

Rational Dividend Addiction in Banking

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Abstract

Banks cut dividends with great reluctance, as if addicted. Their addiction is a major cause of concern for regulators because it may endanger the whole banking system. However, banks may be rational in maintaining elevated dividends if agency costs are high and dividends substitute for shareholder monitoring. Banks may rely on persistent dividend policies to uphold a reputation among investors, especially during crises, when issuing equity becomes likelier. In support of this hypothesis, we find that, during and after the financial crisis, dividend persistence increases with the severity of agency costs banks are subject to; it decreases in the presence of concentrated shareholders, except when stress is acute. By contrast, share repurchases also substitute for shareholder monitoring but trigger no addiction.

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1. Introduction

Despite an immediate debilitating effect on their vitals, banks paid dividends well into the global financial crisis. Rather than cutting or omitting dividends in order to preserve their health, banks persisted in paying out dividends. By doing so, they brought themselves, and the system they were part of, ever closer to breakdown. After the crisis, they reverted to their dependent behavior at the earliest opportunity.

Banks are addicted to dividends. This addiction, sometimes interpreted as recklessness, has raised significant concern among regulators (Rosengren, 2010; Bank of England, 2011). However, as early as the 1970s, scholars noted that dividend cuts by banks were an exception rather than the rule (Keen, 1978, 1983). Since then, they have rarely studied the issue of dividend persistence in the banking industry, possibly hampered by the few occurrences of bank dividend cuts in recent times.²

In this paper, we take advantage of the eventual changes in bank dividend policies observed in the heat of the 2007-09 financial crisis to assess if the addiction of banks to dividends is rational. This addiction would be rational if it resulted from conscious, utility-maximizing decisions (Becker and Murphy, 1988). It could be rational if dividends mitigate severe agency costs of free cash flows by substituting for shareholder monitoring La Porta et al. (2000). Through their dividend policies, banks may seek to maintain a reputation in financial markets; they may attach particular importance to this reputation during crises, when “there is enough uncertainty about future cash flows that the option of going back to the capital market is [especially] valuable.” (La Porta et al., 2000, p. 7) The financial crisis and its aftermath therefore appear as exceptional opportunities to analyze the addiction of banks to dividends.

We focus on the relationship between the addictive behavior of banks, that is on their

²Empirical work conducted on bank dividend policies in the 1980s and 1990s is characterized by small sample sizes. See for example Keen (1983), Bessler and Nohel (1996), Slovin et al. (1999), Bessler and Nohel (2000), and Casey and Dickens (2000).

reluctance to cut or omit dividends, and the existence of agency costs, evidenced by ownership structure, legal structure and analyst coverage. We find that banks that are subject to more severe agency costs have a lower propensity to both omit and cut dividends. Conversely, banks that concentrated shareholders are able to monitor effectively are in general more likely to cut dividends. However, they are less likely to cut in times of acute stress, under the influence of the same concentrated shareholders. By contrast, share repurchases are induced by a more dispersed shareholding but not by heightened agency costs.

This sheds a whole new light on how agency costs of free cash flows influence bank payouts and how dividends trigger a rational addiction among bankers.

First, our findings suggest that the importance of payout as a substitute to monitoring increases with agency costs, and drives managers to maintain their dividend policies unchanged. By contrast, through the monitoring that they exercise, concentrated shareholders alleviate the pressure on bank managers to maintain or increase dividend payout. Nonetheless, these shareholders are also acutely sensitive to the need for banks to uphold a reputation in capital markets in times of crisis.

Second, in the banking industry contrary to unregulated industries (Grullon and Michaely, 2002), share repurchases and dividends are not interchangeable payout methods. Both share repurchases and dividends mitigate agency costs and substitute to shareholder monitoring. But contrary to dividends, buy backs are not a repetitive monitoring device and do not trigger a dependence driven by a concern of maintaining a reputation in capital markets. Only dividends cause a phenomenon of addiction.

Third, the concern to maintain a reputation may be perfectly rational rather than reckless, to the extent that it derives from the incentives that bank managers have to keep their banks afloat despite heavy turbulences. Under this light, the anecdotal evidence that some financial institutions such as Lehman Brothers increased their payout before failing suggests that their addiction may cause banks to OD.

The remainder of the paper is structured as follows. Section 2 reviews prior literature. Section 3 describes the data set and the empirical approach. Section 4 examines whether agency costs influence the propensity to either cut or omit dividends and to initiate share repurchases, in order to test the hypothesis; it is backed by the robustness tests presented in Section 5. Section 6 presents the conclusions.

2. Related Literature

2.1. Dividends

Lintner (1956) was the first to document that dividends were persistent and that firms smoothed them over time, even after the occurrence of financial shocks. Since then, many researchers have attempted to explain dividend persistence, but they have reached no clear consensus on the economic forces that shape this phenomenon. Nonetheless, scholars agree that dividend persistence is economically significant: at the very least, it shapes the value that market participants attribute to market assets and the investment policies that these participants adopt (Grinstein and Michaely, 2005).

However, in few industries is dividend persistence as economically significant as in banking. The persistence of dividends affects the resilience of the banking system as a whole (Acharya et al., 2011). When banks pay dividends, they reduce the equity buffer at their disposal to absorb losses. Hence, they become more fragile. In turn, more fragile banks make it more likely that the deeply interconnected modern banking system may topple in times of stress (Roukny et al., 2013). The excessive persistence of dividends, identified as early as the 1970s (Keen, 1978), is a major cause of concern for regulators and for scholars (Rosengren, 2010; Bank of England, 2011; Brunnermeier et al., 2009).

At the same time, in few industries does the persistence of dividends remain as poorly understood as in banking. Early on, scholars established that the dividend policies of banks differ from those of unregulated firms (Gupta and Walker, 1975). Since then, scholars nearly systematically exclude banks from empirical samples. For one thing,

scholars consider that bank dividend policies may be influenced by regulators. However, outside of crises, there is limited empirical evidence of regulatory influence (Abreu and Gulamhussen, 2013). During crises, the influence of regulators, has been “focused on the ability to pay dividends out of earnings.” (Rosengren, 2010, p. 4) Because earnings often lag the onset of crises, regulatory responses have been late and, to a certain extent, ineffective. For another, scholars have dedicated their research on the symptoms and consequences of persistent dividend policies rather than on their causes, as highlighted in Table 1. To our knowledge, the present paper is the first to address this gap in the literature and to suggest that the persistence exhibited by bank dividend policies stems from a rational addiction.

We dedicate the remainder of this paragraph to agency costs explanations of dividend policies, initially in unregulated firms and then in banks.

Unregulated firms. The modern agency cost theory of firm payouts was proposed by Jensen (1986). According to this theory, firms should reduce the free cash flows at their disposal by paying them out as dividends or via share repurchases to mitigate potential over-investment by managers. Consistent with this theory, firms have been shown to smooth their dividends in response to the presence of agency conflicts (e.g., Leary and Michaely (2011)).

In keeping with Jensen’s (1986) theory, La Porta et al. (2000) introduced two hypotheses that predict how firms may set dividend policies in response to excess free cash flows. According to the first hypothesis, the “outcome” hypothesis, dividends help mitigate agency costs by giving minority shareholders legal powers to compel managers to paying out cash. Managers have essentially no choice but to disburse dividends when there is excess cash at hand and minority shareholder rights are enforceable. According to the second hypothesis, the “substitute” hypothesis, dividends help managers establish a reputation for moderation in appropriating shareholder wealth for their own use. By

Table 1: Summary of the literature on bank dividend policies, highlighting differences between bank and unregulated firms

Area	References	Findings
Signaling: changes in dividend policies of banks signal transitions in their health, unlike those of unregulated firms	Filbeck and Mullineaux (1993)	Even small unexpected increases in dividends are associated with positive changes in bank market values
	Bessler and Nohel (1996)	Dividend cuts affect the market values of banks disproportionately more than those of other firms
	Boldin and Leggett (1995)	Positive relationship between dividends per share and an external health rating of US banks
Adverse consequences: dividend cuts and omissions have more far-reaching consequences in banking than in unregulated industries	Bessler et al. (2006) and Cornett et al. (2011)	Post-IPO banks are more likely than non-financial firms to signal their quality to outsiders by initiating dividends soon after they are listed
	Keen (1983) and Bessler and Nohel (1996)	Larger banks experience a steep decrease in value when they cut dividends, as if the market were expecting fewer adverse consequences for smaller banks after a dividend cut
	Slovin et al. (1999) and Bessler and Nohel (2000)	The signal sent by dividend cuts is contagious and significantly affects the stock prices of competing banks, as if this signal revealed trouble similar to the cutting banks
Risk-shifting: dividend payout are positively related to risk-shifting, that is, to transferring default risk to bank creditors and to the taxpayer in case of failure and/or bailout. There is no such documented bias in unregulated firms	Keen (1978) and Acharya et al. (2011)	Bank dividend cuts may trigger deposit flight, short-term debt rollover risk, a rise in funding costs and the discontinuation of banking relationships
	Hirtle (2014)	During the financial crisis, bank managers may have been reluctant to reduce dividends, contrary to stock repurchases, because of the negative signal this would send in highly uncertain times
	Kanas (2013) and Onali (2014)	Banks load up on risks during growth periods and optimistically increase their payouts to shareholders. By doing so, banks magnify the adverse consequences of dividend persistence on systemic risk: when crisis strikes, banks may be unwilling to reduce their dividend payout from unsustainable levels reached during good times or may only do so with a lag, exposing the banking system to their greater fragility. Acharya et al. (2013) predict and Onali (2014) finds that a high charter value moderates this effect

doing so, they preserve their option to access markets, which is particularly relevant when cash flows are uncertain.

