earnings balance at the end of year *t-1* is greater than 0; 0 otherwise

Other Variables:

ADJ_ASSETS = The book value of total assets (Compustat item: AT) at the end of year *t* plus *NET_REPURCHASES* in year *t.*

MTB = The market value of assets divided by the book value of assets (Compustat item: AT) at the end of year *t-1*. The market value of assets equals the market value of common stock (Compustat item CSHO multiplied by Compustat item PRCC_F) plus the book value of liabilities (Compustat item: LT) plus the book value of preferred stock (Compustat item: PSTK)

CONTING_SHARES = The number of shares needed if contingently issuable shares as of the end of year *t* were issued, calculated as the difference between the common shares used to calculate diluted earnings per share and basic earnings per shares. If contingent shares are negative, then we set contingent shares to zero. For 1996 and subsequent fiscal years, we obtain the common shares used to calculate diluted earnings per share (Compustat item: CSHFD) and basic earnings per share (Compustat item: CSHPRI). For fiscal years prior to 1996 we calculate the number of shares used to calculate diluted earnings per share (Compustat item NI

	divided by Compustat item EPSPI) and basic earnings per share (Compustat item NI divided by Compustat item EPSFI).
DIL_SHARES	= *CONTING_SHARES* divided by the number of shares used to calculate basic earnings per share (Compustat item: CSHPRI) measured at the end of year *t-1*
CHG_DIL_SHARES	= *DIL_SHARES* measured at the end of year *t* less *DIL_SHARES* measured at the end of year *t-1*
LN_MKT	= The natural log of the market value of common stock at the end of year *t*, calculated as the number of common shares outstanding (Compustat item: CSHO) multiplied by price per share (Compustat item: PRCC_F)
DEBT_TO_EQUITY	= The book value of debt (the sum of Compustat items DLTT and DLC) divided by the market value of common stock (Compustat item CSHO multiplied by Compustat item PRCC_F) at the end of year *t-1*
EP_RATIO	= Diluted earnings per share excluding extraordinary items (Compustat item: EPSFX) divided by price per share (Compustat item: PRCC_F) at the end of year *t-1*
CASH	= The annual decile rank (between 0 and 1) of the ratio of cash and short-term investments (Compustat item: CHE) at the end of year *t-1* divided by the book value of total assets (Compustat item: AT) at the end of year *t-1*
BEFORE2004	= 1 for fiscal years ending before 2004; 0 otherwise
MBCA	= 1 for firm year observations in which the Model Business Corporation Act was in effect for the respective state of incorporation; 0 otherwise
OP_INCOME	= Operating income before depreciation (Compustat item: OIBDP) for year *t* scaled by total assets at the end of year *t-1* (Compustat item: AT).
NON_OP_INCOME	= Nonoperating income (Compustat item: NOPI) for year *t* scaled by total assets at the end of year *t-1* (Compustat item: AT)
STDEV_OP_INCOME	= The standard deviation of *OP_INCOME* for the five years ending in year *t.*

DIVID_RATIO = Total dividends (Compustat item: DVT) divided by net income (Compustat item: NI) for the year *t-1*

PAST_RETURN = Raw stock return over the current and prior 2 years, calculated using the change in adjusted stock price (Compustat item PRCC_F divided by Compustat item AJEX) divided by 100

MILLS = The inverse mills ratio calculated as $\phi(Z_{i\gamma})/\Phi(Z_{i\gamma})$ for a treasury stock method firm and $-\phi(Z_{i\gamma})/(1 - \Phi(Z_{i\gamma}))$ for a retirement method firm where ϕ and Φ are the standard normal probability density function and standard normal cumulative density function, respectively, Z is the predicted value from the first stage regression presented in Table 2 for firm *i* and year *t*.

ADJ_EARN = Net income (Compustat item: NI) less 60% of special items (Compustat item: SPI).

