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Abstract

Many large U.S. bank holding companies (BHCs) continued to pay dividends during the 2007-09 financial crisis, even as financial market conditions deteriorated, large losses accumulated, and emergency capital and liquidity were being provided by the official sector. In contrast, share repurchases by these BHCs dropped sharply in the early part of the crisis. Documenting this divergent behavior is one of the key contributions of this paper. The paper also examines the role that repurchases played in large BHCs' decisions to reduce or eliminate dividends. The key findings are that smaller BHCs in the sample with higher levels of repurchases before the financial crisis reduced dividends later and by less than BHCs with lower pre-crisis repurchases, suggesting that repurchases may have served as a cushion against cutting dividends. In contrast, there is only a weak relationship between pre-crisis repurchases and the timing and extent of dividend reductions for the larger BHCs, even though these BHCs were more likely overall to reduce or eliminate dividends during the crisis.

Key words: bank capital, stock repurchases, bank dividends, financial crisis

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Bank Holding Company Dividends and Repurchases
During the Financial Crisis

1. Introduction

Many large U.S. bank holding companies (BHCs) continued to pay dividends during the recent financial crisis, even as financial market conditions deteriorated, large losses accumulated, and emergency capital and liquidity were being provided by the official sector. These continued dividend payments have been the subject of critical commentary because they drained capital from individual banking companies and from the banking system in a time of extreme stress (see, for example, Acharya et al. 2012, Rosengren 2010, Scharfstein and Stein 2008). Some have also argued that continued dividend payments were a means of shifting value from BHC debt holders and creditors (including other banking companies) to equity holders (Srivastav et al. 2014, Acharya et al. 2014). The phenomenon was striking enough that bank supervisors subsequently adopted regulations and supervisory programs intended to limit dividend payments and other capital distributions when capital comes under stress. These measures include Basel III's capital conservation buffer and the Federal Reserve's Comprehensive Capital Analysis and Review (CCAR).

Dividends are only part of the story, however. Before the financial crisis, BHCs also made substantial common stock share repurchases, frequently in amounts that rivaled the size of dividend payments. Share repurchases are similar to dividends in their impact on capital and the balance sheet; both involve a reduction in capital and a transfer of cash from the firm to shareholders. In contrast to dividend payments, share repurchases by large BHCs dropped sharply in the early part of the financial crisis, reaching *de minimis* levels by mid-2008. Many BHCs that had reduced share repurchases to zero continued to pay dividends at pre-financial-crisis levels for several quarters. In some cases, more than a year elapsed between the time a BHC stopped doing share repurchases and when it reduced or eliminated its dividend. Documenting this divergent behavior is one of the key contributions of this paper, as previous analysis of the banking industry has tended to focus on dividend payments alone.

What accounts for this difference in the timing of dividend and share repurchase reductions? To a large extent, the contrast may reflect well-documented differences in the way that firms use dividends and repurchases. Dividends are generally stable and increases or decreases are typically interpreted as signals of long-run changes in firm profitability. Reductions in dividends are generally associated with a negative stock price reaction, since they can be seen a signal of lower future profits (Ghosh and Woolridge 1998, Denis et al. 1994, Bessler and Nohel 1996, 2000). During the financial crisis, concern about negative signals from a dividend cut may have been heightened, given the uncertainty and lack of

transparency about growing losses at individual financial firms. These concerns may have made BHCs even more reluctant to reduce dividends, despite the growing stress.

In contrast, share repurchases are more variable and tend to be used in periods when income is temporarily high, both by non-financial firms (Jagannathan et al. 2000) and by banking companies (Hirtle 2004). In the banking industry, dividends are generally paid on a regular, quarterly basis after having been approved by the firm's board of directors and publicly disclosed by the firm. Repurchases are made more irregularly over time, without public announcement at the time they are executed.[1] For these reasons, BHCs may have been more willing to reduce repurchases quickly as the financial crisis developed and uncertainty about its depth and severity intensified. The ability to reduce repurchases may have served as cushion that allowed BHCs to reduce payouts, at least for a time, without subjecting themselves to the negative market signal from reducing or eliminating their dividends.

This paper examines the timing and extent of dividend payment reductions by a set of large BHCs during the financial crisis. In particular, the paper examines the role that repurchases played in a BHC's decision to reduce or eliminate dividends. Did BHCs with a high level of repurchases prior to the financial crisis cut dividends later, or by less, than BHCs with lower levels of pre-crisis repurchases? In other words, did the ability to reduce high levels of pre-crisis repurchases "cushion" BHCs against the necessity to reduce or eliminate dividends during the financial crisis? Or are higher levels of pre-crisis repurchases associated with more rapid dividend reductions during the crisis, perhaps because BHCs with repurchases had more volatile income, which fell more sharply during the crisis?

The key findings of the paper are that smaller BHCs with higher levels of repurchases before the financial crisis reduced dividends later and by less, on average, than smaller BHCs with lower pre-crisis repurchases. In contrast, the results suggest only a weak relationship between pre-crisis repurchase activity and the timing or size of dividend reductions for larger BHCs, even though these institutions were more likely to reduce or eliminate dividends than smaller firms. For both larger and smaller BHCs, higher overall payouts (repurchases plus dividends) before the crisis are associated with quicker dividend reductions during the crisis. The key findings about the timing of dividend reductions are robust to several alternative specifications of the model, including controlling for expectations of losses during the financial crisis and for the extent of market scrutiny. Thus, the ability to cut repurchases

[1]Firms generally announce their intention to repurchase shares by disclosing a repurchase program that outlines the dollar amount and/or number of share they intend to repurchase over a particular time period. However, there is no obligation for a firm to actually make the repurchases it has announced, nor is there any commitment about the timing of repurchases it actually does (Jagannathan et al. 2000). Since 2004, firms have been required to disclose the number of shares and average price of repurchased shares in subsequent quarterly and annual financial filings (Bonaimé 2012).

appears to have had a cushioning effect against the timing of a dividend cut and the cumulative amount of the dividend reduction, though primarily for the smaller BHCs in the sample.

These findings are consistent with a precautionary view of bank capital, in which BHCs were attempting to balance the desire to retain capital within the firm during a period of increasing stress against a concern about sending a negative and possibly destabilizing signal to the market by reducing or eliminating dividends. The results seem less consistent with a risk-shifting view of dividends, in which dividend payments are intended to shift value from creditors to equity holders. Risk-shifting of this type could also have been accomplished via share repurchases, which dropped quickly during the early phases of the crisis.

From a policy perspective, the results suggest that BHCs could be encouraged to make more of their capital distributions in the form of share repurchases, due to the greater flexibility and market tolerance for variability in this form of distribution. The Federal Reserve's CCAR program – which evaluates large BHCs' proposed dividend payments and share repurchases – takes this view, as under the program, BHCs planning to make dividend payments exceeding 30 percent of after-tax net income receive particularly close scrutiny, but there is no additional scrutiny related to share repurchases (Board of Governors of the Federal Reserve System 2016). A key question is whether sharp reductions in share repurchases would again be tolerated by market participants during times of stress if there is increased emphasis on repurchases as the means of shareholder payouts. In other words, would there be more scrutiny of actual share repurchases such that reductions in these repurchases might send the same kind of market signal as dividend reductions during periods of stress?

The remainder of this paper is organized as follows. Section 2 presents information on dividend payments and share repurchases by large BHCs prior to and during the financial crisis and relates this information to the previous literature on dividends and repurchases by non-financial firms and in the banking industry. Section 3 describes the data used in the paper. Section 4 presents the empirical specification and results, including analysis of the timing and size of dividend reductions by bank holding companies. Section 5 contains a summary and conclusions.

2. BHC Dividends and Repurchases during the Financial Crisis

Figure 1 shows dividend payments by large BHCs – those with assets exceeding $5 billion – from 2005 to 2009, as reported on the Federal Reserve Y-9C regulatory reports.[2] As noted in previous papers (Acharya et al. 2012, Kanas 2013), BHCs continued to pay dividends well after the onset of the 2007 to

[2] For consistency over the sample period, the figure omits the large non-bank financial companies that became bank holding companies in early 2009. If these firms were included and dividend payments were scaled by assets, the patterns reported in Figure 1 and Figure 2 would be substantially similar.

2009 financial crisis. Aggregate dividends averaged more than $10 billion per quarter in 2005 to 2006, and did not fall below this level until the end of 2008. Dividends paid by these large BHCs did not decline to the very low levels that eventually prevailed until mid-2009. The continued high level of dividends through the first part of the financial crisis was particularly striking as these payments occurred during a period of severe market stress and while the official sector was providing extensive support to the banking industry, including liquidity provisions and capital infusions (Rosengren 2010, Scharfstein and Stein 2008).

Focusing just on dividends misses an important part of the story, however. Stock repurchases – when a company buys back its own common stock – are another important way that a firm can return capital to shareholders. Like dividend payments, stock repurchases disperse cash from the company to shareholders. Moreover, repurchases reduce the amount of common stock outstanding one-for-one, just as dividend payments do. Dividend payments reduce retained earnings and thus reduce (potential) common equity, while stock repurchases are a direction reduction in the outstanding amount of common equity.[3]

Figure 2 updates Figure 1 to include common stock repurchases for the sample of large BHCs, based on information in the Federal Reserve Y-9C regulatory reports.[4] As previously documented (Hirtle 2004), repurchases by large BHCs can be substantial; during the two years immediately preceding the financial crisis (2005 and 2006), repurchases by these BHCs often equaled or exceeded the amount of dividend payments. Unlike dividends, however, repurchases dropped sharply relatively early in the financial crisis. By late 2007, repurchases by these large BHCs had fallen to about half their pre-crisis level and by mid-2008, they had fallen to negligible amounts. Repurchases thus fell to *de minimis* levels nearly a year before dividends were similarly reduced.[5]

Figure 3 presents the same information for a selection of individual BHCs. Panel A of the figure shows dividends and repurchases for very large BHCs (those with assets exceeding $120 billion in Q1 2005), while Panel B contains results for a set of smaller BHCs (those with assets between $10 and $15 billion). For comparability purposes, dividends and repurchases are scaled by total BHC assets. While the results are not identical across BHCs, there is a consistent pattern of repurchases declining well before dividends are reduced. This pattern is evident for both the very large and the smaller BHCs in the

[3] See Jagannathan et al. (2000) for a more detailed discussion of the role of repurchases in firm payout policies. Grullon and Michaely (2002) document that non-financial firms increasingly substituted repurchases for dividends through the 1990s.

[4] Repurchases are measured as treasury stock purchases plus the net of common stock retired over common stock conversions. Section 3 discusses this definition in greater detail.

[5] Bliss et al. (2015) find that while dividend reductions by non-financial firms were more common during the financial crisis than in previous periods, the overall reduction in shareholder payouts by these firms was driven primarily by reductions in share repurchases.

sample. The figure also illustrates that the timing of dividend and repurchase reductions differs across BHCs, with some cutting payouts earlier in the financial crisis than others.

What explains the difference in timing between the reduction in dividends and the reduction in share repurchases? Some part of the explanation likely owes to the different roles that dividends and repurchases play in firms' corporate payout strategies. As first described by Lintner (1956), firm managers appear to set dividends under the assumption that investors prefer stable and growing dividends, rather than dividends that fluctuate over time. An increase in dividends is thus generally perceived as a signal of increased sustainable profitability, while a decrease in dividends is taken as a signal of a long-term decline in profits. Consistent with this assertion, previous research has shown that a firm's cash flow volatility is negatively related to both the probability and size of dividend payments (Chay and Suh 2009). In addition, DeAngelo et al. (2006) finds that dividend payments are more common among older, well-established firms with high amounts of retained earnings and that those with low or negative retained earnings have a very low propensity to pay dividends.