In international settings, La Porta et al. (2000) and many other authors find empirical support for the outcome hypothesis. Among the latter, Brockman and Unlu (2011) show, in a setting that contrasts the relative transparency of international jurisdictions, that the substitute hypothesis dominates in opaque environments, whereas the outcome hypothesis dominates in transparent ones. They conclude that transparency increases the pressure on managers to pay out cash to shareholders; opaqueness drives them to establish a reputation in the market.

Banks. The evidence supporting an agency cost explanation of dividend policies has built up over time.

Observing the stock price reaction to dividend increases, Filbeck and Mullineaux (1999) find no difference between bank holding companies that engage in financing activities and those that do not. They conclude that there may be other mechanisms to control agency problems, although they do not explicitly control for agency costs. Contemporaneously, Casey and Dickens (2000) observe a positive correlation between dividend payout ratios and shareholder dispersion, consistent with greater agency conflicts being mitigated by larger dividend payouts. Dickens et al. (2002) observe that dividend yields are inversely related to insider ownership, consistent with an agency-related explanation, and positively related to bank size, consistent with the too-big-to-fail concept. More recently, Abreu and Gulamhussen (2013) observe that the degree of shareholder independence (together with size, profitability, and growth), drove the dividend payout ratios of US banks before and during the financial crisis. They conclude that “dividends compensate for the need for [shareholder] monitoring.” (Abreu and Gulamhussen, 2013, p. 63)

Scholars have also brought some evidence in support of the substitute hypothesis of La Porta et al. (2000). In the Norwegian banking industry, Bøhren et al. (2012) uphold

this hypothesis after observing that savings banks, in which ownership is evenly split between shareholders, depositors, employees, and community citizens, pay higher dividends than shareholder-owned commercial banks. They conclude that adequate dividend policies help mitigate agency conflicts between minority and dominant owners. Historically, Bodenhorn (2014) shows that, in the nineteenth century, bank dividend policies substituted for graduated voting rights. Graduated voting rights are governance arrangements that grant a disproportionately large voting influence to minority shareholders compared to large ones. In doing so, these rights address the expropriation concerns of dispersed minority shareholders. Bodenhorn (2014) also finds that graduated voting rights led to greater shareholder dispersion and that less concentrated ownership reduced risk-taking.

Interestingly, two additional historical studies support the substitute hypothesis in banking. Robinson (1948, p. 407) discusses optimal bank dividend policies and recommends that “those [banks] with close-knit ownership could follow [dividend] policies best adapted to the advantage of both the bank and its owners. Banks with wider distribution of stock ownership could afford, other things being equal, to consider a more generous distribution of earnings.” Mayne (1980) establishes that, in the 1970s, at a time when many banks were converting into Bank Holding Companies, banks that were affiliated with Bank Holding Companies had more generous dividend payouts than banks that were not. She argues that “this may be due to differences in the pattern of ownership or in responsiveness to capital market pressures, the stock of the large firms being more likely to be widely held and publicly traded.” (Mayne, 1980, p. 474)

The present paper provides new insights on bank dividend policies by determining how ownership patterns, agency costs of free cash flows and reputational matters influence the dividend policies of contemporary US banks.

2.2. Share repurchases

In contrast with dividends, bank share repurchases do not cause concern among regulators because of their systemic implications. Hirtle (2014) observes that, when the global financial crisis set in, large US bank holding companies stopped initiating share repurchases well before cutting dividends. She suggests that, unlike dividends, share repurchases do not signal ill health and can be cut without a fear of experiencing withdrawal symptoms.

In fact, in banking, share repurchases may signal good health without generating addiction. Banks that announce repurchases experience higher profitability and good asset quality over the short-run, at least in the absence of a subsequent crisis (Hirtle, 2004). Outside of banking, the evidence in favor of signaling goes in the opposite direction, that of lower subsequent profitability, but supports an agency cost explanation of share repurchases consistent with Jensen's (1986) theory. Firms initiate share repurchases opportunistically when they run short of growth opportunities. In doing so, firms mitigate the risk that they may over-invest (Grullon and Michaely, 2002). However, firms do not increase their repurchases in response to higher institutional holdings or to concentrated holdings (Grinstein and Michaely, 2005), contrary to La Porta et al.'s (2000) substitute hypothesis.

To our knowledge, this paper is the first to examine the influence of dispersed and concentrated shareholders on bank share repurchases and to contrast the extent to which ownership structures influence repurchase and dividend policies.

3. Data and Empirical Methodology

3.1. Sample and Stylized Facts

Our initial sample includes all listed US firms categorized as banks in the Industry Classification Benchmark (ICB) with over USD 1 billion in total assets as at 31 December

2006.³ The sample covers the period between 1 January 2004 and 31 December 2012 so that bank dividend policies can be observed before, during and after the 2007-09 financial crisis.

We collected the histories of regular cash dividends, share repurchases and quarterly accounting variables from Bloomberg. We obtained quarterly institutional holdings from the Thomson-Reuters Institutional Holdings Database (13F). This database aggregates the quarterly holdings reported to the Securities and Exchange Commission (SEC) by banks, brokers-dealers, insurance companies, pension funds, investment companies, not-for-profit institutions, colleges, and foundations, under Section 13F of the Securities Exchange Act of 1934. We also sourced analyst coverage data from the Thomson-Reuters I/B/E/S US Detail History file, a database of individual earnings estimates from a majority of sell-side analysts covering listed US firms. We identified the Bank Holding Companies in our sample based on the Federal Reserve Bank of Chicago Holding Company Data set.⁴

During the crisis, many US banks received capital support from the US Treasury through the Capital Purchase Program (CPP), itself part of the Troubled Asset Relief Program (TARP). There is evidence that, as a condition to receiving such support, banks had to accept restrictions on their dividend policies. We therefore control for CPP capital injections in our regressions. We source transaction-level CPP data from the US Treasury.⁵

We reconcile data sets by CUSIP (Thomson-Reuters, Bloomberg, and Chicago Fed data) and by name and by US State (US Treasury data). After excluding observations with missing data or negative equity, as well as those banks that never pay dividends (19

³The sample includes banks categorized as National Commercial Banks (SIC Code 6021), State Commercial Banks (SIC Code 6022), Commercial Banks Not Elsewhere Classified (SIC Code 6029), Federal Savings Institutions (SIC Code 6035) and Savings Institutions (SIC Code 6036).

⁴As available from <https://www.chicagofed.org/banking/financial-institution-reports/bhc-data>.

⁵We obtain the amount and type of capital support received by each bank, as well as the dates on which they received it and when it was repaid or disposed of on the market, from the Transactions Report - Investment Programs dated 26 July 2013, as available from <http://www.treasury.gov/initiatives/financial-stability/reports/Pages/TARP-Investment-Program-Transaction-Reports.aspx>.

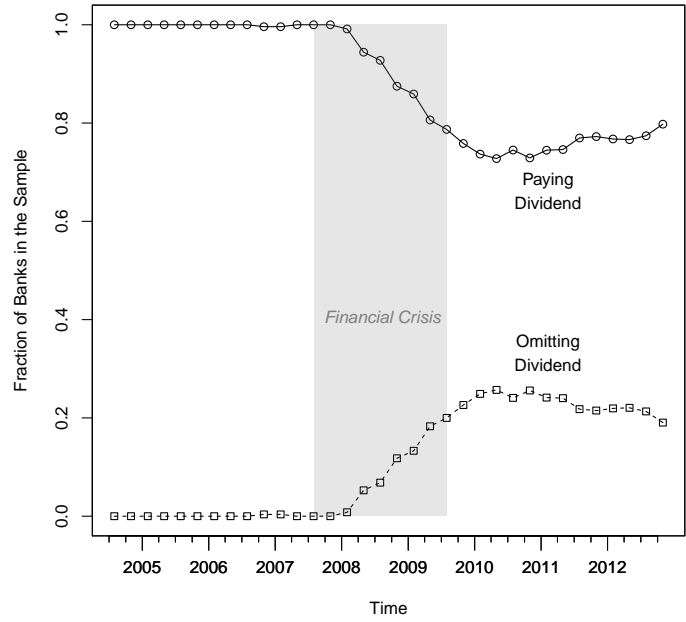
banks) or pay them irregularly (6), the panel comprises 212 Bank Holding Companies (73.9%) and 75 listed commercial banks (26.1%), jointly referred to as banks. The panel is unbalanced either because some banks have become listed, been acquired, or failed during the period, or because of exclusions.