Interaction Variables:

ADJ_EARN_X_TREASURY = *ADJ_EARN* multiplied by *TREASURY*

REPURCHASE_PY_X_TREASURY = *REPURCHASE_PY* multiplied by *TREASURY*

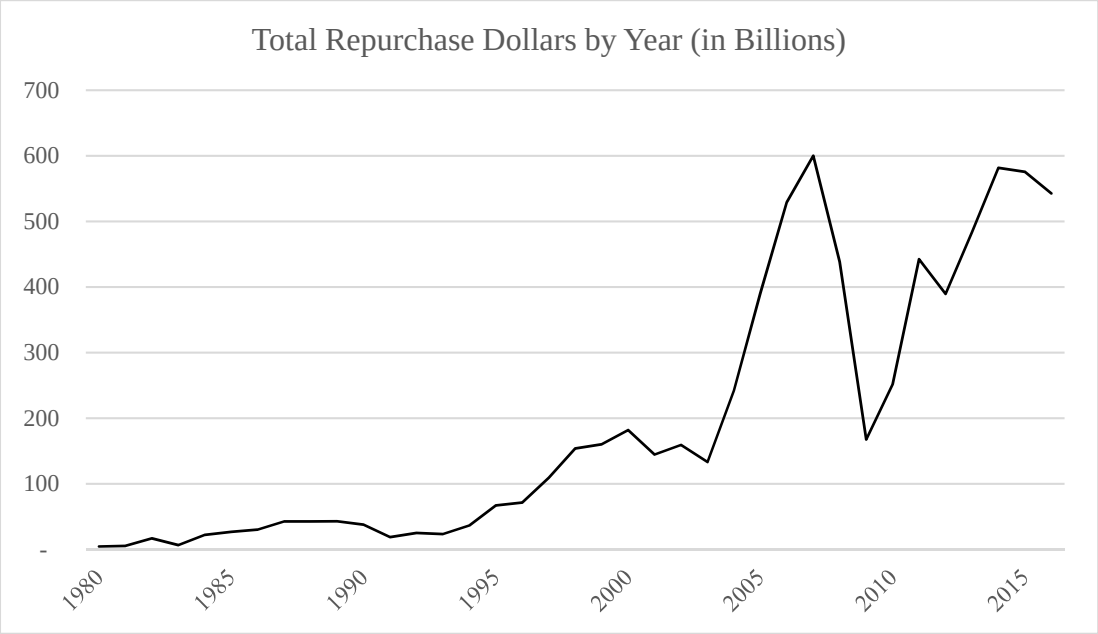
RET_EARN_X_MULTIPLE = *RET_EARN* multiplied by *MULTIPLE*