In contrast to dividends, repurchases are variable over time and tend to be used when profits are temporarily high (Jagannathan et al. 2000). Repurchases are less publicly observable than dividend payments. Firms typically announce repurchase programs in which they specify the amount of repurchases they intend to do over a specified future time period, but there is no obligation for the firm to actually follow through on that intention. Previous research (Stephens and Weisbach 1998, Bonaimé 2012) has shown that "completion rates" (amount repurchases relative to the announced size of the program) for share repurchase programs average about 80% and that a measurable portion of firms purchase few or no shares following the announcement of a repurchase program. For those firms that do reacquire shares under a repurchase program, the timing and amount of those repurchases is up to management discretion. For these reasons, a firm can increase or decrease its actual repurchases without necessarily attracting immediate public attention and sending a signal about future profitability.[6] While firms are required to disclose the number of shares and average price of shares repurchased under publicly announced repurchase programs in their quarterly and annual financial statements (Bonaimé 2012), these disclosures come after the repurchases have been executed. This stands in contrast to dividend payments, which in the banking industry are typically approved by a BHC's board of directors on a quarterly basis and disclosed via a press release.

[6] It is well documented, however, that announcements of repurchase programs are associated with increases in stock prices (Vermaelen 2005, Bonaimé 2012), including in the banking industry (Kane and Susmel 1999). Stephens and Weisbach (1998) show that actual repurchases are negatively related to past stock performance, suggesting that firms may be more likely to make repurchases when management believes that the firm is undervalued.

Several studies have documented that decreases or omissions of dividends result in significant declines in stock prices for both non-financial firms (Ghosh and Woolridge 1988, Denis et al. 1994) and banking institutions (Bessler and Nohel 1996, 2000). Above and beyond the impact on share price, banking companies may have been particularly sensitive to the negative market signal contained in a dividend decrease during the stressed market conditions and heightened uncertainty prevailing during the financial crisis. Abreu and Gulamhussen (2013), for instance, find that signaling was a significant determinant of dividend payout rates for BHCs during the financial crisis, though not in the years before the crisis.

Several recent papers have argued that dividend payments by banking companies are a means of risk-shifting and that continued high dividend payments during the financial crisis were an attempt to shift value from creditors to shareholders. Acharya et al. (2014) develop a model in which dividend payments by one banking company impose externalities on other banking companies, who are creditors of the first bank. Srivastav et al. (2014) examine dividend payments by U.S. BHCs that received capital under the Troubled Asset Relief Program (TARP) and found that those with CEOs who held more inside debt relative to inside equity were more likely to reduce dividends. Their interpretation is that these CEOs had less incentive to shift value from creditors to shareholders. Onali (2014) and Kanas (2013) also find evidence of risk-shifting by banking companies in that higher dividends are associated with higher risk in the cross-section, both before and during the financial crisis.

One question about the risk-shifting explanation is why it would apply to dividends but not to share repurchases. If the intention of management was to shift value to shareholders by reducing cash and increasing leverage, then this shifting also could have been accomplished through share repurchases. Yet repurchases seem to have fallen sharply in the early stages of the financial crisis. This suggests that some additional motivation was at play, perhaps one involving the relationship between dividends and repurchases in BHCs' overall capital planning.

In particular, the contrasting pattern between dividends and repurchases seems consistent with a concern about market signaling, in particular, with a desire to avoid the negative market signal associated with a decrease in dividends. As noted above, this concern may have been particularly acute given stressed conditions and the fragile state of funding markets during the financial crisis. A reduction in dividends by an individual BHC could have been viewed by market participants as a signal that the BHC was weaker than others, with a consequent negative impact on the willingness of creditors and counterparties to continue to interact with the firm.[7] In this environment, BHCs may have chosen to

[7] Hull (2013) identifies a relationship between the timing of dividend cuts by non-financial firms during recessions and the performance of those firms, with early dividend cutters experiencing larger abnormal stock returns. The primary explanation for this finding is that firms can signal that they have profitable investment opportunities by

reduce shareholder payouts and retain capital within the firm by eliminating repurchases first and only later, if the BHC's condition significantly worsened, reduced or eliminated dividends. This is consistent with a precautionary view of capital management (Berger et al. 2008), in which BHC management is concerned with the continued viability of the organization and its ability to withstand the stresses of financial crisis period.

In this view, the ability to reduce repurchases served as a buffer against the need to reduce or eliminate dividends during the financial crisis. BHCs that paid more of their capital distributions in the form of repurchases prior to the financial crisis had a larger buffer of distributions to reduce before having to consider reducing dividends in stressed market conditions. Previous research has found evidence of this kind of buffering among nonfinancial firms; Leary and Michaely (2011) find that nonfinancial firms making repurchases smooth their dividends more over time than firms that do not make repurchases. This buffer role is consistent with the traditional interpretation of repurchases as means of dispersing temporarily high profits. It also implies a somewhat broader function for an on-going level of repurchases as a cushion against future income volatility, consistent with the results in Bonaimé et al. (2014), who find that BHCs treat repurchases and hedging (i.e., using derivatives) as substitutes in managing earnings volatility.

The primary testable hypothesis from this line of argument is that, all else equal, BHCs with higher pre-crisis repurchases reduced or eliminated dividends later in the financial crisis than BHCs with lower pre-crisis repurchase activity. In addition, BHCs with higher repurchases may have reduced dividends less – either at the time of the initial dividend reduction or cumulatively over the crisis – than BHCs with lower repurchases before the crisis. The next section of the paper describes the data and empirical specification that will be used to test these two hypotheses.

3. Dividend and Repurchase Data

The data used in the estimation come primarily from the Federal Reserve Y-9C regulatory reports filed by BHCs with assets greater than $500 million. The Y-9C reports contain quarterly balance sheet and income statement information, as well as information about the composition of the BHC's loan and securities portfolios, non-performing loans, and equity and regulatory capital. The advantage of using regulatory report data is that the information is collected consistently for all BHCs on a quarterly basis over a relatively long historical period.

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cutting dividends and using the retained cash to fund these new investments. Guntay et al. (2015) develop a model in which banks balance considerations of signaling, risk-shifting and free cash flow in determining their dividend payment behavior.

The Y-9C reports contain information about dividends and repurchases made by BHCs each quarter. While the reports collect dividends declared on common stock as a distinct line item, common stock repurchases are not reported directly and must be inferred from other information contained in the reports. In particular, repurchases are calculated as the sum of two Y-9C variables: purchases of treasury stock and the net of common stock retirements minus conversions, if positive (that is, if retirements exceed conversions).[8] The resulting repurchases variable is not a precise measure of common stock repurchases for several reasons. First, the Y-9C treasury stock purchases variable includes repurchases of both common and preferred stock, which could lead to over-statement of common stock repurchases. Offsetting this is that the stock retirement variable is net of conversions, meaning that retirements will be understated by the amount of any conversions taking place in the same quarter. The net retirement/conversions variable also contains several elements not directly related to share repurchases (such as tax benefits associated with the exercise of stock options). It is difficult to determine with certainty whether the net impact of these factors creates a significant or systematic bias in the measure of share repurchases. That said, BHC repurchases measured in this way match closely repurchases data reported on COMPUSTAT by these firms, both in the aggregate and for individual institutions, suggesting that that Y-9C measure is not systematically biased.[9]

Aside from determining the amount of repurchases made by each BHC, the key calculation is to determine when a BHC has reduced its dividends. We use regulatory report data for this purpose since it is available on a consistent basis for all large U.S. BHCs. As noted above, the Y-9C reports contain a line item for the dollar amount of cash dividends declared on common stock during the calendar quarter covered by the report, as well as for the number of common shares outstanding at the end of the quarter. We use this information to calculate two measures: dividends-per-share and dividends as a share of total assets. A BHC is classified as having reduced its dividend if there is a significant quarter-over-quarter decline in these variables, where significance is measured relative to the typical quarterly variation in these variables in the period before the financial crisis (when dividend reductions were very

[8] Treasury stock is stock that has been issued by a firm but is not outstanding with public. It can be stock that has never been publicly held (that is, it has been issued but always retained by the firm) or it can be stock that has been repurchased by the firm after having been publicly held. Retirement of stock is when shares of stock are extinguished by the firm (they are no longer considered issued shares). The Y-9C reports contain a specific line item for treasury stock purchases, which includes purchases of both common and preferred stock. That variable only includes repurchased shares that are retained in treasury stock. Any common shares that are repurchased and then retired (and any other common shares retired) are reported net of new common shares created via conversions from other equity or debt instruments, from the exercise of stock options, and from employee compensation.

[9] The results in this paper do not change meaningfully if COMPUSTAT repurchases are substituted for the Y-9C measure of repurchases in the estimations.

rare).[10] This screen is intended to ensure that declines in the ratios reflect true dividend decreases and not random variation in the measures. The results were checked against public dividend announcements for the BHCs and adjusted in a limited number of cases where those announcements suggested that dividends had not in fact been reduced.

The empirical work that follows focuses on two dividend reduction events: the first time a BHC reduced its dividend during the financial crisis years of 2007 to 2009 and the point at which the BHC eliminated its dividend, which for purposes of this analysis, is defined as the first quarter in which the BHC reduced its dividend to zero or a penny.[11] We focus on these two events because they represent distinct points in the evolution of dividend payments during the financial crisis. The first time a BHC reduced its dividend is an important initial signal to the market and to its counterparties that profits are likely to be lower over the long run and that the BHC is attempting to retain capital within the firm. The point at which BHCs eliminated their dividends altogether is also a significant event, since it is the end-point of the dividend reduction process and also the point at which capitalization of the BHC could no longer be bolstered by reducing distributions. In fact, many BHCs reduced dividends several times during the financial crisis years. Of the sample BHCs that reduced dividends, 60% reduced them more than once between 2007 and 2009 and 16% reduced them three or more times.

The estimation sample consists of top-tier U.S.-owned BHCs with assets exceeding $5 billion as of the beginning of 2005 and that file regulatory reports at least until the first quarter of 2007, the start of the crisis period. There are 84 such BHCs. The sample is limited to these large BHCs to generate a sample with common stock publicly traded on a major exchange, as a rough control over differences in the extent to which the BHCs are subject to external monitoring and in the liquidity of their common stock. Since the estimation is focused on the timing of dividend reductions, BHCs that pay annual or semi-annual dividends are dropped from the sample, as are a small number of special purpose BHCs. As illustrated in Table 1, nearly all (73 of 78) of the remaining BHCs paid dividends at some point during the pre-crisis period (2005 to 2006). A high but smaller share (65 of 78) made repurchases during this period. About 80% of the BHCs (63 of 78) made both dividend payments and repurchases.

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[10]Specifically, a BHC is classified as having reduced its dividend if dividends per share and dividends as a share of assets decline by more than an amount approximately equal to the 5th percentile lower tail of changes in these variables during 2003 to 2006. The results were also adjusted to account for instances in which a BHC appears to have declared two dividends in a single quarter, followed or preceded by a quarter in which no dividends were reported and for cases in which dividend rise sharply in a single quarter and then return to their previous level the following quarter, perhaps due a special dividend. Such cases are not treated as dividend reductions in the data.

[11] Dividends were deemed to have been reduced to zero or a penny in the first quarter in which if dividends-per-share were less than or equal to $0.011. The cut-off was set slightly higher than a penny to account for variability in the measure of dividends-per-share.

