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Abstract

We examine the evolution of equity capital in the U.S. banking industry over the past 35 years. Earnings are the major driver of increases in equity capital in the banking industry. While common stock issuance is frequent, amounts issued are generally small and do not contribute meaningfully to equity capital growth in most cases. Common stock dividends and repurchases are significant drains on equity capital. It is not uncommon for banks to pay out more than they earn, driven both by capital planning motivations and negative shocks to earnings. It is also common for banks to both issue new common stock and make repurchases in the same year, with these offsetting actions related to employee stock-based compensation.

JEL classification: G21, G35, G28
Key words: bank capital, equity capital, bank payouts, dividends and repurchases

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1 Introduction

Capital is fundamental to the health and safety of banks. Equity capital, in particular, is the first line of defense in absorbing losses that can threaten the viability of a banking institution. Without sufficient equity capital, banks can be overly exposed to the possibility of failure and the economy in turn can be exposed to the associated disruptions to the flow of credit and other financial services. Understanding how banks' equity capital evolves over time is thus critical for understanding the risks facing individual banks, the banking system, and the broader economy.

In this study, we examine the sources and uses of equity capital in the banking industry – how banks grow equity capital and how they deplete it. Equity capital – which in the banking industry is the sum of common stock and perpetual preferred stock – is an accounting-based measure that incorporates the value of stock when issued plus accounting-based retained earnings and other comprehensive income. It is distinct, and often differs significantly from, the market value of equity, which reflects the price that investors are willing to pay for a bank's common and preferred stock. Equity capital forms the base of the capital measures used in regulatory capital requirements. Unlike regulatory capital, however, the definition of equity capital has remained relatively consistent over time, which means that we can study the evolution of equity capital over a relatively long historical period that includes several economic cycles.

We use regulatory reports filed by bank holding companies – the FR Y-9C reports – to measure the key components of changes in banks' equity capital over time. [2] These components include new issuance of common and preferred shares, which increase equity capital; dividends and share repurchases, both of which decrease equity capital; and after-tax earnings, which can either increase or decrease equity capital depending on whether earnings are positive or negative. We examine data for the banking industry as a whole and for individual banks in the cross section. One advantage of using regulatory report data is that we can track both publicly traded and non-publicly traded bank holding companies, unlike other studies that focus only on publicly traded firms (for instance, Floyd et al. 2015, Baron 2020, Fahlenbrach et al. 2024). A second advantage is that we can examine trends over a relatively long historical period, from 1990 to 2024.

[2] Due to reporting limitations, our sample excludes bank holding companies with assets less than $3 billion in 2024 dollars and stand-alone commercial banks. The asset cutoff ensures a historically consistent sample, since the reporting threshold for the FR Y-9C has increased over time. These entities are small in aggregate relative to the total industry so our conclusions about the industry would not differ significantly if we had included them in the sample.

The largest contributor to the evolution of equity capital is earnings, which equal 11 to 12 percent of equity capital in a typical year. While new issuance of common or preferred stock is significant in some years and for some individual banks, it generally contributes much less to overall equity capital growth. Common stock issuance is quite frequent, but amounts tend to be small, with median issuance amounts of 0.9 percent of equity capital for those banks that issued across the bank-years in our sample.

Common stock dividends and common stock repurchases reduce equity capital in meaningful ways, representing drawdowns of 4.5 and 4.0 percent, respectively, in a typical year. For the banking industry, common stock is by far the larger component of overall equity capital, representing about 95 percent of the industry total on average during the sample period. Reflecting its much smaller share of overall equity capital, the impact of changes in perpetual preferred stock are typically quite small. The notable exceptions are in 2008 and 2009, reflecting the very significant impact of the preferred stock injections (in 2008) and redemptions (in 2009) associated with the Troubled Asset Relief Program (TARP).

A closer look at the individual-bank data reveals detail that is not observable from the aggregate industry results. In particular, nearly all banks pay dividends most of the time – dividend payments were positive in more than 85 percent of bank-year observations in our sample. As documented in prior studies (Hirtle 2004, Hirtle 2017, Fahlenbrach et al. 2024), share repurchases are also quite common, rising in both frequency and size over the 1990s before declining during the GFC and rising again since that period.

Common stock dividends and repurchases exceed earnings for more than 20 percent of the bank-years in the sample, representing a net drag on equity capital for those institutions in those years. We document significant year-over-year persistence in such behavior, as banks whose payouts exceeded earnings in the prior year are more likely to exhibit the same behavior in the current year. This behavior is more likely at banks with higher common equity, suggesting that capital planning – for instance, movement towards a target capital ratio – could play a role. However, we also document that banks are more likely to make payouts exceeding earnings when they experience a negative earnings shock, consistent with the idea that unanticipated changes in earnings are also an important contributor to this behavior.

A meaningful share of banking organizations both issue new common stock and conduct share repurchases in the same year, with the size of share repurchases generally exceeding the size

of new issuance. This pattern suggests that issuance is only infrequently used as a direct means of increasing equity capital, likely instead reflecting factors such as equity awards associated with employee stock-based compensation (SBC). And indeed, we find that while overall common stock issuance is unrelated to a bank's use of SBC, smaller issuance amounts are positively related to the extent of SBC at the bank. Further, small repurchase activity is also related to the extent of SBC, consistent with the idea that repurchases are being used to offset SBC-related issuance. The significant exception to the relatively minor role of new issuance is the period following the GFC, when sizable new issuance of both TARP-related perpetual preferred stock and common stock took place.