Figure 1

The Home Depot, Inc.
Balance Sheet
At End of 2017 Fiscal Year

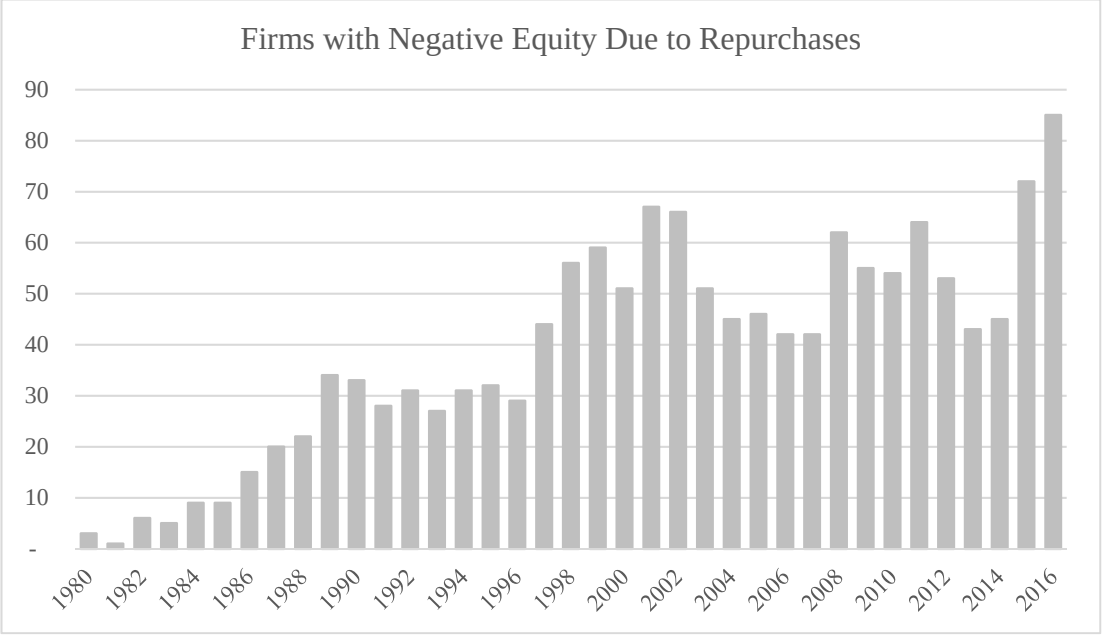
in millions	(A) Treasury Stock Repurchases	(B) Retirement Repurchases	(C) Diference
Total assets	44,529	44,529	-
Total liabilities	43,075	43,075	-
Shareholders' equity:			
Common stock, $0.05 par value; issued: 1,780 (treasury stock repurchases), 1,158 (retirement repurchases)	89	58	31
Additional Paid-in Capital	10,192	6,631	3,561
Retained earnings	*39,935*	*(4,668)*	*44,603*
AOCI	(566)	(566)	-
Treasury stock	(48,196)	-	(48,196)
Total shareholders' equity	1,454	1,454	-
Total liabilities and shareholders' equity	44,529	44,529	-

Figure 2



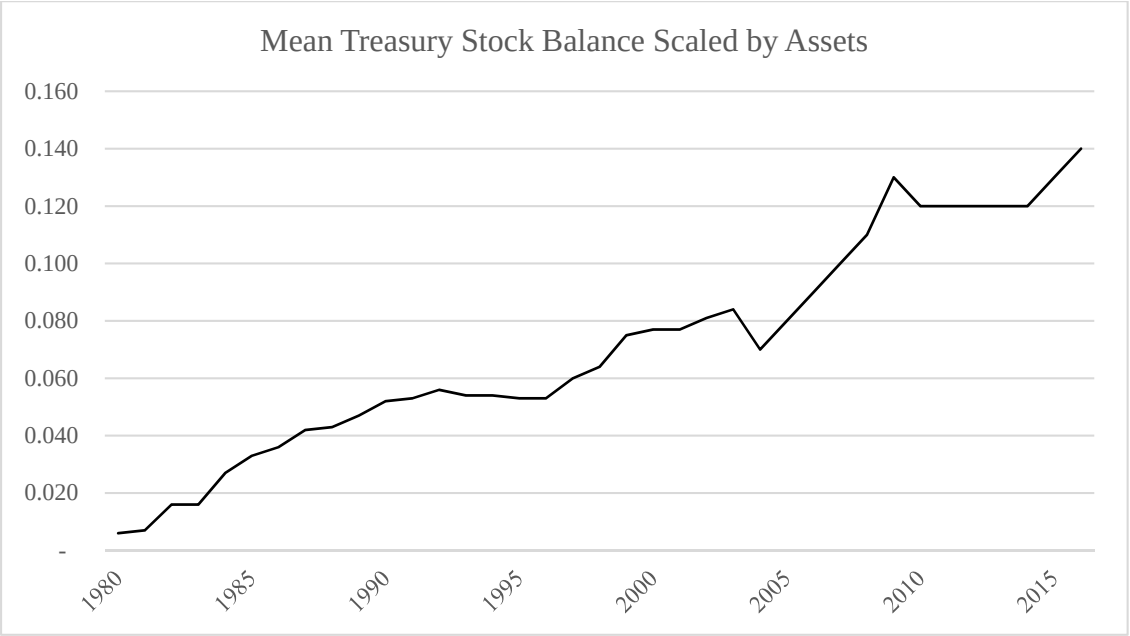
This figure presents the total repurchase dollars by year for all Compustat firms through 2016, excluding financial firms and utilities.