Prior literature has mostly related dividends to the financial statements of the prior accounting year (e.g., Fama and French (2001)). Our analysis requires a more granular approach to match dividend decisions with financial statements in a period during which both payout policies and financial statements evolved rapidly. Nonetheless, banks, like other firms, synchronize their dividend declaration and accounting cycles (e.g., Aharony and Swary (1980)). In our sample, most banks declare dividends together, shortly before or after they disclose their quarterly financial statements, within a period of 31 days from the end of an accounting quarter.

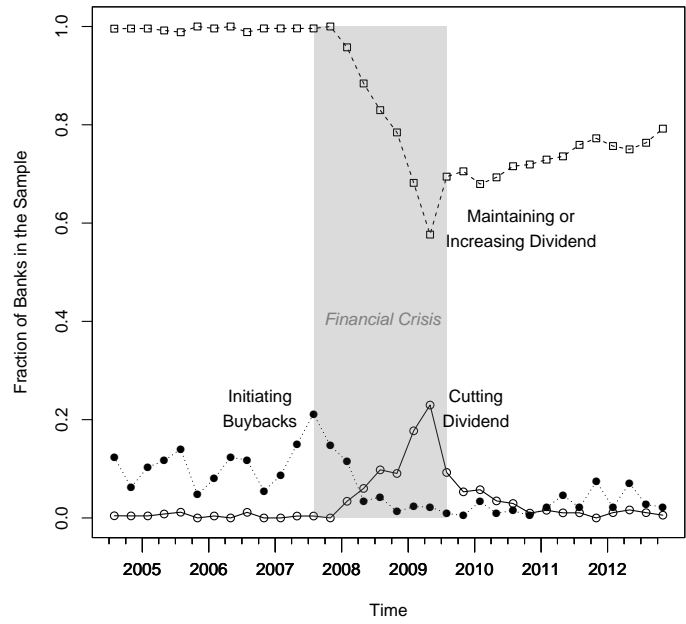
We assume that dividend declarations made during the period starting 60 days before and ending 31 days after an accounting quarter reflect a bank's situation as reported in the financial statements of the previous quarter. We relate dividends to the institutional ownership records at the end of the quarter preceding dividend declarations in order to reduce issues of endogeneity. And, when no dividend is declared and there is no corresponding announcement, we assume that a dividend declaration takes place 91 days after the previous one.

Because of this approach, combined with the availability of dividend data in our sample until 31 December 2012, the end of sample period must be brought back by one quarter to the accounting quarter ending 30 September 2012. Also, because of the necessity to account for dividend persistence based on past quarter dividend declarations, as detailed in Section 3.2, the start of the sample period must be pushed forward by one quarter to start with the accounting quarter ending 30 June 2004. After these eliminations, the sample comprises 7,589 bank-quarter observations.

Figure 1(a) plots the fraction of banks that paid or omitted dividends, quarter by



(a) Fraction of banks in the sample paying or omitting dividend



(b) Fraction of banks in the sample maintaining/increasing or cutting dividend, and initiating share repurchases

Figure 1: Evolution of payout decisions by sample banks over the period between 30 June 2004 and 30 September 2012

quarter over the sample period. Figure 1(b) plots the fraction of banks that maintained/increased dividends and initiated share repurchases. The figures suggest that banks reacted first by abstaining from initiating share repurchases and belatedly by adjusting their dividend policies. The banks did not start cutting dividends before the last quarter of 2007. Before that, they persistently paid dividends. The number of banks that initiated share repurchases peaked in mid-2007. By contrast, the number of banks that cut dividends peaked in the first quarter of 2009. After reaching the peak of dividend omissions in the last quarter of 2010, banks slowly started paying dividends again.

Table 2 reports statistics on dividend changes by sample banks. The reported proportions can be compared with those documented by Grullon et al. (2002) for a broad sample of companies over the period 1967 to 1993: 79.4% of increases and 21.6% of cuts out of 7,642 dividend changes. Before the onset global financial crisis, banks hardly ever cut dividends; they omitted even more rarely. The pre-sample evidence we have at our disposal for sample banks suggests that this pattern is typical and not attributable to boom times.⁶ During and after the crisis the number of cuts and omissions exceeded that of increases, consistent with banks being forced to take drastic measures. Importantly, a large number of banks reacted to the crisis only in the two years following the crisis, as Figure 1 also evidences. After the crisis, banks reverted to their former addiction, as if nothing had happened.

In the sample, a majority of banks (51%) cut dividends once or multiple times in the heat of the crisis, whereas a large majority of banks (69%) never omit dividends. More than half (60%) of banks cut dividends at least once in the heat of the crisis before eventually omitting them. Both facts are consistent with prior evidence that omission is a last resort. A large majority of sample banks (74%) initiate at least one repurchase

⁶The dividend history of sample banks available from Bloomberg for the period preceding the sample period comprises 13,919 dividend decisions going back up to the late 1970s. Among these decisions, we find 2,684 dividend changes, out of which 2,536 increases (94.5%), 136 cuts (5.1%) and 12 omissions (0.4%).

Table 2: Statistics on dividend changes by sample banks over the total sample period and over sub-periods preceding, during and after the global financial crisis. The proportions are calculated based on the number of changes in each period or sub-period.

	From	30 Jun 2004	30 Sep 2007	30 Sep 2009	30 Sep 2011
	To	30 Jun 2007	30 Jun 2009	30 Jun 2011	30 Sep 2012
Changes	Total	828	401	172	140
	Increases	813	167	102	130
	Cuts & Omissions	15	234	70	10
	Omissions	1	58	25	2
Proportions	Increases	98.19%	41.65%	59.30%	92.86%
	Cuts & Omissions	1.81%	58.35%	40.70%	7.14%
	Omissions	0.12%	14.46%	14.53%	1.43%

during the sample period. In total, they announce 508 buybacks, or 2.41 per bank on average (with a standard deviation of 1.57).

Regression variables are defined in Table 3. The dispersion and concentration of institutional shareholders, as well as proxies for the severity of agency costs, are our main variables of interest. Following Hilt (2008), we measure shareholder dispersion through the number of institutional shareholders and, following Demsetz and Lehn (1985), shareholder concentration through a Herfindahl-Hirschman index (INSTIT_OWN_HHI). However, shareholder dispersion is strongly correlated with bank size. Similarly to Hong et al. (2000), we use the residual dispersion of institutional shareholders (RES_NUM_OWNERS) instead of the number of institutional shareholders, where the residual comes from a regression of institutional shareholder dispersion on bank size. In order to uphold the substitute model of La Porta et al. (2000), underlying our hypothesis of addiction, we should observe that the propensity to cut and omit dividends decreases with residual shareholder dispersion and/or increases with shareholder concentration. If market access influences dividend policies, we expect differentiated results between dividend omission and dividend cut models, such that the severity of omissions appears more significant than that of cuts.

Additionally, we use analyst coverage as a proxy for the severity of agency costs, with

Table 3: Definition of variables used in regressions. Dividend declarations made on date d where $Q - 60 \leq d \leq Q + 31$ and Q a quarter end date, are related to the financial statements of the quarter ending on Q . Accounting variables are those of the quarter ending on Q . Institutional ownership is measured on Q' where Q' is a quarter end date and $Q' < d$. Market measurements are also made during the period $[Q - 60, Q + 31]$. Sources: institutional ownership data from Thomson-Reuters Institutional Holdings Database (13F), accounting variables from Bloomberg, analyst coverage based on the I/B/E/S US Detail History file, Troubled Asset Relief Program (TARP) CPP from the US Treasury, TED spread based on data from the Federal Reserve Bank of St. Louis.