Because the analysis focuses on dividend reductions, the final estimation sample is limited to BHCs that paid dividends during the pre-crisis period. Of these, some stopped filing regulatory reports before they reduced or eliminated dividends, most often because they were acquired by other BHCs. These BHCs were also dropped from the sample[12], resulting in a final estimation sample of 66 BHCs. As illustrated in Table 2, three-quarters of these BHCs cut dividends during the financial crisis years of 2007 to 2009. The larger BHCs in the sample were more likely to reduce dividends than the smaller ones. All but two of the larger BHCs (those with assets exceeding $25 billion) reduced dividends at some point during the financial crisis, as compared to just under two-thirds of the smaller BHCs in the sample. Larger BHCs were also more likely to eliminate dividends, as illustrated on the right side of the table. Just under half of the BHCs eventually reduced their dividends to zero or a penny, with a higher share (54% versus 40%) of the largest BHCs reducing dividends to this amount.

Figure 4 illustrates the timing of initial dividend reductions and eliminations by the sample BHCs between 2007 and 2009. Consistent with the results in Figure 1, which shows the dollar amount of dividends paid, there were few dividend reductions until mid-2008 and many BHCs in the sample did not reduce their dividends for the first time until the first half of 2009. Most BHCs that eliminated their dividends did so during 2009, though a third of those BHCs that would eventually eliminate their dividends had done so by the end of 2008.

Table 3 provides a preliminary examination of the relationship between repurchases and dividend reductions during the financial crisis. The table divides the sample of BHCs into "high repurchase" and "low repurchase" sub-samples, based on the whether the BHC's cumulative repurchases before the financial crisis (in 2005 and 2006) scaled by assets are below or above the median value for the 66 BHCs in the sample. The table shows the percentage of low-repurchase and high-repurchase BHCs that cut or eliminated dividends at some point during the financial crisis. For the sample as a whole (the top panel of the table), pre-crisis repurchase activity has no relationship to the probability that a BHC reduces dividends during the financial crisis: about three-quarters of both low-repurchase and high-repurchase BHCs cut dividends. When the sample is separated by asset size (the middle and bottom panels of the table), however, a different picture emerges. Among smaller BHCs, higher pre-crisis repurchases are associated with a lower probability of reducing dividends, with 53% of high-repurchase smaller BHCs reducing dividends, compared to 68% of low-repurchase smaller BHCs.

[12] The results are substantially similar if these BHCs are retained in the estimation sample and treated as censored subjects. Note that BHCs that cut dividends and later stop filing regulatory reports are retained in the main estimation sample. Most BHCs that became stressed and were acquired by other BHCs during the financial crisis cut dividends before being acquired, so the sample should not suffer from significant survivorship bias.

Among the larger BHCs, the opposite relationship seems to hold, though since all but two of these BHCs cut their dividends during the crisis, the difference is difficult to interpret.

The right side of the table shows the relationship between pre-crisis repurchases and reductions in dividends to zero or a penny. The extent of pre-crisis repurchases seems to be associated with whether a BHC eventually eliminated its dividend. BHCs that were more active repurchasers prior to the financial crisis were less likely to reduce dividends to zero or penny, with 33% of high-repurchase BHCs eliminating dividends as compared to 58% of low-repurchase BHCs. Similar to general dividend reductions, there are differences in this relationship by BHC asset size. Among smaller BHCs, high pre-crisis repurchases are associated with a lower probability of eliminating dividends, while among larger institutions, there is no strong relationship between pre-crisis repurchases and dividend elimination during the financial crisis. As noted, the larger BHCs in the sample were more likely to eliminate dividends than the smaller BHCs.

4. Empirical Specification and Estimation Results

The Timing of Dividend Reductions

The information in Table 3 is consistent with the idea that the ability to reduce repurchases served as a buffer against the need for BHCs to reduce or eliminate dividends during the financial crisis, at least for the smaller institutions in the sample. This section presents results that explore these relationships in a more rigorous way. These results are based on estimation of a Cox proportional hazard model:

$$h_i(t) = h_0(t) * \exp(\beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki}),$$

where $h_0(t)$ is the baseline hazard for period t, $h_i(t)$ is the period t hazard for BHC i, and Xβ is a vector of BHC-specific variables (x_i) and associated coefficients (β). In the Cox model, the BHC-specific variables shift the BHC-specific hazard up or down proportionately to the baseline hazard and the regression coefficients (the βs) show the estimated impact of each variable on the amount and direction of this shift. A positive coefficient β indicates that a higher value of the variable increases the BHC-specific hazard. As noted above, the two hazard events examined in the analysis are the first time a BHC reduced its dividend during 2007 to 2009 and the point at which the BHC eliminated its dividend during this period.

The variables in the model specification include a series of control variables suggested by previous research as factors that affect corporate dividend payout policies (Abreu and Gulamhussen 2013, Hull 2013, Kanas 2013, Onali 2014, Srivastav et al. 2014). These factors include firm size (log of total assets) and profitability (return on assets, calculated as after tax net income divided by total

assets). The specification also includes the ratio of non-performing loans to total loans, as a forward-looking variable intended to capture likely future reductions in profitability.[13] These variables are from the Federal Reserve Y-9C reports. All control variables are lagged one quarter to control for potential endogeneity. Table 4 contains basic statistics for the control variables used in the analysis, for the sample as a whole and for the larger and smaller BHC sub-samples.

The specification also includes controls for the current capitalization of the BHC, a factor that has been found to be significant in previous studies focusing on non-financial firms, and one that is particular important in the banking industry, since bank capital is a key focus of regulation and supervisory oversight. Given the importance of capital in banking, several alternative capital ratios are considered, including the ratio of Tier 1 capital to risk-weighted assets (RWA), the ratio of common equity to RWA, the ratio of Tier 1 capital to average assets, and the ratio common equity to total assets. These four ratios are based on book values of capital, as reported on the Y-9C regulatory reports. Two additional specifications include ratios based on the market value of common equity, one relative to RWA and one relative to (the book value of) total assets, where the market value of common equity is derived from information from the Center for Research in Securities Prices (CRSP). The full set of capital ratios thus includes official regulatory capital ratios (Tier 1 capital to RWA and Tier 1 capital to average assets), capital ratios based on book and market values, and both risk-weighted and simple leverage ratios. As with the other control variables, the capital ratios are lagged one quarter.

The repurchases variable used in the estimation is the sum of repurchases in the two-year period before the financial crisis, scaled by total BHC assets.[14] This variable is intended to capture the potential for a BHC to reduce its overall capital distributions without reducing dividends. The variable is measured cumulatively over the pre-crisis period since repurchases can be quite variable from quarter-to-quarter (see Figure 3) and thus cumulative repurchases provide a better measure of typical BHC repurchase activity than simply relying on the quarter immediately prior to the onset of the crisis. A potential alternative way of capturing the amount of buffer provided by repurchases would be to measure the amount by which repurchases actually declined during the crisis relative to the pre-crisis period. However, actual repurchase reductions could be driven by BHC-specific unobservable factors that also drive dividend reductions (e.g., management judgment, supervisory pressure, private information about future profitability), making this variable endogenous with the timing and amount of dividend reductions. For that reason, the specification includes historical repurchase activity to measure the *potential* for repurchases to affect dividend policy during the crisis.

[13] Non-performing loans are defined as loans that are 90 or more days past due plus non-accrual loans.
[14] The results are qualitatively similar if pre-crisis repurchases are scaled by the book value of common equity or the market value of common equity instead of by total assets.

Tables 5 and 6 contain the basic results of hazard model estimation, where the events reflected in the hazard are the first time a BHC reduced its dividends during the financial crisis (Table 5) and the point at which BHCs eliminated their dividends (Table 6). Each column of the tables reports results of the model using one of the six alternative capital ratios described in the previous section. The simple bivariate results relating pre-crisis repurchase behavior to the probability of dividend reductions (Table 3) suggested meaningful differences between the larger and smaller BHCs in the sample. To capture these differences, the coefficient on the pre-crisis repurchases variable is allowed to differ between the larger and smaller BHCs.

The results for the control variables (lower panel of the tables) are consistent with prior work on the factors driving corporate dividend policy (Abreu and Gulamhussen 2013, Hull 2013, Kanas 2013, Onali 2014, Srivastav et al. 2013), as well as with expectations for the impact of the factors on the timing of dividend reductions by banking companies. In particular, higher profitability (net income/assets) and lower levels of non-performing loans tend to reduce the probability that a BHC cut or eliminated its dividend in a given quarter of the financial crisis period. Larger BHCs were somewhat less likely to reduce or eliminate their dividends earlier in the financial crisis than smaller BHCs (the coefficient on the log of asset size is negative, though not always statistically different from zero in the dividend reduction results). Finally, the coefficients for all six alternate capital ratios are negative in both sets of results, indicating that higher capital ratios are associated with later dividend reductions and dividend eliminations. In the dividend reduction results (Table 5), risk-weighted book value capital ratios seem to have a more significant impact than the simple leverage ratios, suggesting that risk-weighted ratios may have been more binding for the dividend reduction decision than leverage-type ratios during this period. Overall, however, capital ratios based on the market value of common equity appear to have the strongest impact on the timing of dividend reductions and dividend eliminations. In fact, in specifications including market value capital ratios, the size and statistical significant of the coefficients on the other control variables are reduced.

The top panels of Tables 5 and 6 report the coefficients on the repurchases variable. Consistent with the bivariate results in Table 3, there appear to be important differences between smaller and larger BHCs in the impact of pre-crisis repurchases on the timing of dividend reductions and dividend eliminations. For smaller BHCs, higher pre-crisis repurchases are associated with cutting and eliminating dividends later in the financial crisis – the coefficients on the repurchases variable are negative and statistically significant in most specifications. In contrast, for larger BHCs, the coefficient is positive and statistically significant in the dividend reduction equations (Table 5) and positive but not statistically significant in the dividend elimination equations (Table 6). These findings suggest that larger BHCs with higher pre-crisis repurchases tended to reduce dividends more quickly during the financial crisis, all else

equal. In general, the hypothesis that the repurchases coefficients for larger and smaller BHCs are the same can be rejected at high confidence levels (see the last row of the panel).

The Impact of Total Payout Rates

These results suggest that the ability to reduce repurchases may have served as a cushion against the need to reduce or eliminate dividends during the financial crisis, though only for the smaller BHCs in the sample. It is not immediately clear why the results differ by asset size or why larger BHCs with higher pre-crisis repurchases would be quicker to reduce or eliminate dividends. One potential explanation is that the larger and smaller BHCs differed in the overall rate of shareholder payouts before the crisis and that the results for repurchases are proxying for this broader payout behavior. Specifically, larger BHCs with higher pre-crisis repurchases might also have had higher overall payouts – dividends plus repurchases – which led them to reduce their overall payouts more quickly during the crisis.

The results in Tables 7 and 8 explore this idea. These tables augment the specifications in Tables 5 and 6 by including a variable measuring pre-crisis total payout rates: the average ratio of dividends plus repurchases to net income in 2005 and 2006. The coefficients on this variable are consistent with the story above, in that the higher levels of pre-crisis total payouts are associated with more rapid initial dividend cuts (Table 7).[15] The results for dividend eliminations (Table 8) are similar, though the coefficients are not statistically significant in most specifications. As illustrated in the top panels of the tables, the results for pre-crisis repurchases for the smaller BHCs continue to hold after including the total payout variable; higher levels of pre-crisis repurchases for these BHCs continue to be significantly associated with slower initial dividend reductions and dividend eliminations. In anything, the results are stronger, with larger and more precisely estimated coefficients in these specifications.

The results for the larger BHCs are impacted, however. After including the total payouts variable, the coefficients on pre-crisis repurchases are no longer positive and statistically significant. In fact, in the dividend elimination equation (Table 8), the coefficients are consistently negative – suggesting that higher pre-crisis repurchases could be associated with delayed dividend eliminations – though the results are not statistically significant. Thus, the results suggest that the overall rate of pre-crisis payouts had an important association with the timing of initial dividend reductions for larger BHCs and there is weak evidence that pre-crisis repurchases served as a buffer against dividend eliminations for these firms.