Figure 3



This figure presents the frequency, by year, of Compustat firms with negative reported book value of stockholders' equity and positive stockholders' equity adjusted for repurchases (calculated as the book value of stockholders' equity plus the cumulative amount of share repurchases over the firm's life reported in Compustat).

Figure 4



This figure presents, by year, the mean treasury stock balance scaled by the book value of total assets. Firms with a zero balance in treasury stock are excluded from the calculation of the mean.

Figure 5

This figure presents the frequency of Compustat firms with reported retained earnings greater than zero, but pro forma retained earnings less than zero. Pro forma retained earnings is the retained earnings balance as if all repurchases to date are retirement repurchases instead of treasury stock repurchases.

Table 1
Univariate Statistics

Panel A: Descriptive Statistics

	All Firms	(A) Treasury Stock Repurchases				(B) Retirement Repurchases				(A) - (B) Diff in Mean			(A) - (B) Diff in Median	
	n	n	Mean	Median	Std	n	Mean	Median	Std	Diff		t-stat	Diff	χ^2
REPURCHASE	45,119	31,321	0.032	0.010	0.055	13,798	0.042	0.017	0.063	(0.010)	***	(17.126)	(0.007) ***	650.858
MTB	45,119	31,321	1.832	1.429	1.342	13,798	1.764	1.376	1.253	0.068	***	5.054	0.053 ***	63.264
DIL_SHARES	45,119	31,321	0.018	-	0.040	13,798	0.017	-	0.038	0.001	**	2.253	-	1.615
CHG_DIL_SHARES	45,119	31,321	(0.001)	-	0.030	13,798	(0.002)	-	0.027	0.001	**	2.390	- ***	17.908
LN_MKT	45,119	31,321	5.702	5.696	2.511	13,798	5.506	5.477	2.611	0.196	***	7.536	0.220 ***	57.268
DEBT_TO_EQUITY	45,119	31,321	0.491	0.183	1.011	13,798	0.518	0.157	1.117	(0.026)	**	(2.472)	0.025 ***	53.856
EP_RATIO	45,119	31,321	(0.012)	0.049	0.368	13,798	0.009	0.053	0.351	(0.021)	***	(5.760)	(0.005) ***	180.961
CASH	45,119	31,321	0.491	0.444	0.317	13,798	0.520	0.556	0.323	(0.029)	***	(8.793)	(0.111) ***	76.454
MBCA	45,119	31,321	0.030	-	0.171	13,798	0.248	-	0.432	(0.218)	***	(76.677)	- ***	1,363.913
RET_EARN	45,119	31,321	0.494	0.444	0.320	13,798	0.514	0.556	0.315	(0.020)	***	(6.268)	(0.111) ***	38.861
OP_INCOME	45,119	31,321	0.129	0.139	0.153	13,798	0.142	0.141	0.136	(0.013)	***	(8.758)	(0.003) ***	24.262
NON_OP_INCOME	45,119	31,321	0.011	0.006	0.021	13,798	0.012	0.006	0.022	(0.001)	***	(6.534)	(0.001) ***	50.679
STDEV_OP_INCOME	45,119	31,321	0.117	0.047	0.409	13,798	0.093	0.046	0.280	0.024	***	6.260	0.001 ***	21.304
DIVID_RATIO	45,119	31,321	0.164	-	0.456	13,798	0.190	-	0.478	(0.026)	***	(5.540)	- ***	86.405
PAST_RETURN	40,764	28,241	0.005	0.002	0.013	12,523	0.004	0.002	0.012	0.000	**	1.997	0.000	0.280

Table 1 (continued)