Variable	Description
Institutional ownership	
RES_NUM_OWNERS	Residual number of institutional shareholders, determined as the residual of a regression of the number of institutional shareholders on bank size
INSTIT_OW_N_HHI	Concentration of institutional shareholders, measured as a Herfindahl-Hirschman Index (HHI)
Agency Costs	
BHC_INDICATOR	Binary variable taking the value 1 if a bank is a Bank Holding Company (BHC) and 0 otherwise
RES_NUM_ANALYSTS	Residual analyst coverage, determined as the residual of a regression of the number of analysts having issued at least one recommendation on a bank over the prior 90-day period on bank size
Accounting and related measurements	
CAP_TO_RBC	Risk-based capital ratios
CASH_MKT_SEC_TO_ASSETS	Ratio of cash holdings and marketable securities to total assets
EQUITY_TO_ASSETS	Ratio of total equity to total assets
LOG_ASSETS	Natural logarithm of total assets, used as a measurement of bank size
QCH_ASSETS	Difference between total assets on Q and on $Q - 1$, divided by total assets on Q
QUARTER_ROA	Quarterly return on assets, defined as quarter earnings divided by total assets
RET_EARN_TO_ASSETS	Ratio of retained earnings to total assets
Time effects	
AVG_TED	Average TED spread measured over the period $[Q - 60, Q + 31]$. The TED spread is the difference between the 3-month LIBOR and secondary market rates on 3-month US Treasury Bills
D_{it-1}	In dividend regressions, binary variable taking the value 1 if a bank declared a dividend during the quarter ending on $Q - 1$ and 0 otherwise. In buyback regressions, binary variable taking the value 1 if a bank initiated a share buyback during the quarter ending on $Q - 1$ and 0 otherwise
UNDER_TARP	Binary variable taking the value 1 during the period when a bank receives financial support from the US Treasury under TARP and 0 outside of this period (or if the bank does not receive such support)

banks more subject to agency costs attracting more sell-side analysts. Using this proxy, Moyer et al. (1989) show that agency costs are more elevated in banking than in other industries. Because analyst coverage is strongly correlated with bank size, we also substitute it with residual analyst coverage (RES_NUM_ANALYSTS), where residual analyst coverage is determined in a regression of analyst coverage on bank size. If our hypothesis holds, banks with greater residual analyst coverage should have a lower propensity to cut or omit and a greater propensity to initiate share repurchases. Also, we use the fact that a bank is a Bank Holding Company (BHC) rather than a listed commercial bank (BHC_INDICATOR) as another proxy for agency costs. Prior literature evidences that financial conglomerates are more complex than listed banks and give managers more opportunities for shareholder expropriation (Doukas et al., 2000; Laeven and Levine, 2007). Consistent with Mayne's (1980) results, should find that the dividend policies of BHCs are more persistent than those of listed banks.

Finally, we proxy the intensity of the banking crisis with the TED spread, that is the difference between the 3-month LIBOR and secondary market rates on 3-month US Treasury Bills.

If dividend repurchases substitute for dividends, we should find a similar influence of ownership structure and agency costs on the propensity to initiate buybacks. If dividend repurchases do not trigger addiction, only some of our variables of interest may increase the likelihood of buybacks. If the crisis has a muting influence on bank dividend policies, we should find that the propensity to omit or cut dividends increases with the TED spread.

Summary statistics are provided in Table 4 for subsamples partitioned by quarterly dividend decision and in Table 5 for subsamples partitioned by quarterly buyback decisions.

The statistics in Table 4 suggest that banks that omit dividends differ significantly from those that pay them. First, the omitting banks are owned by a less dispersed institutional

Table 4: Summary statistics: means and (standard deviations) of dependent and control variables, clustered by the dividend status of sample banks in each quarter. Dividend Paid clusters bank-quarters during which a dividend was declared. Dividend Omitted clusters bank-quarters during which no dividend was paid despite a prior history of dividend payment. Dividend Maintained or Increased clusters bank-quarters during which banks maintained or increased their nominal quarterly dividend. Dividend Cut clusters bank-quarters during which banks reduced their nominal quarterly dividend. ***, **, and * denote statistical significance levels of 1%, 5%, and 10% of a t-test between the mean of each subsample and that of the Dividend Paid subsample.

Variable	Dividend Paid	Dividend Omitted	Dividend Maintained or Increased	Dividend Cut
RES_NUM_OWNERS	0.908 (89.308)	-8.247*** (71.530)	1.399 (88.909)	-12.392** (98.824)
INSTIT_OWN_HHI	0.103 (0.121)	0.185*** (0.181)	0.102 (0.119)	0.120 (0.182)
BHC_INDICATOR	0.756 (0.430)	0.776 (0.417)	0.757 (0.429)	0.733 (0.444)
RES_NUM_ANALYSTS	0.204 (4.145)	-1.850*** (4.453)	0.247 (4.126)	-0.977*** (4.477)
LOG_ASSETS	8.600 (1.516)	7.987*** (1.101)	8.588 (1.505)	8.902*** (1.764)
CAP_TO_RBC	0.140 (0.038)	0.134*** (0.041)	0.140 (0.038)	0.135** (0.032)
CASH_MKT_SEC_TO_ASSETS	0.046 (0.047)	0.075*** (0.051)	0.046 (0.047)	0.045 (0.044)
EQUITY_TO_ASSETS	0.097 (0.031)	0.065*** (0.036)	0.097 (0.031)	0.087*** (0.023)
QCH_ASSETS	0.019 (0.052)	-0.026*** (0.254)	0.019 (0.051)	0.007*** (0.061)
QUARTER_ROA	0.002 (0.003)	-0.004*** (0.023)	0.002*** (0.003)	-0.002*** (0.008)
RET_EARN_TO_ASSETS	0.038 (0.032)	-0.007*** (0.051)	0.038 (0.032)	0.028*** (0.031)
AVG_TED	57.070 (50.105)	49.491*** (50.099)	55.456* (48.837)	100.849*** (62.784)
D_{it-1}	0.996 (0.066)	0.114*** (0.318)		(0.000)
UNDER_TARP	0.114 (0.317)	0.526*** (0.500)	0.101** (0.302)	0.449*** (0.498)
N	6,836	753	6,593	243

investor base, consistent with the substitute hypothesis. Second, the omitting banks are covered by fewer sell-side analysts, suggesting that they are less subject to agency costs. Third, the omitting banks are smaller on average than dividend-paying banks. Larger banks may have more to lose or may feel protected because they are too big to fail. Fourth, the omitting banks hold more cash than the paying banks. They may be more prudent; equally, they may be facing a cash crisis. Fifth, the omitting banks report fewer retained earnings on their balance sheet, consistent with the fact that they may have exhausted their capital buffers.

Banks that cut dividends have a greater resemblance to those that pay dividends than to those that omit them. However, the cutting banks are unprofitable and larger. Besides, in common with the dividend omitting banks, the cutting banks have higher leverage and lower capital ratios, consistent with Onali's (2014) findings. Both the cutting and omitting banks also experience low asset growth or even contraction and are much more likely to have received support from the US Treasury through the CPP. Interestingly, the TED spread suggests that unlike dividend cutting decisions, omission decisions are made during periods of lower stress, although this may be a feature of the short period of time over which most banks decided to omit.

The statistics in Table 5 show that banks that initiate share repurchases also differ from the banks that do not. First, the initiating banks are owned by a widely dispersed institutional shareholder base, again consistent with the substitute hypothesis. Alternatively, this may result from a clientele effect, such as that documented by Grinstein and Michaely (2005). Second, the initiating banks hold less cash, more equity and more retained earnings than the others. Third, the repurchasing banks are larger. Fourth, they are more profitable, consistent with share repurchases being launched in good times and opportunistically, at times when banks are most likely to over-invest (Grullon and Michaely, 2002). The statistics also suggest that, in contrast with dividend policies, share repurchase decisions are not driven by shareholder concentration or the severity of agency

costs of free cash flows.

3.2. Empirical Approach

Our primary focus is on the addition of banks to dividends, and therefore on their reluctance to cut or omit dividends, rather than on absolute or relative dividend payouts. Our secondary focus is on the drivers of share repurchase decisions rather than on their modalities. Our empirical approach models dividend and buyback decisions as binary outcomes. For dividend omissions, following Fama and French (2001), outcomes take the value 1 when banks pay a dividend, regardless of its level, and 0 when they omit it. For dividend cuts, following Benito and Young (2003), outcomes take the value 1 when banks maintain or increase the nominal value of a dividend compared to the last paid dividend, and 0 when they pay a lower (but non-zero) nominal dividend. Distinguishing omissions from cuts makes it possible to compare the drivers and implicit severity of the two dividend decisions. For share buybacks, outcomes take the value 1 when banks initiate dividends and 0 when they do not.

We estimate random effects probit regressions with maximum likelihood while controlling for time effects:⁷

$$Prob(D_{it} = 1 \mid D_{it-1}, X_{it}, T_t) = \Phi(\alpha + \tau T_t' + \beta X_{it}' + \delta D_{it-1} \mathbf{1}_{omissions|repurchases} + v_i + \epsilon_{it}) \quad (1)$$

where $Prob$ is the probability operator, i indexes banks and t , quarters, D_{it} is the binary outcome for bank i at time t as described above, X_{it} is a vector with the characteristics of bank i at time t , T_t is a vector of bank-independent control variables at time t , Φ is the cumulative distribution function of the standard normal distribution, α (the intercept), τ , β , and δ are the regression parameters to be estimated and ϵ_{it} is an error term.