[15] In the results reports in Tables 7 and 8, the pre-crisis total payout rate variable is not interacted with BHC asset size. In specifications where the coefficient was allowed to vary between the larger and smaller BHCs, the difference was never statistically significant.

Robustness: Expectations of Crisis Performance and Market Discipline

An important assumption underlying the analysis thus far is that the size of pre-crisis repurchases is not endogenously related to the performance of these BHCs during the crisis. This need be the case. For instance, it could be that higher pre-crisis repurchases were driven by higher income volatility, this higher volatility in turn resulted in those BHCs experiencing sharper declines in profits and capital during the financial crisis, and that these declines simply overwhelmed any cushioning effect of the higher repurchases. While the estimates control for BHC performance during the crisis by including return on assets and the non-performing loan rate in the specification, these variables capture performance to date rather than expectations of all-in performance during the crisis (although the non-performing loan rate has a forward-looking aspect). To the extent that BHC management anticipated large losses in future quarters of the crisis, this could have led to earlier dividend reductions given performance to date.

The results in Tables 9 and 10 explore this possibility. The tables present extensions of the hazard model specification including variables that capture expectations of future performance by the BHCs during the financial crisis. The tables show the results of including three different measures of expected BHC performance during the crisis: average realized ROA during the crisis (a perfect-foresight expectations measure), the ratio to market to book value of common stock (a market-based measure), and the median one-quarter-ahead analysts' forecast of earnings-per-share (EPS).[16] Table 9 reports results for initial dividend reductions, while Table 10 reports results for dividend eliminations. For conciseness, both tables just report coefficient estimates on the repurchases variable, the pre-crisis total payout rate, and the three different expectations variables, though the equations contain the full set of variables reported in Tables 7 and 8.

Overall, the findings do not change substantively when these crisis performance expectations measures are included in the specifications. The coefficients on each of the three crisis expectations measures enter the equations with the expected sign for both larger and smaller BHCs (indicating that expectations of better crisis performance were associated with later dividend cuts and dividend eliminations), and are statistically significant in most specifications.[17] In general, the results continue to suggest that higher pre-crisis repurchases are associated with later dividend cuts and eliminations for the smaller BHCs; the coefficients on pre-crisis repurchases continue to be negative and statistically

[16] The median EPS forecast is scaled by the average one-quarter-ahead EPS forecast during 2005 and 2006 so that the measure is comparable across BHCs.

[17] The coefficients are least precisely estimated in the equations involving the market value capital ratios. In addition, the coefficient on the crisis ROA variable for smaller BHCs is not statistically significant in most of the specifications of the dividend elimination equation, though it generally has the expected sign.

significant. For the larger BHCs, the coefficients on pre-crisis repurchases are again not statistically significant, though they are consistently negative in the dividend elimination equations (Table 10). Thus, the results for the larger BHCs do not appear to be driven by expectations of larger losses during the crisis over-whelming any cushion provided by the ability to reduce repurchases.

An alternative explanation for the larger BHC result is that, among the larger BHCs, those with higher repurchases prior to the financial crisis received greater market scrutiny and were thus subject to more intensive market discipline, which caused BHC management to reduce dividends more quickly as financial market conditions deteriorated.

Table 11 reports results of the hazard models including a variable proxying for differences in market scrutiny across BHCs: the number of analysts reporting EPS projections for the BHC in each quarter. The results suggest that BHCs covered by more analysts reduced dividends more quickly during the financial crisis, and that the impact of additional analyst coverage was greatest for the smaller BHCs in the sample. The results suggest a significant relationship between analyst coverage and the timing of dividend eliminations only for smaller BHCs (bottom panel of Table 11). In no case, however, does including the analyst coverage variables alter the results relating pre-crisis repurchases and the timing of dividend reductions and eliminations.

The Size of Dividend Reductions

The results thus far have focused on the timing of dividend reductions and eliminations during the financial crisis. A related question is whether pre-crisis repurchases affected not just the timing, but also the size, of dividend reductions. Were BHCs with higher repurchases during the financial crisis able to reduce their dividends by smaller amounts, once those reductions occurred?

As a first step in addressing this question, Table 12 presents some basic information on the size of dividend reductions. The top panel of the table shows the percent change in dividends-per-share the first time a BHC reduced its dividends between Q1 2007 and Q4 2009, while the bottom panel shows the size of the total dividend-per-share reduction over this period. Each panel splits the sample into "low repurchase" and "high repurchase" BHCs, where, as before, low and high repurchase BHCs are defined by whether cumulative pre-crisis repurchases scaled by assets are below or above the median value for the 66 BHCs in the sample.

The average initial reduction in dividends-per-share was just under 65% for all BHCs, while the average total reduction over the crisis period was more than 90%.[18] As the first column of the table shows, there is no significant difference in the size of the initial dividend reduction between low repurchase and high repurchase BHCs for the sample as a whole, though high repurchase BHCs appear

[18] The numbers in Table 12 are for the 48 BHCs that reduced dividends. The results presented in Table 13 take account of potential biases from the selection process between BHCs that did and did not reduce dividends.

to have experienced smaller total dividend reductions (bottom panel). The remaining columns of the table show the difference in initial and total dividend reductions by BHC asset size. While there is no meaningful difference in the size of the initial dividend reduction between high repurchase and low repurchase BHCs for either asset size category, total dividend reductions by low repurchase smaller BHCs were significantly larger than for high repurchase smaller BHCs. Total dividend reductions were also larger for low repurchase larger BHCs, but the difference is significant only at the 16% level.

To explore these findings further, Table 13 presents results of multivariate analysis of the size of BHCs' initial and total dividend reductions. Since not all BHCs reduced dividends during the crisis, the analysis is based on a two-step Heckman selection model to take account of potential selection bias. The first step assesses the probability that a BHC reduced dividends, using the control variables from the hazard model analysis of the timing of dividend reductions (log of total assets, net income scaled by assets, the non-performing loan share, and either the ratio of the market value or book value of common equity to risk-weighted assets). As illustrated in columns labeled "selection equation," these variables enter with the expected signs and with coefficients that are statistically significant, except for net income.

The bottom panel of the tables show the results explaining the size of the initial and total dividend reductions, after controlling for the selection correction term. Drawing on the hazard rate results discussed above, these second-stage equations contain the pre-crisis total payout rate and pre-crisis repurchases interacted with BHC size group. The results of the multivariate analysis mirror those for the bivariate results presented in Table 12. There is no statistically significant relationship between the extent of repurchases before the financial crisis and the size of the initial dividend reduction, for either larger or smaller BHCs (left-hand side of Table 13). The coefficients on the repurchase variables are never statistically significant. In contrast, the results for total dividend reductions (right-hand side of the table) suggest that higher levels of pre-crisis repurchases are associated with lower total dividend reductions over the crisis period for smaller BHCs (the positive impact of higher repurchases offsetting the negatively-valued reductions). The coefficients on pre-crisis repurchases are also positive for the larger BHCs, but they are not statistically significant.

Overall, the results suggest that repurchase behavior prior to the financial crisis had an impact on the overall size of dividend reductions during the financial crisis, especially for the smaller BHCs in the sample. There is no evidence that pre-crisis repurchase behavior had an impact on the size of initial dividend reductions, even though it appears to be associated with differences in the timing of those reductions for the smaller BHCs.

5. Summary and Conclusions

This paper has examined the relationship between repurchases and dividends by large BHCs during the financial crisis. The motivation for examining this relationship is the observation that while BHCs continued to pay dividends at pre-crisis levels well after the onset of the financial crisis, they reduced share repurchases relatively quickly. Documenting this divergent behavior is an important contribution of this paper, as previous commentary and analysis has tended to focus on dividend payments alone. Much of that analysis has focused on the drain of capital from the banking system during a time a severe stress, including theoretical work suggesting that BHCs' continued dividend payments may have been motivated by a desire to shift value from creditors to shareholders.

The findings in this paper suggest a somewhat different interpretation, however. Among the BHCs in the sample, smaller institutions with higher levels of repurchases before the financial crisis were slower to reduce and eliminate dividends during the financial crisis than similar BHCs with lower pre-crisis repurchases. These BHCs not only reduced their dividends later in the crisis than similar BHCs with lower pre-crisis repurchases, but also reduced their dividends by smaller amounts. For these BHCs, the ability to reduce repurchases may have served as a kind of buffer, allowing them to reduce shareholder payouts and retain capital within the firm without undergoing the immediate negative public signal associated with a dividend reduction. This behavior is more consistent with a precautionary view of bank capital, in which these BHCs were attempting to manage their capital resources to ensure the continued viability of the firm. In considering the significance of these findings, it is important to remember that all the BHCs are in the sample are relatively large financial institutions, so the behavior of even the smaller ones is meaningful for the stability and performance of the overall U.S. banking system.

The results suggest that the impact of repurchases at the larger BHCs in the sample differed significantly from the impact at the smaller BHCs. There is limited evidence that larger BHCs with higher pre-crisis repurchases were slower to reduce to dividends earlier in the crisis, once pre-crisis total payout behavior is accounted for. One possible explanation is that the larger BHCs were subject to more intensive market discipline, which drove their payout behavior, and thus their dividend reductions were not as affected by any buffering impact of repurchases. In fact, nearly all of largest BHCs (more than 90%) reduced their dividends during the financial crisis, as compared to less than two-thirds of the smaller BHCs. The largest BHCs were also somewhat more likely to eliminate their dividends than the smaller BHCs. However, including variables designed to capture potential differences in the extent of market scrutiny across larger BHCs does not alter the finding that larger BHCs with higher repurchases before the crisis did not tend to reduce dividends more slowly during the financial crisis.

Overall, the findings suggest a complex, dynamic relationship between overall payout rates and the split of those payouts between dividends and repurchases. Understanding this relationship is

particularly critical in the banking industry, given the important role of bank capital in financial stability and the primacy of capital regulation in the oversight of these institutions. On the one hand, supervisory measures encouraging BHCs to rely more on repurchases could enhance the stability of individual BHCs and of the banking system if these distributions can be reduced without sending potentially destabilizing signals to market participants. On the other hand, increased emphasis on repurchases could foster increased scrutiny and market monitoring of these transactions, reducing BHCs' flexibility to change these actions over time. Additional research on the determinants of shareholder payouts in the banking industry could help shed light on which of these forces is more likely to prevail and, thus, whether policymakers should emphasize repurchases as the preferred means for BHCs to return capital to shareholders.