Panel B: Correlations

	VARIABLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	*REPURCHASE*		***0.31***	***0.07***	0.00	***0.13***	***-0.16***	***0.05***	***0.16***	***0.04***	***0.15***	***0.18***	***0.03***	***0.02***	***-0.02***	***0.08***
2	*MTB*	***0.32***		***0.07***	***-0.03***	***0.25***	***-0.24***	***0.03***	***0.24***	0.01	***0.04***	***0.12***	***0.08***	***0.13***	***-0.02***	***0.18***
3	*DIL_SHARES*	***0.21***	***0.25***		***-0.50***	***0.08***	0.01	***0.09***	***0.02***	***-0.02***	***-0.03***	***0.09***	***-0.02***	***-0.01***	***-0.04***	***0.13***
4	*CHG_DIL_SHARES*	***-0.04***	***-0.08***	***-0.42***		0.00	***0.02***	***-0.06***	***-0.02***	-0.00	***0.01***	***0.05***	***0.02***	0.00	0.00	***0.04***
5	*LN_MKT*	***0.18***	***0.42***	***0.38***	***-0.04***		***-0.21***	***0.15***	***-0.11***	***-0.03***	***0.30***	***0.35***	***-0.13***	***-0.11***	***0.15***	***0.14***
6	*DEBT_TO_EQUITY*	***-0.32***	***-0.50***	***-0.09***	***0.05***	***-0.08***		***-0.35***	***-0.24***	***-0.04***	***-0.26***	***-0.09***	***-0.05***	***-0.03***	***-0.03***	***-0.08***
7	*EP_RATIO*	***0.06***	***-0.17***	***0.19***	***-0.09***	***0.05***	***0.11***		***-0.02***	***0.02***	***0.25***	***0.25***	***0.04***	***-0.19***	***0.09***	***0.14***
8	*CASH*	***0.17***	***0.19***	***-0.03***	***-0.01***	***-0.12***	***-0.54***	***-0.11***		-0.00	***0.01***	***-0.11***	***0.26***	***0.11***	***-0.08***	***0.04***
9	*MBCA*	***0.06***	***0.02***	-0.00	-0.00	***-0.03***	***-0.06***	***0.02***	-0.00		***0.09***	***0.04***	***-0.02***	***-0.02***	***0.01***	***-0.02***
10	*RET_EARN*	***0.22***	***0.12***	***0.15***	***-0.03***	***0.30***	***-0.26***	***0.36***	***0.01***	***0.09***		***0.43***	***0.01***	***-0.15***	***0.14***	***0.05***
11	*OP_INCOME*	***0.24***	***0.41***	***0.21***	***0.05***	***0.37***	***-0.13***	***0.34***	***-0.09***	***0.04***	***0.43***		***-0.10***	***-0.19***	***0.10***	***0.30***
12	*NON_OP_INCOME*	***0.04***	***0.02***	***-0.14***	***0.03***	***-0.13***	***-0.16***	***0.06***	***0.35***	***-0.01***	***0.05***	***-0.05***		***0.05***	***-0.01***	***0.06***
13	*STDEV_OP_INCOME*	-0.01	***0.09***	***-0.15***	***-0.01***	***-0.36***	***-0.19***	***-0.18***	***0.25***	-0.01	***-0.25***	***-0.12***	***0.14***		***-0.06***	***-0.01***
14	*DIVID_RATIO*	***0.05***	***0.05***	***0.09***	***-0.04***	***0.32***	***0.03***	***0.36***	***-0.14***	***0.04***	***0.36***	***0.27***	***0.02***	***-0.31***		***-0.03***
15	*PAST_RETURN*	***0.14***	***0.25***	***0.19***	***0.09***	***0.28***	***-0.10***	***0.26***	***0.01***	-0.00	***0.19***	***0.45***	***0.06***	***-0.17***	***0.14***	

Panel A presents descriptive statistics for the sample of firm year observations from 1980-2016 partitioned on treasure stock repurchases (*TREASURY* = 1) and retirement repurchases (*TREASURY* = 0). *, **, *** indicates significance at the 0.10, 0.05, and 0.01 level respectively using a two-tailed test. Panel B presents Pearson (Spearman) correlations among selected variables above (below) the diagonal. Correlations with p-values less than 0.05 are presented in boldface. Variable definitions are provided in the Appendix.