⁷This choice is further discussed in 5.1, together with an alternative specifications of the random effects probit regressions.

Table 5: Summary statistics: means and (standard deviations) of dependent and control variables, clustered by the share buyback status of sample banks in each quarter. No Buyback Initiated clusters bank-quarters during which no share buyback is initiated. Buyback Initiated clusters bank-quarters during which a share buyback is initiated. ***, **, and * denote statistical significance levels of 1%, 5%, and 10% of a t-test between the mean of each subsample and that of the Dividend Paid subsample.

Variable	No Buyback Initiated	Buyback Initiated
RES_NUM_OWNERS	-1.409 (85.728)	19.638*** (110.386)
INSTIT_OWN_HHI	0.111 (0.130)	0.110 (0.146)
BHC_INDICATOR	0.759 (0.427)	0.734 (0.442)
RES_NUM_ANALYSTS	-0.007 (4.232)	0.091 (4.063)
LOG_ASSETS	8.529 (1.474)	8.681* (1.709)
CAP_TO_RBC	0.139 (0.038)	0.142 (0.049)
CASH_MKT_SEC_TO_ASSETS	0.049 (0.048)	0.044** (0.045)
EQUITY_TO_ASSETS	0.093 (0.033)	0.102*** (0.033)
QCH_ASSETS	0.014 (0.097)	0.017 (0.053)
QUARTER_ROA	0.001 (0.008)	0.003*** (0.002)
RET_EARN_TO_ASSETS	0.033 (0.037)	0.039*** (0.032)
AVG_TED	56.529 (50.698)	53.377 (41.728)
PRIOR_BUYBACK_INITIATED	0.069 (0.253)	0.063 (0.243)
UNDER_TARP	0.165 (0.371)	0.006*** (0.077)
N	7,081	508

We account for dividend persistence in omission regressions via the autoregression term D_{it-1} .⁸ We account for the fact that buybacks may span two or more quarters during which banks do not initiate new buybacks via the same autoregression term.⁹ We include random effects, that is, company-specific, time-independent factors that are assumed to be randomly distributed, via the variable v_i , with $v_i \sim N(0, s_v^2)$.¹⁰ Unlike in Benito and Young (2003), we control explicitly for time effects through T_t and through bank-specific time effects included in X_{it} rather than through fixed effects. We measure bank-independent time effects through the average TED spread during the dividend quarter (AVG_TED), which reflects the intensity of the liquidity stress experienced by banks during the crisis. Bank-specific time effects consist of the financial support provided by the US Treasury under the TARP CPP (UNDER_TARP), often through the issuance of preferred stock or subordinated debentures to the US Treasury, together with warrants.

Other controls are consistent with those in prior literature; they include quarterly change in assets (QCH_ASSETS), the ratio of equity capital to assets (EQUITY_TO_ASSETS), and the ratio of retained earnings to assets (RET_EARN_TO_ASSETS). Quarterly change in assets controls for investment opportunities, as in Fama and French (2001).

⁸ $\mathbb{1}_{omissions|buybacks}$ is the indicator function that takes the value 1 for omission and buyback regressions and 0 for other regressions.

⁹Among our regressions, only the omission regression is subject to the initial conditions problem due to the use of a lagged version of the dependent variable in a binary response model (Heckman, 1981). This problem occurs because the model cannot account for responses prior to the sample period, and in particular at the start of the underlying process. The problem may lead to an estimator that is inconsistent and biased. However, under our hypothesis that reputational concerns drive payout decisions, the binary pay/omit process should not have a long-term memory. In particular, this process should not depend on an initial condition with or without a dividend payment. Only the very recent history of the process should matter to bank managers. Unreported regressions in which we test the influence of pre-sample omissions for all sample banks suggest the absence of a long-term memory. We find that a dummy variable taking the value 1 if a bank omitted dividends at least once prior to the sample period (12 occurrences for 12 distinct banks over a history of 13,919 dividend decisions going back to the late 1970s for certain banks) and 0 otherwise is not statistically significant in omission regressions. Likewise, pre-sample decisions to cut (136 occurrences) do not affect decisions to omit. Similarly, a measurement of the number of omissions or cuts divided by the number of dividend decisions we have on record for sample banks is no more significant. Finally, our conclusions are identical to those presented below if we omit the lagged dependent variable in regressions, except for the fact that the intensity of the crisis (AVG_TED) becomes statistically insignificant.

¹⁰By contrast, the error term ϵ_{it} is both time and bank dependent, with $\epsilon_{it} \sim N(0, s_\epsilon^2)$.

The capital-to-assets ratio measures banks' leverage and the extent to which they can suffer losses on their assets before exhausting their capital. The retained-earnings-to-assets ratio is a related metric that captures shareholders' historical preferences for distributing earnings as dividends (DeAngelo et al., 2006). Controls specific to the banking industry address prior claims made in the literature. First, cash and short-term securities holdings (CASH_MKT_SEC_TO_ASSETS) and quarterly profits deflated by assets (QUARTER_ROA) control for Keen's (1978, p. 5) contention that "no banker would cut dividends unless his bank were in a severe earnings or liquidity crunch." Second, bank size (LOG_ASSETS) and regulatory capital (CAP_TO_RBC) control for scholarly hypotheses that banks may have continued paying dividends well into the crisis because of the implicit government guarantees from which larger banks benefit and because of overly flattering capital ratios.

4. Empirical Results

4.1. Dividend Persistence

Tables 6 and 7 report estimates of the random effects probit models that assess the influence of our variables of interest on the propensity to omit or cut dividends. Table 8 further assesses the joint influence of the financial crisis and of institutional ownership on the persistence of dividends by interacting ownership concentration with the TED spread. The tables report goodness of fit statistics appropriate for such models (Nakagawa and Schielzeth, 2013). More specifically, the tables report the marginal R^2 , which is concerned with the variance explained only by the tested variables (and fixed effects, if any). The tables also report the conditional R^2 , also concerned with the variance explained by random effects.

We discuss our results by describing what the regressions tell us on various influences on bank dividend policies.

Table 6: Random effects probit regressions to explain dividend omissions by US banks between 30 June 2004 and 30 September 2012. The binary dependent variable takes the value 0 if a bank omitted a dividend in a quarter and 1 otherwise. The sample includes 287 banks and 7,589 bank quarters. Dependent variables are described in Table 3. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively, and z statistics are reported in parentheses below parameter estimates.

	(1)	(2)	(3)	(4)
RES_NUM.OWNERS	0.004** (0.001)			0.004*** (0.001)
INSTIT_OW_N_HHI		-0.299 (0.438)		0.034 (0.466)
RES_NUM.ANALYSTS			0.074*** (0.020)	0.087*** (0.022)
BHC_INDICATOR	0.140 (0.177)	0.168 (0.163)	0.084 (0.160)	0.047 (0.173)
LOG_ASSETS	0.315*** (0.087)	0.201*** (0.062)	0.319*** (0.073)	0.449*** (0.103)
CASH_MKT_SEC_TO_ASSETS	-5.623*** (1.539)	-4.528*** (1.375)	-4.978*** (1.356)	-6.037*** (1.500)
CAP_TO_RBC	-0.130 (2.765)	-0.199 (2.560)	-0.288 (2.512)	-0.141 (2.670)
EQUITY_TO_ASSETS	20.762*** (3.856)	19.671*** (3.705)	17.886*** (3.602)	18.134*** (3.724)
QCH_ASSETS	4.926*** (1.172)	4.533*** (0.635)	4.541*** (0.653)	5.078*** (1.177)
QUARTER_ROA	39.036*** (6.683)	39.736*** (5.751)	41.217*** (5.798)	40.682*** (6.714)
RET_EARN_TO_ASSETS	4.833* (2.562)	4.380* (2.340)	4.525* (2.354)	4.904* (2.549)
AVG_TED	-0.005*** (0.001)	-0.005*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
D_{it-1}	3.989*** (0.184)	3.940*** (0.173)	3.904*** (0.172)	3.957*** (0.184)
UNDER_TARP	-0.716*** (0.162)	-0.723*** (0.154)	-0.739*** (0.153)	-0.736*** (0.159)
Constant	-5.174*** (0.829)	-4.192*** (0.666)	-4.879*** (0.680)	-5.892*** (0.934)
Observations	7,589	7,589	7,589	7,589
Marginal R ²	72.6%	72.0%	74.3%	75.9%
Conditional R ²	82.1%	79.8%	80.8%	83.3%

Table 7: Random effects probit regressions to explain dividend cuts by US banks between 30 June 2004 and 30 September 2012. The binary dependent variable takes the value 0 if a bank cut its nominal dividend in a quarter and 1 otherwise. The sample includes 286 banks and 6,836 bank quarters. Dependent variables are described in Table 3. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively, and z statistics are reported in parentheses below parameter estimates.