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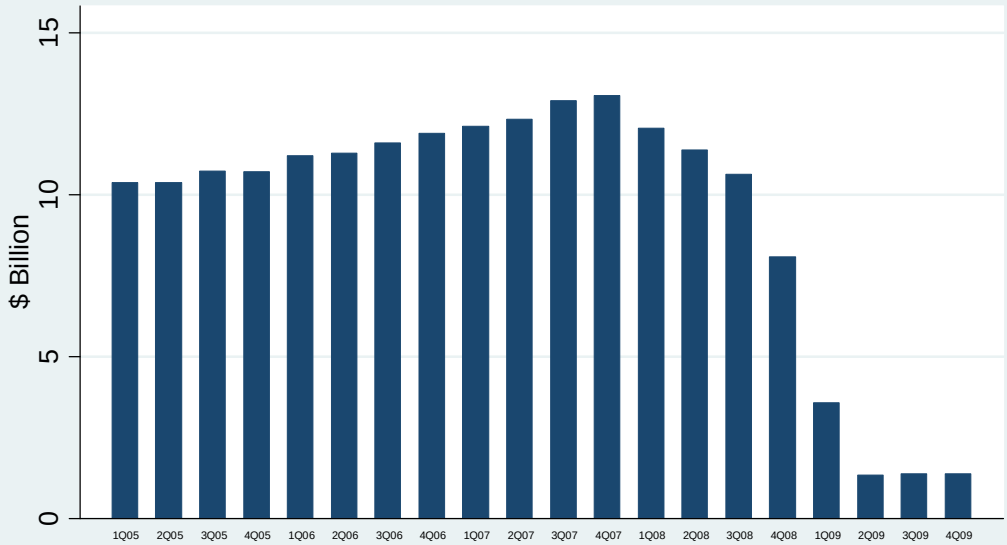
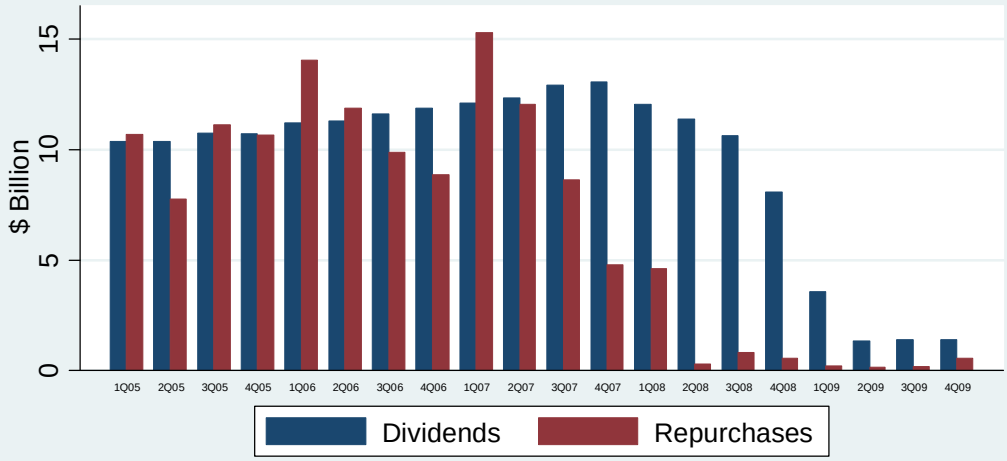
Figure 1
Dividends Paid by Large Bank Holding Companies
2005 to 2009



All top-tier domestic bank holding companies with assets over $5 billion as of Q1 2005.
Source: Federal Reserve Y-9C Reports

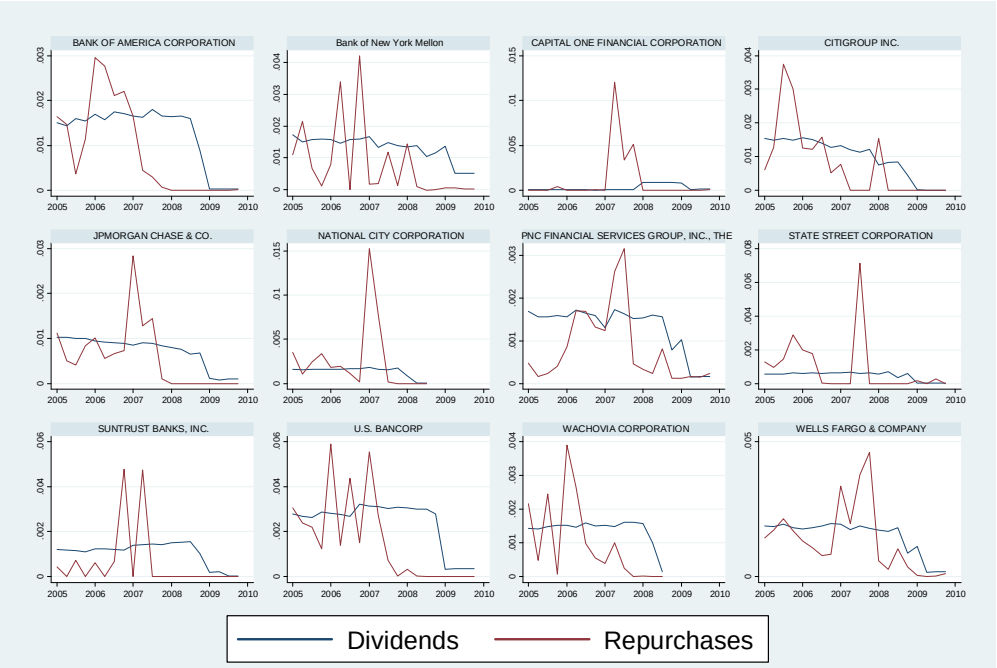
Figure 2
Dividends and Repurchases by Large Bank Holding Companies
2005 to 2009



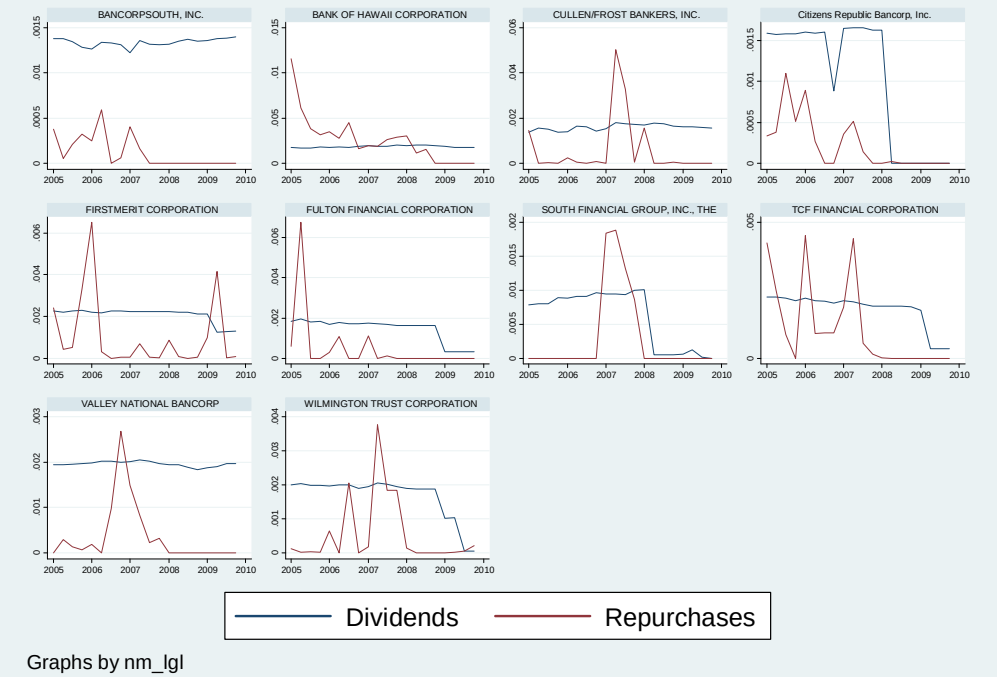
All top-tier domestic bank holding companies with assets over $5 billion as of Q1 2005.
Repurchases are defined as treasury stock purchases plus net retirement/conversion of common stock, when positive.
Source: Federal Reserve Y-9C Reports

Figure 3
Dividends and Repurchases by Large Bank Holding Companies
2005 to 2009

A: BHCs with Assets Greater than $120 Billion

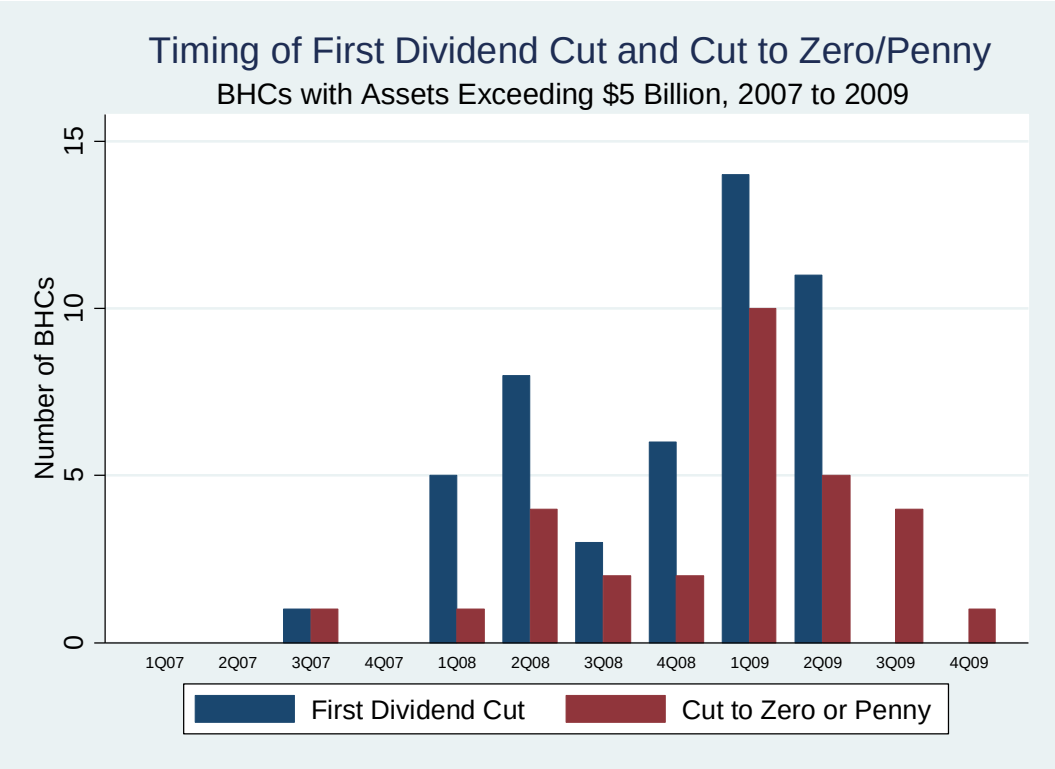


B: BHCs with Assets between $10 and $15 Billion



Source: Federal Reserve Y-9C Reports and author's calculations.

Figure 4



Source: Federal Reserve Y-9C Reports and author's calculations.

Table 1
Dividend and Repurchase Behavior
By Large Bank Holding Companies before the Financial Crisis
2005 to 2006

	Made Repurchases	Did Not Make Repurchases	Total
Paid Dividends	63	10	73
Did Not Pay Dividends	2	3	5
Total	65	13	78

Note: The sample includes BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that survived at least until Q1 2007. Three special purpose BHCs are dropped from the sample, as are three BHCs that pay dividends irregularly. Source: Federal Reserve Y-9C Reports.

Table 2
BHC Dividend Behavior during the Financial Crisis
2007 to 2009

	Sample BHCs	Cut Dividends in 2007 - 2009		Eliminated Dividend		
	Number	Number	% of Total	Number	% of Total	% of BHC Cutting Dividends
All BHCs	66	48	73%	30	45%	63%
Smaller BHCs	42	26	62%	17	40%	65%
Larger BHCs	24	22	92%	13	54%	59%

Note: The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006. BHCs that stopped filing regulatory reports before cutting dividends are dropped from the sample. Smaller/Larger BHCs are those with assets less than/greater than $25 billion. A dividend cut is defined as a reduction in the ratio of dividends-to-assets and dividends-per-share greater than the 5th percentile decline in these ratios during 2003 to 2006. A dividend elimination is defined as dividends-per-share falling below $0.011. Source: Federal Reserve Y-9C Reports.