Table 2
First Stage Selection Model

Dependent Variable =	***TREASURY***		
	Coef		tstat
MTB	0.022	**	2.107
DIL_SHARES	0.513		1.364
CHG_DIL_SHARES	0.635	**	2.018
LN_MKT	0.005		0.559
DEBT_TO_EQUITY	-0.036	***	-3.079
EP_RATIO	-0.073	***	-2.837
CASH	-0.250	***	-5.401
BEFORE2004	-2.801	***	-14.749
MBCA	-1.506	***	-26.352
Year Fixed Effects	Yes		
Observations	45,119		
Pseudo R-squared	0.141		

***two-tailed p-value < 0.01; **two-tailed p-value < 0.05; *two-tailed p-value < 0.10

This table presents the first stage probit regression for the choice of type of repurchase. Significance tests use standard errors robust to heteroskedasticity and clustered by firm. Variable definitions are provided in the Appendix.

Table 3
Regression Analyses of H1

Dependent Variable =	***REPURCHASE***							
	(A)		(B)		(C)		(D)	
	All Firms				*Single Method Firms*			
	Coef	tstat	Coef	tstat	Coef	tstat	Coef	tstat
TREASURY	**0.033** ***	**4.554**	**0.030** ***	**4.082**	**0.067** ***	**4.872**	**0.062** ***	**4.341**
LN_MKT	0.001 ***	4.724	0.001 ***	4.739	0.001 ***	4.565	0.002 ***	4.839
RET_EARN	0.012 ***	7.464	0.012 ***	7.010	0.015 ***	6.384	0.015 ***	5.920
OP_INCOME	0.062 ***	13.931	0.069 ***	13.067	0.054 ***	9.558	0.063 ***	9.199
NON_OP_INCOME	0.057 ***	3.107	0.053 ***	2.648	0.051 *	1.915	0.038	1.293
STDEV_OP_INCOME	0.006 ***	5.939	0.011 ***	5.407	0.005 ***	4.579	0.010 ***	4.364
DIVID_RATIO	-0.004 ***	-6.956	-0.004 ***	-6.600	-0.005 ***	-5.586	-0.005 ***	-5.803
DEBT_TO_EQUITY	-0.003 ***	-11.761	-0.003 ***	-10.739	-0.003 ***	-7.807	-0.003 ***	-7.097
CASH	0.031 ***	20.192	0.032 ***	19.709	0.036 ***	16.193	0.038 ***	16.032
PAST_RETURN			0.031	0.967			-0.001	-0.034
MILLS	-0.025 ***	-5.995	-0.024 ***	-5.516	-0.047 ***	-5.776	-0.044 ***	-5.245
Year Fixed Effects	Yes		Yes		Yes		Yes	
State Fixed Effects	Yes		Yes		Yes		Yes	
Observations	45,119		40,764		24,534		21,592	
Adjusted R-squared	0.120		0.129		0.130		0.143	

***two-tailed p-value < 0.01; **two-tailed p-value < 0.05; *two-tailed p-value < 0.10

This table presents OLS regression estimation of Equation 1. In Columns (A) and (B) we include all firms in our sample, and in Columns (C) and (D) we only include firms that do not change their method of accounting for stock repurchases from its initial year in Compustat through 2016 (i.e., "single method firms"). Significance tests use standard errors robust to heteroskedasticity and clustered by firm. Variable definitions are provided in the Appendix.