	(1)	(2)	(3)	(4)
RES_NUM_OWNERS	0.0004 (0.0004)			0.001 (0.0004)
INSTIT_OWN_HHI		-1.023*** (0.212)		-0.957*** (0.216)
RES_NUM_ANALYSTS			0.024*** (0.008)	0.020** (0.008)
BHC_INDICATOR	0.210*** (0.079)	0.246*** (0.077)	0.177** (0.080)	0.217*** (0.078)
LOG_ASSETS	-0.033 (0.023)	-0.066*** (0.022)	-0.026 (0.022)	-0.057** (0.023)
CASH_MKT_SEC_TO_ASSETS	-0.018 (0.776)	0.236 (0.752)	0.152 (0.770)	-0.007 (0.768)
CAP_TO_RBC	0.194 (1.282)	0.375 (1.249)	0.342 (1.265)	0.599 (1.241)
EQUITY_TO_ASSETS	2.872* (1.532)	2.139 (1.496)	2.117 (1.530)	1.775 (1.502)
QCH_ASSETS	0.816 (0.605)	0.965 (0.607)	0.873 (0.602)	0.990 (0.606)
QUARTER_ROA	46.768*** (6.327)	47.836*** (6.228)	47.665*** (6.307)	46.972*** (6.243)
RET_EARN_TO_ASSETS	0.889 (1.117)	1.032 (1.081)	0.958 (1.117)	1.152 (1.084)
AVG_TED	-0.005*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)	-0.005*** (0.001)
UNDER_TARP	-0.818*** (0.084)	-0.837*** (0.077)	-0.845*** (0.084)	-0.848*** (0.078)
Constant	2.146*** (0.255)	2.540*** (0.259)	2.141*** (0.253)	2.489*** (0.264)
Observations	6,836	6,836	6,836	6,836
Marginal R ²	19.1%	20.3%	19.5%	21.1%
Conditional R ²	20.2%	20.3%	20.6%	21.1%

Agency Costs. Tables 6 and 7 show a clear influence of our main variables of interest on dividend policies, but the difference between the models is subtle. First, banks with a more widely dispersed shareholder base (RES_NUM_OWNERS) are less likely to omit dividends, but not to cut them. Second, banks with a more concentrated shareholder base (INSTIT_OWN_HHI) have a greater propensity to cut dividends, but not to omit them. Third, Bank Holding Companies (BHC_INDICATOR set at one) have a lower propensity than listed banks to cut, but not omit, dividends. Fourth, the reluctance to omit and cut dividends increases with the severity of agency costs (RES_NUM_ANALYSTS).¹¹

Bank managers appear to maintain dividends to defuse the situation in which minority shareholders are unable to, or unwilling to, invest in monitoring the banks. Minority shareholders may be unable to effectively monitor banks because they are opaque. They may be unwilling to do so because the costs of monitoring are excessive. By contrast, concentrated shareholders appear to alleviate the pressure on management to maintain dividends at high levels. They have stronger incentives to invest in monitoring. They may also be represented on Boards of Directors and get access to private information.

The lower propensity of Bank Holding Companies to cut dividends compared to listed banks appears coherent with this explanation. It is congruent with Mayne's (1980) findings, as are the payout regressions presented in Paragraph 5.2. Arguably, Bank Holding Companies give managers more opportunities for shareholder expropriation. Alternatively, Bank Holding Companies may attract a greater diversity of investors that

¹¹Unreported regressions show that these results are robust to alternative specifications of the regressions, including using strictly lagged accounting measurements as independent variables, replacing QUARTER_ROA with the natural logarithm of the Z-score, a measurement of bank risk-taking (see Laeven and Levine (2009)), omitting the prior quarter dividend decision D_{it-1} and removing random effects altogether. Conclusions are also qualitatively similar to those in the omission regressions when the binary dependent variable takes the value 1 when banks pay a significant fraction (above 5%, 10%, or 20%) of their highest prior dividend over the period, and 0 when they only pay a small fraction (respectively below 5%, 10%, or 20%) of that dividend or omit altogether. In the case of the dividend omission regressions, the results are also robust to estimating fixed effect logistic regressions instead of random effect probit regressions. In the case of the dividend cut regressions, the limited variability of shareholder concentration and Bank Holding Company status over time for any given bank makes fixed effects logistic regressions inappropriate as robustness checks. Additional robustness tests are documented in Section 5.

may not be adequately captured by our ownership structure variables. In either case, BHC_INDICATOR indicates that agency costs are exacerbated.

We interpret these results as providing empirical support for our hypothesis. By paying dividends, those in control seek to uphold a reputation for restraint in expropriating weaker shareholders that are the least capable of exerting control over management actions. Upholding this reputation is more important for banks in which agency costs are more severe. Upholding this reputation is also more significant among the most transient investors, whose loss would trigger a higher cost of capital and possibly greater difficulty in accessing equity markets, as the regressions in Paragraph 5.1 suggest. Finally, upholding a reputation for reasonableness appears to be of primary importance during stress periods. We observe, in Table 8, that highly concentrated shareholders reverse their previous influence and induce a lower propensity to cut in times of acute crisis.

Also, the models (together with those presented in paragraphs 5.1 and 5.2) suggest some tension between minority and concentrated shareholders. Bank managers are reluctant to omit dividends in the “static”, pay-omit equilibrium, under the influence of minority shareholders. Managers seek to maintain their reputation among those shareholders by paying dividends. But managers are also willing to cut dividends in the “dynamic”, maintain-cut equilibrium, under the influence of concentrated shareholders. Managers may be put under pressure to maintain dividends at elevated levels by dispersed shareholders and by controlling shareholders in times of acute crisis. The fact that bank dividend policies may be a response to the tension between minority and concentrated shareholders agrees with recent findings that adequate dividend policies help address agency conflicts between minority and powerful owners (Bøhren et al., 2012; Bodenhorn, 2014).

Regulatory Influence. Tables 6 and 7 suggest that the acceptance of capital injections under the CPP program coincided with a higher propensity to cut and omit dividends,

Table 8: Random effects probit regressions to assess the influence of the crisis on the propensity of US banks to omit (Regression 1) or cut (Regression 2) dividends or to initiate share repurchases (Regression 3) between 30 June 2004 and 30 September 2012. The binary dependent variable takes the value 0 if a bank omitted a dividend (Regression 1), cut a dividend (Regression 2) or did not initiate a share repurchase (Regression 3) in a quarter and 1 otherwise. The sample includes 287 banks and 7,589 bank quarters for dividend omissions and share repurchase initiations and 286 banks and 6,836 bank quarters for dividend cuts. Dependent variables are described in Table 3. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively, and z statistics are reported in parentheses below parameter estimates. For conciseness, the bank control variables and the intercept are not reported.

	Dividend Omission	Dividend Cut	Repurchase Initiated
	(1)	(2)	(3)
RES_NUM_OWNERS	0.004*** (0.001)	0.001 (0.0004)	0.001*** (0.0003)
INSTIT_OWN_HHI	-0.250 (0.605)	-1.739*** (0.325)	-0.006 (0.300)
INSTIT_OWN_HHI*AVG_TED	0.004 (0.006)	0.014*** (0.005)	0.004 (0.003)
RES_NUM_ANALYSTS	0.087*** (0.022)	0.021** (0.008)	0.001 (0.007)
BHC_INDICATOR	0.047 (0.174)	0.219*** (0.079)	-0.022 (0.072)
LOG_ASSETS	0.454*** (0.104)	-0.051** (0.024)	0.039* (0.021)
AVG_TED	-0.005*** (0.001)	-0.006*** (0.001)	-0.001 (0.001)
D_{it-1}	3.960*** (0.185)		-0.321*** (0.097)
UNDER_TARP	-0.741*** (0.160)	-0.851*** (0.078)	-1.388*** (0.210)
Observations	7,589	6,836	7,589
Marginal R ²	75.9%	21.6%	24.4%
Conditional R ²	83.4%	21.6%	30.5%

despite potential prior cuts.¹² In other words, regulators had to intervene to (temporarily) cure banks from their addiction. Most banks were too dependent on dividends to cut as much as regulators forced them to.