Table 3
Incidence and Extent of Dividend Cuts and Pre-crisis Repurchases
2007 to 2009

		Cut Dividends		Eliminated Dividends	
	Sample BHCs	Number	% of Total	Number	% of Total
		All BHCs			
Low Repurchases	33	23	70%	19	58%
High Repurchases	33	25	76%	11	33%
All	66	48	73%	30	45%
		Smaller BHCs			
Low Repurchases	25	17	68%	15	60%
High Repurchases	17	9	53%	2	12%
All	42	26	62%	17	40%
		Larger BHCs			
Low Repurchases	8	6	75%	4	50%
High Repurchases	16	16	100%	9	56%
All	24	22	92%	13	54%

Note: The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006. BHCs that stop filing regulatory reports before cutting dividends are dropped from the sample. Smaller/Larger BHCs are those with assets less than/greater than $25 billion. A dividend cut is defined as a reduction in the ratio of dividends-to-assets and dividends-per-share greater than the 5th percentile decline in these ratios during 2003 to 2006. "Eliminated Dividends" is the number of BHCs who reduced their dividends-per-share below $0.011 by Q4 2009. Low/High repurchases are defined as BHCs with 2005 – 2006 repurchases relative to assets below/above the median for the sample BHCs. Source: Federal Reserve Y-9C Reports.

Table 4
Basic Statistics of the Regression Sample

	Mean	Median	Standard Deviation	Minimum	Maximum	Number of Observations
All BHCs						
Assets ($ Billion)	126.5	13.8	366.0	4.0	2358.3	597
Net Income/Assets (%)	0.70	1.18	1.22	-12.02	3.92	597
Non-performing Loans/Loans	0.014	0.007	0.013	0.000	0.179	597
Tier 1 Capital/RWA (%)	10.52	10.23	2.38	6.53	20.25	597
Common Equity/RWA (%)	13.14	11.83	4.40	6.15	32.53	597
Market Value of Common/RWA (%)	19.51	23.20	9.69	1.66	59.56	573
Tier 1 Capital/Assets (%)	8.25	8.07	1.37	4.03	17.51	597
Common Equity/Assets (%)	9.69	8.97	2.35	4.56	17.92	597
Market Value of Common/Assets (%)	14.40	17.26	6.20	1.30	40.64	573
Pre-crisis Repurchases/Assets	0.0087	0.0060	0.0087	0.0000	0.0368	66
Smaller BHCs						
Assets ($ Billion)	11.5	9.0	4.7	4.0	27.4	403
Net Income/Assets (%)	0.73	1.17	1.13	-8.81	3.92	403
Non-performing Loans/Loans	0.013	0.007	0.014	0.001	0.179	403
Tier 1 Capital/RWA (%)	11.10	10.64	2.25	6.74	20.02	403
Common Equity/RWA (%)	13.40	12.16	4.26	7.05	32.53	403
Market Value of Common/RWA (%)	19.98	24.09	9.46	1.66	59.56	379
Tier 1 Capital/Assets (%)	8.48	8.29	1.16	5.97	12.35	403
Common Equity/Assets (%)	9.75	9.08	2.13	6.35	17.92	403
Market Value of Common/Assets (%)	14.66	18.00	6.06	1.30	40.64	379
Pre-crisis Repurchases/Assets	0.0084	0.0052	0.0098	0.0000	0.0368	42
Larger BHCs						
Assets ($ Billion)	365.3	97.5	573.3	28.0	2358.3	194
Net Income/Assets (%)	0.65	1.24	1.39	-12.02	3.30	194
Non-performing Loans/Loans	0.015	0.009	0.011	0.000	0.054	194
Tier 1 Capital/RWA (%)	9.33	8.93	2.19	6.53	20.25	194
Common Equity/RWA (%)	12.59	11.19	4.65	6.15	24.33	194
Market Value of Common/RWA (%)	18.61	21.05	10.10	2.68	49.36	194
Tier 1 Capital/Assets (%)	7.75	7.55	1.63	4.03	17.51	194
Common Equity/Assets (%)	9.56	8.81	2.75	4.56	17.50	194
Market Value of Common/Assets (%)	13.89	16.03	6.45	2.41	32.24	194
Pre-crisis Repurchases/Assets	0.0093	0.0105	0.0065	0.0000	0.0221	24

The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006. BHCs that stop filing regulatory reports before cutting dividends are dropped from the sample. Smaller/larger BHCs are those with assets less than/greater than $25 billion. The estimation sample includes quarterly observations for each BHC from Q1 2007 until the quarter in which the BHC first reduces dividends or until Q4 2009 if the BHC does not reduce dividends. Pre-crisis repurchases are defined as the sum of treasury stock purchases plus net common stock retirements (retirements minus conversions, if positive) from Q1 2005 to Q4 2006; there is one observation of this variable for each BHC in the estimation sample. BHC data are from the Federal Reserve Y-9C regulatory reports for bank holding companies; the market value of common equity is from CRSP.

Table 5
Impact of Pre-Crisis Repurchases on The Timing of First Dividend Cut

2007 to 2009

	(1)	(2)	(3)	(4)	(5)	(6)
			Pre-Crisis Repurchases/Assets			
Smaller BHCs	-46.233**	-43.126*	-9.701	-46.944**	-46.389**	-12.298
	(22.668)	(23.043)	(20.960)	(22.218)	(23.185)	(21.618)
Larger BHCs	44.135**	44.454**	70.820***	49.685**	48.591**	86.571***
	(20.152)	(20.895)	(21.534)	(20.908)	(20.642)	(24.589)
P-Value: Smaller = Larger	0.000	0.001	0.001	0.000	0.000	0.000
			Control Variables			
Log of Assets	-0.103	-0.059	-0.091	-0.063	-0.071	-0.153*
	(0.112)	(0.107)	(0.092)	(0.103)	(0.103)	(0.084)
Net Income/Assets	-0.339***	-0.364***	-0.200**	-0.352***	-0.362***	-0.175**
	(0.093)	(0.096)	(0.081)	(0.093)	(0.100)	(0.083)
Non-performing Loans/Loans	42.526***	35.505***	19.811*	42.801***	38.776***	20.811**
	(10.274)	(10.113)	(10.579)	(11.235)	(10.054)	(10.195)
			Capital Ratio			
	Tier 1/RWA	Common/ RWA	Market Value of Common/RWA	Tier 1/Assets	Common/Assets	Market Value of Common/Assets
Capital Ratio	-0.103	-0.054**	-0.101***	-0.026	-0.047	-0.161***
	(0.075)	(0.027)	(0.026)	(0.066)	(0.057)	(0.046)
Number of BHCs	66	66	64	66	66	64
Observations	597	597	573	597	597	573

Note: The table reports coefficients from the estimation of a Cox proportional hazards model, where the hazard is defined as the first time a BHC cuts its dividend between Q1 2007 and Q4 2009 (the "financial crisis period"). A dividend cut is defined as a reduction in the ratio of dividends-to-assets and in dividends-per-share greater than the 5th percentile decline in these ratios during 2003 to 2006; 48 of the 66 BHCs in the sample cut dividends during the financial crisis period. The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006. BHCs that stop filing regulatory reports before cutting dividends are dropped from the sample. Pre-crisis repurchases are defined as the sum of treasury stock purchases plus net common stock retirements (retirements minus conversions, if positive) from Q1 2005 to Q4 2006. All other control variables are one-quarter lagged values. Smaller/Larger BHCs are those with Q4 2006 assets below/above $25 billion. BHC data are from the Federal Reserve Y-9C regulatory reports for bank holding companies; the market value of common equity is from CRSP. The symbols ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 6
Impact of Pre-Crisis Repurchases on
The Timing of Dividend Elimination

2007 to 2009

	(1)	(2)	(3)	(4)	(5)	(6)
			Pre-Crisis Repurchases/Assets			
Smaller BHCs	-132.420***	-129.087***	-51.874	-133.389***	-134.777***	-33.026
	(48.450)	(49.608)	(47.447)	(50.051)	(51.595)	(30.394)
Larger BHCs	18.472	14.656	1.480	18.893	17.439	5.334
	(37.472)	(38.164)	(37.661)	(37.485)	(39.577)	(37.023)
P-Value: Smaller = Larger	0.013	0.021	0.395	0.015	0.018	0.408
			Control Variables			
Log of Assets	-0.310	-0.307*	-0.309*	-0.314*	-0.331**	-0.364**
	(0.201)	(0.177)	(0.183)	(0.174)	(0.169)	(0.163)
Net Income/Assets	-0.166***	-0.165***	-0.092***	-0.165***	-0.168***	-0.060*
	(0.033)	(0.033)	(0.034)	(0.034)	(0.032)	(0.032)
Non-performing Loans/Loans	61.445***	58.771***	37.480***	61.835***	57.548***	26.775**
	(14.329)	(11.869)	(12.631)	(13.558)	(12.329)	(13.530)
			Capital Ratio			
	Tier 1/RWA	Common/ RWA	Market Value of Common/RWA	Tier 1/Assets	Common/Assets	Market Value of Common/Assets
Capital Ratio	-0.002	-0.040	-0.156**	-0.013	-0.101	-0.319***
	(0.154)	(0.057)	(0.068)	(0.134)	(0.095)	(0.066)
Number of BHCs	64	64	62	64	64	62
Observations	666	666	642	666	666	642

Note: The table reports coefficients from the estimation of a Cox proportional hazards model, where the hazard is defined as the BHC eliminating its dividend between Q1 2007 and Q4 2009 (the "financial crisis period"). A dividend elimination is defined as dividends-per-share falling below $0.011 (to zero or a penny); 30 of the 66 BHCs in the sample eliminated their dividends during the financial crisis period. The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006. BHCs that stop filing regulatory reports before cutting dividends are dropped from the sample. Pre-crisis repurchases are defined as the sum of treasury stock purchases plus net common stock retirements (retirements minus conversions, if positive) from Q1 2005 to Q4 2006. All other control variables are one-quarter lagged values. Smaller/Larger BHCs are those with Q4 2006 assets below/above $25 billion. BHC data are from the Federal Reserve Y-9C regulatory reports for bank holding companies; the market value of common equity is from CRSP. The symbols ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 7
Impact of Pre-Crisis Repurchases on the Timing of First Dividend Cut
Controlling for Pre-Crisis Total Payout Rate

2007 to 2009

	(1)	(2)	(3)	(4)	(5)	(6)
			Pre-Crisis Repurchases/Assets			
Smaller BHCs	-102.418***	-99.127***	-67.695**	-106.376***	-103.289***	-68.713**
	(32.411)	(32.081)	(27.232)	(34.464)	(33.808)	(29.083)
Larger BHCs	-5.320	-4.868	19.146	-0.013	1.099	40.164
	(24.404)	(23.154)	(24.740)	(25.835)	(24.358)	(27.792)
P-Value: Smaller = Larger	0.001	0.001	0.002	0.000	0.000	0.000
			Pre-Crisis Total Payout Rate			
Pre-Crisis Dividends + Repurchases/Net Income	1.295***	1.290***	1.253***	1.294***	1.265***	1.139***
	(0.400)	(0.368)	(0.376)	(0.435)	(0.402)	(0.391)
			Control Variables			
Log of Assets	-0.067	-0.028	-0.061	-0.029	-0.041	-0.130
	(0.107)	(0.103)	(0.089)	(0.096)	(0.100)	(0.087)
Net Income/Assets	-0.344***	-0.363***	-0.199**	-0.364***	-0.365***	-0.177**
	(0.089)	(0.091)	(0.079)	(0.088)	(0.090)	(0.082)
Non-performing Loans/Loans	48.267***	40.909***	24.508**	49.367***	44.625***	26.199***
	(11.394)	(10.767)	(10.706)	(11.987)	(10.684)	(10.120)
			Capital Ratio			
	Tier 1/RWA	Common/ RWA	Market Value of Common/RWA	Tier 1/Assets	Common/Assets	Market Value of Common/Assets
Capital Ratio	-0.100	-0.053*	-0.105***	-0.037	-0.040	-0.163***
	(0.076)	(0.028)	(0.027)	(0.069)	(0.053)	(0.048)
Number of BHCs	66	66	64	66	66	64
Observations	597	597	573	597	597	573