Table 4
Regression Analysis of H2

Dependent Variable =	***CH_REPURCHASE***					
	(A)			(B)		
	All Firms			*Single Method Firms*		
	Coef		tstat	Coef		tstat
ADJ_EARN	0.105	***	14.026	0.106	***	11.061
REPURCHASE_PY	-0.630	***	-34.811	-0.609	***	-26.561
TREASURY	-0.015	***	-3.220	-0.023	***	-2.959
ADJ_EARN_X_TREASURY	**-0.064**	*******	**-7.671**	**-0.075**	*******	**-7.000**
REPURCHASE_PY_X_TREASURY	0.139	***	6.122	0.154	***	5.091
MILLS	0.004		1.560	0.008	*	1.728
Year Fixed Effects	Yes			Yes		
State Fixed Effects	Yes			Yes		
Observations	45,119			24,534		
Adjusted R-squared	0.191			0.179		

***two-tailed p-value < 0.01; **two-tailed p-value < 0.05; *two-tailed p-value < 0.10

This table presents OLS regression estimation of Equation 4. In Column (A) we include all firms in our sample, and in Column (B) we only include firms that do not change their method of accounting for stock repurchases from its initial year in Compustat through 2016 (i.e., "single method firms"). Significance tests use standard errors robust to heteroskedasticity and clustered by firm. Variable definitions are provided in the Appendix.

Table 5
Changing Accounting Method Over Time

# of Times Firm Changes Accounting Method Over Time	# of Firms	Firm Year Obs
0	6,491	24,813
1	2,123	14,059
2	494	4,080
3	167	1,430
4	41	462
5	13	171
6	5	82
9	1	22
	9,335	45,119

This table categorizes our sample firms and firm year observations based on the total number of times the firm changes its method of accounting for repurchases from its initial year in Compustat through 2016.

Table 6
Regression Analysis of H1
Sample = Consecutive Repurchases Under Different Accounting Methods

Dependent Variable =	*REPURCHASE*					
	(A)			(B)		
	Coef		tstat	Coef		tstat
TREASURY	**0.036**	***	**7.213**	**0.039**	***	**7.308**
LN_MKT	0.000		0.319	0.000		0.123
RET_EARN	0.018	*	1.832	0.019	*	1.810
OP_INCOME	0.011		0.650	0.012		0.632
NON_OP_INCOME	0.021		0.476	0.048		0.893
STDEV_OP_INCOME	0.000	*	-1.785	0.000		0.027
DIVID_RATIO	-0.001		-0.739	-0.001		-0.728
DEBT_TO_EQUITY	-0.004	***	-3.012	-0.004	***	-2.751
CASH	0.033	***	4.386	0.034	***	4.058
PAST_RETURN				-0.003	***	-4.343
MILLS	-0.014	***	-3.957	-0.015	***	-3.861
Observations	1,156			1,038		
Adjusted R-squared	0.058			0.060		

***two-tailed p-value < 0.01; **two-tailed p-value < 0.05; *two-tailed p-value < 0.10

This table presents OLS regression estimation of Equation 1. We only include firms with repurchases in two consecutive years under two different methods. For example, a firm makes a retirement (treasury stock) repurchase in year *t-1* and a treasury stock (retirement) repurchase in year *t*. For firms with multiple accounting method changes during the sample period, we only include the firm year observations from the first accounting method change in our sample. As a result, each firm included in this test is represented only twice: one firm year observation with a retirement repurchase and one firm year observation with a treasury stock repurchase. Significance tests use standard errors robust to heteroskedasticity and clustered by firm. Variable definitions are provided in the Appendix.

Table 7
Regression Analysis of H2
Sample = Consecutive Repurchases Under Different Accounting Methods

Dependent Variable =	***CH_REPURCHASE***		
	Coef		tstat
ADJ_EARN	0.109	***	2.881
REPURCHASE_PY	-0.777	***	-10.638
TREASURY	0.029	***	4.478
ADJ_EARN_X_TREASURY	**-0.088**	**	**-2.194**
REPURCHASE_PY_X_TREASURY	0.319	**	2.140
MILLS	-0.011	***	-3.475
Observations	1,156		
Adjusted R-squared	0.166		

***two-tailed p-value < 0.01; **two-tailed p-value < 0.05; *two-tailed p-value < 0.10

This table presents OLS regression estimation of Equation 4. We only include firms with repurchases in two consecutive years under two different methods. For example, a firm makes a retirement (treasury stock) repurchase in year *t-1* and a treasury stock (retirement) repurchase in year *t*. For firms with multiple accounting method changes during the sample period, we only include the firm year observations from the first accounting method change in our sample. As a result, each firm included in this test is represented only twice: one firm year observation with a retirement repurchase and one firm year observation with a treasury stock repurchase. Significance tests use standard errors robust to heteroskedasticity and clustered by firm. Variable definitions are provided in the Appendix.