Interestingly, dividend persistence is not driven by elevated regulatory capital ratios (CAP_TO_RBC). Instead, banks appear less likely to omit dividends, if their equity (EQUITY_TO_ASSETS) or their retained earnings (RET_EARN_TO_ASSETS) are higher, consistent with a preparedness to exhaust capital buffers before omitting dividends. By contrast, the regressions presented in Section 5.2 evidence that payouts decrease with regulatory capital ratios and suggest that better capitalized banks were more prudent than others.

Bank Size. Bank size has a contrasted influence on the propensity to cut and omit dividends. Larger banks exhibit greater tolerance than smaller ones, i.e., they are more prepared to reduce payout. By contrast, they are unwilling to go “cold turkey”, i.e., to omit dividend payments altogether. Controlling for agency costs, and following Becker and Murphy’s (1988) conclusions, it appears that larger banks are more addicted to dividends than smaller ones.

This finding concurs with prior evidence that the stakes are higher for larger banks, possibly because they are more reliant on markets and have a more crucial need to establish a reputation in capital markets (Bessler and Nohel, 1996). It also agrees with larger banks being induced by too-big-to-fail guarantees to maintain dividend policies unchanged and to risk shift (Kanas, 2013; Onali, 2014).

¹²Unreported regressions, in which UNDER_TARP is replaced by a measurement of capital injected, further highlight that the pressure imposed by US authorities may have been proportional to the injected capital and may have differed according to the securities that they purchased. We reach these conclusions by replacing the binary variable UNDER_TARP with either the log of capital injected (plus one) or the ratio of capital injected by the US Treasury to total assets, and by incorporating binary variables corresponding to different type of securities purchased by the government. All other conclusions described above are robust to the inclusion of these variables as well as to the omission of any influence of the CPP program. Other unreported regressions, in which banks that failed during the crisis are removed from the sample, also confirm that our conclusions are robust to forceful regulatory actions at failing banks.

4.2. Share repurchases

Table 9 reports estimates of the random effects probit models that assess the influence of ownership and agency cost variables on the propensity to initiate share repurchases. We contrast these results with those obtained in Section 4.1.

The regressions suggest that banks with a widely dispersed ownership are more likely to initiate share repurchases, in particular when banks are profitable and growing. Like dividends, buybacks appear to help management defuse agency costs of free cash flows. In doing so, buybacks substitute for the monitoring that smaller or more transient shareholders may not be willing to exercise. The alternative explanation that repurchases may cater to clientele effects is only partly withheld in our robustness tests discussed in Section 5.1.

Also, banks are no less likely to initiate purchases when institutional ownership is concentrated, both during normal and stress periods (as shown in Table 8). Banks are no more likely to launch buybacks when they exhibit more elevated agency costs. Buybacks appear more important for managers of larger banks, perhaps because agency costs of free cash flows are magnified by bank size, or because the stakes are higher than for smaller banks, as concluded above.

5. Robustness Tests

5.1. Endogeneity: clientele effects

On the one hand, the relationship between payout policy and ownership dispersion that we observe could be endogenous if it is driven by clientele effects similar to those observed by Grinstein and Michaely (2005). Such clientele effects would translate into institutional shareholders selecting the banks they invest in based on their *ex ante* expectations of dividend and repurchase policies rather than managers adopting payout policies influenced by their owners and seeking to maintain a reputation. On the other hand, the fact

Table 9: Random effects probit regressions to explain share buy back initiations by US banks between 30 June 2004 and 30 September 2012. The binary dependent variable takes the value 1 if a bank initiated a share buyback in a quarter and 0 otherwise. The sample includes 287 banks and 7,589 bank quarters. Dependent variables are described in Table 3. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively, and z statistics are reported in parentheses below parameter estimates.

	(1)	(2)	(3)	(4)
RES_NUM_OWNERS	0.001*** (0.0003)			0.001*** (0.0003)
INSTIT_OWN_HHI		0.222 (0.215)		0.207 (0.216)
RES_NUM_ANALYSTS			-0.0002 (0.007)	0.001 (0.007)
BHC_INDICATOR	-0.016 (0.072)	-0.019 (0.072)	-0.014 (0.073)	-0.022 (0.072)
LOG_ASSETS	0.033* (0.020)	0.045** (0.021)	0.038* (0.020)	0.040* (0.021)
CASH_MKT_SEC_TO_ASSETS	-1.846*** (0.674)	-1.552** (0.665)	-1.538** (0.665)	-1.859*** (0.674)
CAP_TO_RBC	-0.063 (0.889)	-0.096 (0.892)	-0.062 (0.893)	-0.090 (0.890)
EQUITY_TO_ASSETS	2.481** (1.130)	2.412** (1.139)	2.295** (1.142)	2.572** (1.140)
QCH_ASSETS	0.927** (0.371)	0.959*** (0.370)	0.955*** (0.370)	0.932** (0.371)
QUARTER_ROA	12.006** (4.820)	12.878*** (4.805)	12.943*** (4.814)	11.982** (4.818)
RET_EARN_TO_ASSETS	0.791 (0.921)	0.915 (0.927)	0.916 (0.930)	0.795 (0.919)
AVG_TED	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
D_{it-1}	-0.318*** (0.097)	-0.315*** (0.097)	-0.313*** (0.097)	-0.320*** (0.097)
UNDER_TARP	-1.394*** (0.211)	-1.408*** (0.208)	-1.409*** (0.208)	-1.392*** (0.211)
Constant	-1.924*** (0.209)	-2.043*** (0.227)	-1.958*** (0.211)	-2.002*** (0.224)
Observations	7,589	7,589	7,589	7,589
Marginal R ²	24.4%	23.5%	23.5%	24.4%
Conditional R ²	30.5%	30.0%	30.0%	30.5%

that the relationship between bank payout policies and ownership concentration could be endogenous appears less problematic.

Importantly, all of our variables of interest are binary policy decisions. It is not obvious that dispersed shareholders would self-select the banks they invest in based on their *ex ante* expectations of dividend decisions in times of crisis rather than on dividend payout levels. By contrast, it seems reasonable to expect that dispersed shareholders would self-select those banks that have a habit of initiating share repurchases when the risk of over-investing increases.

Nonetheless, we address the potential endogeneity that may affect our interpretation of reputation effects by estimating additional regressions in which we split the ownership variables between their mean for each bank over the sample period and quarterly variations compared to this mean. If clientele effects drive our results, the propensity to maintain dividends unchanged and that to initiate share repurchases should increase with the mean dispersion of shareholders. By contrast, if reputation effects drive our results, dividend policies should be significantly influenced by variations of our variables of interest around the mean.

In doing so, we adopt the regression specification suggested by Bell and Jones (2015) to address potential endogeneity problems in random effect regressions:¹³

$$\begin{aligned} & Prob(D_{it} = 1 \mid D_{it-1}, X_{it}, T_t) \\ & = \Phi(\alpha + \tau T'_t + \beta_1 (X_{it} - \bar{X}_i) + \beta_2 \bar{X}_i + \delta D_{it-1} \mathbb{1}_{omissions|repurchases} + \nu_i + \epsilon_{it}) \quad (2) \end{aligned}$$

where \bar{X}_i is a vector with the mean characteristics of bank i over the full sample period.

¹³Bell and Jones (2015) demonstrate that there are few instances in which fixed effects models are preferable to random effects models since the former can be seen as constrained forms of the latter. The same researchers find that the assumptions underlying random effects are no more demanding than those relating to their fixed effects counterparts. They also show that, on the one hand, fixed effects dummy coefficients are not measured reliably and that, on the other hand, only random effects models reveal specific characteristics at the aggregate level.

Table 10: Alternative specification of random effects probit regressions to show the robustness of agency costs in explaining dividend omissions and cuts and the initiation of share repurchases by US banks between 30 June 2004 and 30 September 2012. This specification follows Bell and Jones (2015). The binary dependent variable takes the value 0 if a bank omitted (Regression 1) or cut (Regression 2) a dividend in a quarter and 1 otherwise. The sample includes 287 banks and 7,589 bank quarters for dividend omissions and 286 banks and 6,836 bank quarters for dividend cuts. For each bank, the dependent variables are the dependent variables described in Table 3 averaged over all bank quarters (MEAN_i) or demeaned by the average over all bank quarters (DEMEANED_i) as per Equation 2. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively, and z statistics are reported in parentheses below parameter estimates. For conciseness, bank control variables and the constant are not reported.