Note: The table reports coefficients from the estimation of a Cox proportional hazards model, where the hazard is defined as the first time a BHC cuts its dividend between Q1 2007 and Q4 2009 (the "financial crisis period"). A dividend cut is defined as a reduction in the ratio of dividends-to-assets and in dividends-per-share greater than the 5th percentile decline in these ratios during 2003 to 2006; 48 of the 66 BHCs in the sample cut dividends during the financial crisis period. The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006. BHCs that stop filing regulatory reports before cutting dividends are dropped from the sample. Pre-crisis repurchases are defined as the sum of treasury stock purchases plus net common stock retirements (retirements minus conversions, if positive) from Q1 2005 to Q4 2006. The pre-crisis total payout rate is defined as the ratio of dividends plus repurchases to net income from Q1 2005 to Q4 2006. All other control variables are one-quarter lagged values. Smaller/Larger BHCs are those with Q4 2006 assets below/above $25 billion. BHC data are from the Federal Reserve Y-9C regulatory reports for bank holding companies; the market value of common equity is from CRSP. The symbols ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 8
Impact of Pre-Crisis Repurchases on the Timing of Dividend Elimination
Controlling for Pre-Crisis Total Payout Rate

2007 to 2009

	(1)	(2)	(3)	(4)	(5)	(6)
Pre-Crisis Repurchases/Assets						
Smaller BHCs	-175.755**	-175.475**	-105.658*	-174.892**	-184.269**	-93.256*
	(69.201)	(70.769)	(59.208)	(69.118)	(75.194)	(51.381)
Larger BHCs	-20.705	-29.777	-54.508	-21.466	-25.560	-53.836
	(51.402)	(53.445)	(52.024)	(51.750)	(52.174)	(53.716)
P-Value: Smaller = Larger	0.013	0.024	0.415	0.016	0.019	0.393
Pre-Crisis Total Payout Rate						
Pre-Crisis Dividends + Repurchases/Net Income	0.948	1.046	1.162*	0.952	1.069	1.182
	(0.838)	(0.864)	(0.684)	(0.843)	(0.861)	(0.740)
Control Variables						
Log of Assets	-0.281	-0.283	-0.287	-0.280	-0.316*	-0.352**
	(0.194)	(0.173)	(0.179)	(0.173)	(0.165)	(0.161)
Net Income/Assets	-0.155***	-0.151***	-0.075**	-0.155***	-0.155***	-0.042
	(0.034)	(0.034)	(0.036)	(0.035)	(0.033)	(0.033)
Non-performing Loans/Loans	65.262***	62.709***	42.283***	65.241***	61.809***	32.155**
	(14.766)	(11.850)	(12.478)	(13.646)	(12.397)	(13.777)
Capital Ratio						
	Tier 1/RWA	Common/ RWA	Market Value of Common/RWA	Tier 1/Assets	Common/Assets	Market Value of Common/Assets
Capital Ratio	0.009	-0.052	-0.160**	0.011	-0.118	-0.322***
	(0.156)	(0.059)	(0.065)	(0.131)	(0.096)	(0.064)
Number of BHCs	64	64	62	64	64	62
Observations	666	666	642	666	666	642

Note: The table reports coefficients from the estimation of a Cox proportional hazards model, where the hazard is defined as the BHC eliminating its dividend between Q1 2007 and Q4 2009 (the "financial crisis period"). A dividend elimination is defined as dividends-per-share falling below $0.011 (to zero or a penny); 30 of the 66 BHCs in the sample eliminated their dividends during the financial crisis period. The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006. BHCs that stop filing regulatory reports before cutting dividends are dropped from the sample. Pre-crisis repurchases are defined as the sum of treasury stock purchases plus net common stock retirements (retirements minus conversions, if positive) from Q1 2005 to Q4 2006. The pre-crisis total payout rate is defined as the ratio of dividends plus repurchases to net income from Q1 2005 to Q4 2006. All other control variables are one-quarter lagged values. Smaller/Larger BHCs are those with Q4 2006 assets below/above $25 billion. BHC data are from the Federal Reserve Y-9C regulatory reports for bank holding companies; the market value of common equity is from CRSP. The symbols ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 9
Impact of Pre-Crisis Repurchases on Timing of First Dividend Cut
Controlling for Crisis Outcomes
2007 to 2009

	Capital Ratio in the Specification					
	Tier 1/RWA	Common/ RWA	Market Value of Common/RWA	Tier 1/Assets	Common/Assets	Market Value of Common/Assets
Crisis ROA						
Repurchases: Smaller BHCs	-82.324***	-75.339***	-67.484**	-89.174***	-86.123***	-77.251***
	(29.200)	(27.628)	(28.652)	(30.106)	(28.922)	(29.168)
Repurchases: Larger BHCs	-9.986	-9.526	10.997	-6.005	-10.061	16.340
	(31.254)	(29.864)	(33.552)	(33.403)	(32.045)	(37.200)
Pre-crisis Total Payout Rate	1.191***	1.207***	1.190***	1.171***	1.220***	1.206***
	(0.401)	(0.402)	(0.409)	(0.414)	(0.397)	(0.417)
Crisis ROA – Smaller BHCs	-0.376**	-0.378**	-0.198	-0.313**	-0.326**	-0.075
	(0.173)	(0.162)	(0.168)	(0.152)	(0.151)	(0.167)
Crisis ROA – Larger BHCs	-0.789***	-0.907***	-0.620***	-0.867***	-0.915***	-0.576**
	(0.188)	(0.186)	(0.201)	(0.197)	(0.190)	(0.226)
Market/Book Value						
Repurchases: Smaller BHCs	-80.468***	-60.593**	-68.675**	-90.407***	-63.892**	-69.776**
	(29.303)	(29.038)	(28.250)	(30.804)	(30.676)	(28.701)
Repurchases: Larger BHCs	28.156	21.587	25.547	37.473	33.629	42.136
	(38.990)	(36.597)	(36.863)	(39.776)	(35.536)	(36.147)
Pre-crisis Total Payout Rate	1.182***	1.200***	1.237***	1.186***	1.121***	1.143***
	(0.388)	(0.386)	(0.377)	(0.426)	(0.409)	(0.392)
Market/Book – Smaller BHCs	-0.990***	-1.280***	-0.288	-0.897***	-1.383***	0.039
	(0.276)	(0.275)	(0.353)	(0.266)	(0.317)	(0.444)
Market/Book – Larger BHCs	-1.103**	-1.207**	-0.306	-1.115**	-1.315**	-0.018
	(0.544)	(0.518)	(0.543)	(0.513)	(0.539)	(0.429)
Analysts' Forecasts						
Repurchases: Smaller BHCs	-116.022***	-118.164***	-106.483***	-121.384***	-123.731***	-105.465***
	(31.883)	(32.720)	(31.546)	(33.864)	(33.822)	(32.882)
Repurchases: Larger BHCs	5.918	0.317	16.080	14.977	8.994	40.481
	(25.667)	(28.659)	(27.814)	(25.890)	(26.253)	(36.894)
Pre-crisis Total Payout Rate	1.876***	1.930***	1.823***	1.795***	1.897***	1.696***
	(0.509)	(0.549)	(0.508)	(0.479)	(0.527)	(0.471)
Analyst Forecast – Smaller BHCs	-1.542**	-1.559**	-1.107*	-1.479**	-1.606***	-0.928
	(0.602)	(0.615)	(0.662)	(0.597)	(0.614)	(0.678)
Analyst Forecast – Larger BHCs	-2.123***	-2.124***	-1.621**	-2.082***	-2.357***	-1.717***
	(0.766)	(0.790)	(0.735)	(0.668)	(0.757)	(0.660)

Note: The table reports coefficients from the estimation of a Cox proportional hazards model, where the hazard is defined as the first time a BHC cuts its dividend between Q1 2007 and Q4 2009 (the "financial crisis period"). A dividend cut is defined as a reduction in the ratio of dividends-to-assets and in dividends-per-share greater than the 5th percentile decline in these ratios during 2003 to 2006; 48 of the 66 BHCs in the sample cut dividends during the financial crisis period. The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006. BHCs that stop filing regulatory reports before cutting dividends are dropped from the sample. Pre-crisis repurchases are defined as the sum of treasury stock purchases plus net common stock retirements (retirements minus conversions, if positive) from Q1 2005 to Q4 2006. The pre-crisis total payout rate is defined as the ratio of dividends plus repurchases to net income from Q1 2005 to Q4 2006. Crisis ROA is average ROA from Q1 2007 to Q4 2009. Market/Book is the ratio of the market value of equity to the book value of equity, lagged one quarter. Analysts Forecast is the median one-quarter-ahead earnings per share (EPS) forecast scaled by average EPS forecasts from 2005 to 2006, as reported on I/B/E/S. The specification also includes one-quarter lagged values of the log of asset size, the ratio of net income to assets, and the non-performing loan ratio. Smaller/Larger BHCs are those with Q4 2006 assets below/above $25 billion. BHC data are from the Federal Reserve Y-9C regulatory reports for bank holding companies; the market value of common equity is from CRSP. The symbols ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 10
Impact of Pre-Crisis Repurchases on Timing of Dividend Eliminations
Controlling for Crisis Outcomes
2007 to 2009

	Capital Ratio in the Specification					
	Tier 1/RWA	Common/ RWA	Market Value of Common/RWA	Tier 1/Assets	Common/Assets	Market Value of Common/Assets
Crisis ROA						
Repurchases: Smaller BHCs	-136.159**	-128.327**	-99.295*	-134.102**	-142.974**	-96.758*
	(53.558)	(54.137)	(52.496)	(54.484)	(60.178)	(50.370)
Repurchases: Larger BHCs	-42.364	-48.891	-56.183	-42.939	-47.560	-58.951
	(49.806)	(47.475)	(48.998)	(48.795)	(48.281)	(53.904)
Pre-crisis Total Payout Rate	0.908	1.026	1.056	0.911	1.087	1.225*
	(0.802)	(0.766)	(0.700)	(0.789)	(0.786)	(0.715)
Crisis ROA – Smaller BHCs	-0.354	-0.394*	-0.097	-0.360	-0.361	0.171
	(0.256)	(0.230)	(0.299)	(0.245)	(0.228)	(0.208)
Crisis ROA – Larger BHCs	-0.745***	-0.768***	-0.287	-0.740***	-0.883***	-0.036
	(0.244)	(0.233)	(0.293)	(0.236)	(0.247)	(0.336)
Market/Book Value						
Repurchases: Smaller BHCs	-118.799**	-102.230*	-105.632**	-111.988**	-104.204*	-95.276*
	(53.710)	(53.063)	(52.447)	(50.922)	(57.165)	(56.192)
Repurchases: Larger BHCs	-28.704	-52.448	-45.397	-21.375	-51.682	-52.102
	(49.320)	(50.586)	(51.371)	(47.401)	(54.430)	(55.967)
Pre-crisis Total Payout Rate	0.883	1.139*	1.046	0.763	1.322*	1.245
	(0.695)	(0.683)	(0.701)	(0.732)	(0.749)	(0.780)
Market/Book – Smaller BHCs	-1.962***	-2.186***	-1.235	-2.104***	-2.649***	0.847
	(0.624)	(0.618)	(0.873)	(0.664)	(0.559)	(0.939)
Market/Book – Larger BHCs	-1.955**	-2.308**	-1.223*	-1.999**	-2.678***	0.878
	(0.807)	(0.940)	(0.723)	(0.790)	(0.822)	(1.078)
Analysts' Forecasts						
Repurchases: Smaller BHCs	-156.807***	-133.595***	-131.655***	-136.592***	-144.302***	-122.153***
	(56.102)	(46.103)	(48.044)	(48.041)	(52.725)	(47.060)
Repurchases: Larger BHCs	-41.555	-30.769	-52.995	-34.667	-47.306	-70.508
	(51.996)	(51.077)	(55.927)	(52.815)	(51.351)	(54.225)
Pre-crisis Total Payout Rate	1.760**	1.516*	1.781**	1.593*	1.807**	1.848**
	(0.792)	(0.853)	(0.909)	(0.848)	(0.834)	(0.861)
Analyst Forecast – Smaller BHCs	-2.648***	-2.546***	-2.372***	-2.480***	-2.486***	-1.628**
	(0.513)	(0.515)	(0.454)	(0.506)	(0.560)	(0.651)
Analyst Forecast – Larger BHCs	-2.170***	-1.984**	-1.635**	-1.920**	-1.915**	-0.871
	(0.685)	(0.878)	(0.720)	(0.887)	(0.857)	(1.167)