Table 8
Determinants Model for Method Changes

Dependent Variable =	***CHG_METHOD***		
	Coef		tstat
RET_EARN	**-0.702**	***	**-7.366**
AVOID_NEG_RE	**0.779**	***	**4.418**
MULTIPLE	0.846	***	11.312
MTB	0.044	*	1.703
DIL_SHARES	0.309		0.385
CHG_DIL_SHARES	-0.697		-0.763
LN_MKT	-0.010		-0.776
DEBT_TO_EQUITY	-0.063	**	-2.417
EP_RATIO	0.070		0.585
CASH	0.052		0.589
BEFORE2004	0.280		1.404
MBCA	-0.789	***	-9.599
Year Fixed Effects	Yes		
Observations	7,893		
Pseudo R-squared	0.278		

***two-tailed p-value < 0.01; **two-tailed p-value < 0.05; *two-tailed p-value < 0.10

This table presents a determinants model estimated in a probit regression for firms changing its method of accounting for repurchases. We only include firms with a retirement repurchase in year *t-1* and a repurchase, either retirement or treasury stock, in year *t*. Significance tests use standard errors robust to heteroskedasticity and clustered by firm. Variable definitions are provided in the Appendix.

Table 9
Regression Analysis of H1
Sample = Massachusetts Firms

Dependent Variable =	***REPURCHASE***			
	(A)		(B)	
	Coef	tstat	Coef	tstat
TREASURY	**0.005**	**0.159**	**0.020**	**0.511**
LN_MKT	-0.001	-0.287	0.002	0.557
RET_EARN	-0.030	-0.381	-0.048	-0.541
OP_INCOME	0.239	1.642	0.397 **	2.632
NON_OP_INCOME	1.043	0.968	0.621	0.630
STDEV_OP_INCOME	-0.228	-1.283	-0.272 *	-2.385
DIVID_RATIO	0.015	0.397	0.020	0.392
DEBT_TO_EQUITY	-0.163	-0.854	-0.140	-0.943
CASH	0.010	0.135	0.022	0.418
PAST_RETURN			-2.893 *	-1.991
Observations	106		104	
Adjusted R-squared	0.113		0.210	

***two-tailed p-value < 0.01; **two-tailed p-value < 0.05; *two-tailed p-value < 0.10

This table presents OLS regression estimation of Equation 1. We only include firms incorporated in the state of Massachusetts which have at least 5 treasury stock repurchases from 1994-2003 and at least 5 retirement repurchases from 2005-2014. Significance tests use standard errors robust to heteroskedasticity and clustered by firm. Variable definitions are provided in the Appendix.

Table 10
Regression Analysis of H2
Sample = Massachusetts Firms

Dependent Variable =	*CH_REPURCHASE*		
	Coef		tstat
ADJ_EARN	0.408	***	5.651
REPURCHASE_PY	-0.900	***	-15.382
TREASURY	0.018		1.249
ADJ_EARN_X_TREASURY	**-0.374**	**	**-2.766**
REPURCHASE_PY_X_TREASURY	0.316	***	4.505
Observations	106		
Adjusted R-squared	0.418		

***two-tailed p-value < 0.01; **two-tailed p-value < 0.05; *two-tailed p-value < 0.10

This table presents OLS regression estimation of Equation 4. We only include firms incorporated in the state of Massachusetts which have at least 5 treasury stock repurchases from 1994-2003 and at least 5 retirement repurchases from 2005-2014. Significance tests use standard errors robust to heteroskedasticity and clustered by firm. Variable definitions are provided in the Appendix.