	Dividend Omission	Dividend Cut	Repurchase Initiated
	(1)	(2)	
MEAN_RES_NUM_OWNERS	0.002 (0.001)	0.00004 (0.0004)	0.001** (0.0004)
MEAN_INSTIT_OWN_HHI	0.015 (0.509)	-1.253*** (0.246)	-0.045 (0.280)
MEAN_LOG_ASSETS	0.421*** (0.094)	-0.057** (0.025)	0.050** (0.022)
DEMEANED_RES_NUM_OWNERS	0.010*** (0.003)	0.003** (0.001)	0.002* (0.001)
DEMEANED_INSTIT_OWN_HHI	1.514 (0.945)	0.155 (0.561)	0.841** (0.394)
DEMEANED_LOG_ASSETS	-1.574*** (0.493)	-0.918*** (0.225)	-0.383*** (0.124)
RES_NUM_ANALYSTS	0.059*** (0.019)	0.018** (0.009)	0.004 (0.007)
BHC_INDICATOR	-0.072 (0.165)	0.189** (0.082)	-0.027 (0.073)
AVG_TED	-0.004*** (0.001)	-0.005*** (0.001)	-0.0003 (0.001)
D_{it-1}	4.229*** (0.212)		-0.347*** (0.098)
UNDER_TARP	-0.501*** (0.151)	-0.820*** (0.082)	-1.305*** (0.214)
Observations	7,589	6,836	7,589
Marginal R ²	82.7%	27.0%	25.1%
Conditional R ²	85.2%	27.0%	30.9%

We show regression estimates in Table 10. In the regressions, we denote by \bar{X}_i by MEAN_i and $(X_{it} - \bar{X}_i)$ by Demeaned_i.

The regressions support our prior conclusions that reputation, rather than clientele effects, increases the persistence of dividends. The propensity to pay and to maintain dividends is greater when shareholder dispersion is above average prior to dividend decisions. This is consistent with management seeking to establish a reputation among the most transient investors. These investors are arguably the least informed and the least willing to invest in monitoring and therefore those for which agency costs appear as the most severe. The loss of these investors appears as a financial shock that management wants to avoid, especially in times of stress, since it would translate into higher costs of capital and may even threaten their access to equity markets.

By contrast, the propensity to cut dividends is permanently higher for banks whose ownership is more concentrated, independently of fluctuations in shareholder concentration. This is once again consistent with the substitute hypothesis. There is less need for management to preserve a reputation if large shareholders constantly invest in monitoring (or are granted privileged access to private information) and the other dispersed shareholders rely on the largest shareholders to monitor management.

As expected, share repurchases are not entirely driven by reputational aspects. Clientele effects are also at play. A high average dispersion of institutional owners is associated with a greater propensity to initiate buybacks. Nonetheless, above average shareholder dispersion clearly influences share repurchases, consistent with our prior interpretation. Interestingly, above average ownership concentration also positively influences the propensity to initiate buybacks. Concentrated owners appear to favor increasing their hold on the business. However, we note that this may be a consequence of repeated buyback in which other institutional shareholders dispose of their holdings and the concentration of controlling owners mechanically increases over time.

Finally, the propensity to omit appears circumstantial, as larger banks seem keen to

avoid omitting dividends unless they have assets substantially above the sample period average. In fact, the heightened propensity to both omit and cut dividends associated with above-average assets may result from excessive growth, similar to that observed by Foos et al. (2010), leading to lower overall bank quality and being driven by management risk-taking.

5.2. Intensity: payout

In order to further test the robustness of the dividend cut regressions shown in tables 7 and 8, we seek to explain the quarterly dividend payout of the banks in our data set. If our results concerning dividend decisions are robust, we should observe that ownership structures influence dividend payouts and not only binary dividend policies. More specifically, if agency costs influence dividend payout, we should find that payout increases together with the dispersion of institutional shareholders and decreases with their concentration. We should also find that, in times of stress, concentrated shareholders induce a higher payout to help maintain the bank reputation among dispersed shareholders.

Following Abreu and Gulamhussen (2013), we regress the total dividend payout scaled by total assets P_{it} against the explanatory variables described previously.

$$P_{it}(X_{it}, T_t) = \alpha + \tau T_t' + \beta X_{it}' + v_i + \epsilon_{it} \quad (3)$$

Like Abreu and Gulamhussen (2013), we do not normalize payout by the stock price or earnings considering the heightened volatility of either measurement during the crisis. As previously, we address the heterogeneity in our sample by controlling for bank random effects in Tobit regressions. We focus on explaining the scaled payout rather than changes in payout. We show regression estimates in Table 11.

The regressions are clearly consistent with our main prior conclusions. Bank dividend payouts increase with shareholder dispersion and decrease with ownership concentration, except during periods of heightened crisis. However, our proxies for the sever-

Table 11: Random effects Tobit regressions to explain the quarterly dividend payout of US banks scaled by total assets between 30 June 2004 and 30 September 2012. The sample includes 284 banks and 6,782 bank quarters. Dependent variables are described in Table 3. ***, **, and * denote statistical significance levels of 1%, 5%, and 10%, respectively, and z statistics are reported in parentheses below parameter estimates.

	(1)	(2)
RES_NUM.OWNERS	0.0008*** (0.0002)	0.0008*** (0.0002)
INSTIT_OWN_HHI	-0.399** (0.183)	-0.608*** (0.195)
INSTIT_OWN_HHI*AVG_TED		0.004*** (0.001)
RES_NUM_ANALYSTS	-0.033*** (0.003)	-0.033*** (0.003)
BHC_INDICATOR	-0.035 (0.091)	-0.035 (0.091)
LOG_ASSETS	-0.102*** (0.024)	-0.102*** (0.024)
CAP_TO_RBC	-3.325*** (0.384)	-3.342*** (0.393)
CASH_MKT_SEC_TO_ASSETS	-0.485 (0.368)	-0.485 (0.375)
EQUITY_TO_ASSETS	2.548*** (0.560)	2.524*** (0.593)
QCH_ASSETS	-0.106 (0.288)	-0.100 (0.296)
QUARTER_ROA	18.660*** (3.388)	18.360*** (3.434)
RET_EARN_TO_ASSETS	8.104*** (0.351)	8.119*** (0.347)
AVG_TED	0.0003 (0.0003)	-0.0001 (0.0003)
UNDER_TARP	-0.307*** (0.034)	-0.307*** (0.034)
Intercept	1.877*** (0.221)	1.898*** (0.220)
Observations	6,782	6,782
Log-likelihood	-8,209.455	-8,206.605

ity of agency costs appear to take different meanings in this setting. Our first proxy for agency costs, BHC_INDICATOR, is not statistically significant. Our second proxy, RES_NUM_ANALYSTS, takes a negative sign in the regressions, suggesting that analysts are effective in reducing agency costs of free cash flows, consistent with prior findings (Doukas et al., 2000).¹⁴

6. Conclusion

During the 2007-09 financial crisis, many banks had no choice but to eventually reduce dividend dosages. Some only took radical action under regulatory pressure. Others, like Lehman Brothers, died after increasing dividends, as if from overdose. After the crisis, most surviving banks fell back into their dependence.

This addictive behavior is a major cause of concerns for regulators because it puts the whole banking system at risk. Nonetheless, this behavior has not frequently been studied, one of the reasons being the strength of the addiction itself. Sometimes interpreted as recklessness, this addiction may be rational on the part of bank managers if two conditions are met. First, banks are subject to severe agency costs of free cash flows but cannot be monitored efficiently by investors. Banks establish a reputation for moderation in expropriating shareholders through their dividend policies; they have no alternatives. Second, managers attribute particular value to the reputation of their bank in times of crisis, when issuing equity becomes likelier.

This paper provides strong support for the first condition using a broad panel of US banks during a period that spans the financial crisis. The strength of banks' addiction to dividends grows with the severity of the agency costs they are subject to. Only concentrated shareholders, that may conduct effective monitoring, induce banks to lower

¹⁴Nonetheless, payout regressions may warrant additional controls to address greater heterogeneity in bank dividend policies compared to binary payout decisions. For example, when we also control for the capital structure (short-term debt and deposits to assets), the payout of bank holding companies becomes statistically significant with the expected sign, without that this should otherwise affect our conclusions.

payouts. But these shareholders reverse their influence in times of acute crisis and induce greater dividend persistence, consistent with the second condition. The remainder of second first condition calls on different research methods and is left for further research.

By contrast, the paper shows that share repurchases only address the concerns of dispersed shareholders; the recurrence of repurchases is not exacerbated by the severity of agency costs. Buybacks trigger no addiction. In the banking industry, they are not interchangeable with dividends. Accordingly, they raise limited concerns among regulators.

In banking, the role that dividends play as a monitoring device, and the detrimental addiction that this device generates are deeply intertwined. This addiction may only be cured through forceful regulatory intervention. However, such intervention may also make dividend policies less effective as a monitoring device. Indirectly, restricting bank dividend policies may affect the capacity of certain banks to attract external capital. Just as importantly, curbing bank dividend policies may trigger market reactions mitigated by persistent dividends. When considering restrictions, regulators should be prepared to intervene in capital markets, possibly going as far as providing a capital backstop in case their decisions makes banks unable to raise private capital.

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