Note: The table reports coefficients from the estimation of a Cox proportional hazards model, where the hazard is defined as the BHC eliminating its dividend between Q1 2007 and Q4 2009 (the "financial crisis period"). A dividend elimination is defined as dividends-per-share falling below $0.011 (to zero or a penny); 30 of the 66 BHCs in the sample eliminated their dividends during the financial crisis period. The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006. BHCs that stop filing regulatory reports before cutting dividends are dropped from the sample. Pre-crisis repurchases are defined as the sum of treasury stock purchases plus net common stock retirements (retirements minus conversions, if positive) from Q1 2005 to Q4 2006. The pre-crisis total payout rate is defined as the ratio of dividends plus repurchases to net income from Q1 2005 to Q4 2006. Crisis ROA is average ROA from Q1 2007 to Q4 2009. Market/Book is the ratio of the market value of equity to the book value of equity, lagged one quarter. Analysts Forecast is the median one-quarter-ahead earnings per share (EPS) forecast scaled by average EPS forecasts from 2005 to 2006, as reported on I/B/E/S. The specification also includes one-quarter lagged values of the log of asset size, the ratio of net income to assets, and the non-performing loan ratio. Smaller/Larger BHCs are those with Q4 2006 assets below/above $25 billion. BHC data are from the Federal Reserve Y-9C regulatory reports for bank holding companies; the market value of common equity is from CRSP. The symbols ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 11
Impact of Pre-Crisis Repurchases on
The Timing of First Dividend Cut and Dividend Elimination
Controlling for Analyst Coverage
By BHC Asset Size, 2007 to 2009

	Capital Ratio in the Specification					
	Tier 1/RWA	Common/ RWA	Market Value of Common/RWA	Tier 1/Assets	Common/Assets	Market Value of Common/Assets
First Dividend Cut:						
Pre-Crisis Repurchases and Dividends as Share of Assets						
Repurchases: Smaller BHCs	-139.945***	-137.328***	-97.723***	-148.873***	-140.769***	-96.429***
	(32.020)	(33.285)	(34.808)	(36.097)	(33.455)	(34.955)
Repurchases: Larger BHCs	-24.909	-28.849	4.189	-25.585	-27.452	20.414
	(34.878)	(33.677)	(36.231)	(31.107)	(32.111)	(39.278)
Pre-crisis Total Payout Rate	2.094***	2.090***	1.689***	2.177***	2.085***	1.587***
	(0.540)	(0.522)	(0.552)	(0.581)	(0.518)	(0.533)
Analyst Coverage – Smaller BHCs	0.195***	0.191***	0.114*	0.204***	0.198***	0.118**
	(0.046)	(0.047)	(0.059)	(0.049)	(0.045)	(0.057)
Analyst Coverage – Larger BHCs	0.085*	0.086**	0.042	0.085**	0.092**	0.049
	(0.044)	(0.043)	(0.047)	(0.040)	(0.042)	(0.046)
Number of BHCs	63	63	63	63	63	63
Dividend Elimination:						
Pre-Crisis Repurchases and Dividends as Share of Assets						
Repurchases: Smaller BHCs	-239.885***	-241.556***	-146.083*	-234.869***	-257.888***	-117.140
	(85.684)	(92.184)	(85.447)	(87.055)	(98.640)	(76.530)
Repurchases: Larger BHCs	-28.078	-37.842	-41.786	-28.502	-39.312	-38.876
	(55.398)	(58.933)	(52.114)	(54.592)	(55.692)	(53.542)
Pre-crisis Total Payout Rate	1.807*	1.939	1.419	1.772	2.181*	1.214
	(1.093)	(1.203)	(1.080)	(1.090)	(1.218)	(1.163)
Analyst Coverage – Smaller BHCs	0.174**	0.168**	0.056	0.165**	0.191**	0.027
	(0.077)	(0.084)	(0.082)	(0.084)	(0.088)	(0.091)
Analyst Coverage – Larger BHCs	0.035	0.026	-0.032	0.027	0.045	-0.029
	(0.041)	(0.041)	(0.037)	(0.048)	(0.041)	(0.040)
Number of BHCs	61	61	61	61	61	61

Note: The table reports coefficients from the estimation of a Cox proportional hazards model, where the hazard in the top panel is defined as the first time a BHC cuts its dividend between Q1 2007 and Q4 2009 (the "financial crisis period") and the hazard in the bottom panel hazard is the BHC eliminating its dividend during this period. A dividend cut is defined as a reduction in the ratio of dividends-to-assets and in dividends-per-share greater than the 5th percentile decline in these ratios during 2003 to 2006; 48 of the 66 BHCs in the sample cut dividends during the financial crisis period. A dividend elimination is defined as dividends-per-share falling below $0.011 (to zero or a penny); 30 of the 66 BHCs in the sample eliminated their dividends during the financial crisis period. The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006. BHCs that stop filing regulatory reports before cutting dividends are dropped from the sample. Pre-crisis repurchases are defined as the sum of treasury stock purchases plus net common stock retirements (retirements minus conversions, if positive) from Q1 2005 to Q4 2006. The pre-crisis total payout rate is defined as the ratio of dividends plus repurchases to net income from Q1 2005 to Q4 2006. Analyst Coverage is the number of unique analysts reporting one-quarter ahead earnings per share (EPS) forecasts during the previous quarter, as reported on I/B/E/S. The specification also includes one-quarter lagged values of the log of asset size, the ratio of net income to assets, and the non-performing loan ratio. Smaller/Larger BHCs are those with Q4 2006 assets below/above $25 billion. BHC data are from the Federal Reserve Y-9C regulatory reports for bank holding companies; the market value of common equity is from CRSP. The symbols ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 12
Size of Dividend Reduction and Pre-crisis Repurchases

Average Percent Change in Dividends-per-Share
BHCs that Cut Dividends, 2007 to 2009

	All BHCs	Smaller BHCs	Larger BHCs	P-Value (Smaller – Larger)
		First Dividend Reduction		
Low Repurchases	-65.7%	-67.4%	-61.0%	0.678
High Repurchases	-63.4%	-67.4%	-61.2%	0.483
Total	-64.5%	-67.4%	-61.1%	0.393
P-value (Low - High)	0.759	0.999	0.990	
		Total Dividend Reduction		
Low Repurchases	-95.7%	-95.6%	-95.7%	0.981
High Repurchases	-87.1%	-79.9%	-91.1%	0.058*
Total	-91.2%	-90.2%	-92.4%	0.521
P-value (Low - High)	0.010***	0.008***	0.159	

Note: The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006 and that cut dividends between 2007 and 2009. BHCs that stop filing regulatory reports before cutting dividends are dropped from the sample. A dividend cut is defined as a reduction in the ratio of dividends-to-assets and in dividends-per-share greater than the 5th percentile decline in these ratios during 2003 to 2006. The first dividend reduction is the percent change in dividends-per-share the first time a BHC reduces its dividend between Q1 2007 and Q4 2009, while the total dividend reduction is the percent difference between the minimum dividends-per-share and the average during 4 quarters immediately before the first dividend cut. Smaller/Larger BHCs are those with assets less than/greater than $25 billion. Low/High repurchases are defined as BHCs with 2005 – 2006 repurchases relative to assets below/above the median for the sample BHCs. The symbols ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.
Source: Federal Reserve Y-9C Reports.

Table 13
Impact of Pre-Crisis Repurchases on Size of Dividend Reductions
2007 to 2009

	First Dividend Reduction				Total Dividend Reduction			
	Selection Equation	Size of Dividend Cut	Selection Equation	Size of Dividend Cut	Selection Equation	Size of Dividend Cut	Selection Equation	Size of Dividend Cut
Log of Assets	0.600*		0.632**		0.600*		0.632**	
	(0.311)		(0.263)		(0.311)		(0.263)	
Net Income/Assets	0.354		0.005		0.354		0.005	
	(0.444)		(0.245)		(0.444)		(0.245)	
Non-performing Loans/Loans	207.431**		244.375***		207.431**		244.375***	
	(95.161)		(92.047)		(95.161)		(92.047)	
Market Value Common/RWA	-0.089**				-0.089**			
	(0.036)				(0.036)			
Common/RWA			-0.155*				-0.155*	
			(0.089)				(0.089)	
Constant		-0.687***		-0.712***		-0.993***		-1.010***
		(0.102)		(0.123)		(0.042)		(0.050)
Pre-crisis Total Payout Rate		0.044		0.058		0.051		0.060
		(0.144)		(0.148)		(0.059)		(0.060)
Repurchases: Smaller BHCs		-1.410		-1.609		12.109***		11.807***
		(10.557)		(10.463)		(4.300)		(4.261)
Repurchases: Larger BHCs		1.626		2.369		2.372		2.817
		(7.824)		(8.115)		(3.186)		(3.305)
P-Value: Smaller = Larger		0.725		0.655		0.006		0.013
Observations	64	48	66	48	64	48	66	48

Note: The table reports the results of a two-step Heckman selection model; the selection equation is whether a BHC made a dividend cut during Q1 2007 to Q4 2009 while the second-stage model is the size of the dividend cut. A dividend cut is defined as a reduction in the ratio of dividends-to-assets and in dividends-per-share greater than the 5th percentile decline in these ratios during 2003 to 2006; 48 of the 66 BHCs in the sample cut dividends during the financial crisis period. The size of the first dividend cut is the percent change in dividends-per-share in the quarter of the first dividend cut between Q1 2007 and Q4 2009 relative to the average dividend-per-share in the preceding 4 quarters. The size of the total dividend cut is the percent difference between the minimum dividend-per-share during 2007-09 and the average dividend-per-share in the 4 quarters immediately before the first dividend cut during that period. The sample includes all BHCs headquartered in the 50 states with assets exceeding $5 billion as of Q1 2005 that paid common stock dividends as of Q4 2006. BHCs that stop filing regulatory reports before cutting dividends are dropped from the sample. Pre-crisis repurchases are defined as the sum of treasury stock purchases plus net common stock retirements (retirements minus conversions, if positive) from Q1 2005 to Q4 2006. The pre-crisis total payout rate is defined as the ratio of dividends plus repurchases to net income from Q1 2005 to Q4 2006. Control variables in the selection equation are as of Q4 2006. Smaller/Larger BHCs are those with Q4 2006 assets below/above $25 billion. BHC data are from the Federal Reserve Y-9C regulatory reports for bank holding companies. The symbols ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.