Previous work has examined a range of topics related to the evolution of equity capital in the banking industry, though few have examined that subject directly. The largest body of related work has focused on dividends and share repurchases. For instance, several papers have examined the historical behavior of payouts in the banking industry, often emphasizing the relative roles of dividends and share repurchases and how those roles have changed over time (Falhenbrach et al. 2024, Floyd et al. 2015, Hirtle 2004, 2017). This work also documents that repurchases are a higher share of dividends at larger banking companies (Falhenbrach et al. 2024) and that repurchases are more volatile than dividends over time (Falhenbrach et al. 2024, Floyd et al. 2015, Hirtle 2023), consistent with the relationship between repurchases and dividends for non-financial firms (Jagannathan et al. 2000).

Other papers examine bank payout behavior during periods of financial stress, such as the GFC (Acharya et al. 2022, Cziraki et al. 2024, Hirtle 2016) and the COVID-19 pandemic (Fringuellotti and Kroen 2024, Hirtle 2023, Marsh 2022). These papers document that while banks continued to pay dividends well into the GFC, they cut back on share repurchases early in this period. Similarly, most banks continued to pay dividends during the pandemic, though regulators capped dividends at pre-pandemic levels and prohibited share repurchases by large banks (Board of Governors of the Federal Reserve System 2020). The papers propose two alternative explanations for banks' payout behavior during these periods. The first is "risk-shifting," that in continuing to pay dividends and thus increasing leverage, banks were attempting to shift risk from shareholders to creditors and to other banks. The second is "signaling," that banks were reluctant to cut dividends because of the negative signal that action could send to counterparties and to the broader financial markets during a period of stress. Evidence about the two motivations is mixed, with

some papers suggesting that risk-shifting was the dominant motivation (Acharya et al. 2016, Acharya et al. 2022, Fringuellotti and Kroen 2024) and others finding less evidence of risk shifting or suggesting that concerns about signaling seem more consistent with the evidence (Cziraki at al. 2024, Hirtle 2016).

A third related strand examines common equity issuance. Baron (2020) focuses specifically on the banking industry, finding that net equity issuance – that is, equity issuance net of dividends and repurchases – is countercyclical, particularly at large banks. Banks issue less equity, on net, during credit expansions. New issuance is common at small banks and can be substantial. Farre-Mensa et al. (2024) look at the relationship between payouts and debt and equity issuance at non-financial firms and find that a large share of firms that make payouts also issue debt or equity in the same year, with debt issuance being particularly common. Further, each year, a large share of firms makes payouts exceeding free cash flow, meaning that these payouts are "financed" by new issuance (particularly debt). While not focused on banking, this paper does look at joint decisions about payouts and issuance relative to income (free cash flow) that are the subject of our analysis.

A final strand of research examines how stock-based compensation (SBC) and employee equity incentives shape repurchase and issuance policies in non-financial firms. While these papers do not consider financial firms, this work is relevant for interpreting similar patterns in our bank data. Mohanram et al (2020) document that equity issuance and repurchases increase monotonically with SBC intensity, and that firms with high SBC intensity are more likely to repurchase stock in subsequent years, consisting with managing dilution from stock grants. Bonaimé et al. (2020) find a positive relationship between equity compensation and repurchases once the growth of restricted stock is considered and that frequent repurchasers align repurchase activity with dilution events rather than with periods of undervaluation. Other work focuses on the timing of repurchases around vesting and equity sales. Edmans et al. (2022) shows that firms buy back more stock when CEOs' equity vests and that CEOs sell more shares in the weeks following buyback announcements, while Moore (2023) finds that firms are more likely to repurchase, and in larger amounts, in months when executives sell equity due to vesting. Lastly, Dittman et al. (2025) shows that although repurchases and SBC events appear correlated in the raw data, these correlations disappear once the firm's corporate calendar is taken into account, suggesting that part of the relationship between SBC and repurchases reflects institutional timing rather than a direct causal link.

Our paper extends this prior work in several ways. To begin, we bring together the various threads of work looking separately at dividends and share repurchases, new common equity issuance, and income in the banking industry by examining their joint behavior both across banks and over time. In this way, we establish some basic facts about the sources of equity capital growth in the banking industry. Further, we examine the characteristics of banks that make payouts greater than their earnings to understand the role of capitalization and the volatility of earnings and payouts. We also extend the literature on the relationship between SBC, issuance, and repurchases by examining these activities in the banking industry. Finally, using regulatory report data allows us to examine both publicly traded and non-publicly traded bank holding companies, in contrast to most of the prior literature, which has focused on publicly traded firms. In the same vein, we can also look at different asset size cohorts of banks, including small institutions.

The remainder of this paper is organized as follows. Section 2 describes the data we use in our analysis, how we define our key variables, and the sample of banks we use in the analysis. Section 3 presents aggregate results for the banking industry and for cohorts based on asset size and whether a bank holding company is publicly traded, establishing stylized facts about how equity capital changes over time and the key drivers of those changes. Section 4 turns to cross-sectional analysis of individual banks, with a particular focus on examining the factors that distinguish banks that pay out more than they earn in a particular year and on concurrent issuance and repurchasing of common stock. The final section contains a summary and conclusions.

2 Data, Variables, and Sample

Our primary data source is the FR Y-9C report, which contains consolidated balance sheet and income statement data for bank holding companies, the corporate parents that own commercial banks and related subsidiaries, and which are typically the issuers of common and preferred stock in the banking industry (Board of Governors of the Federal Reserve System 2024).[3] We rely in particular on the "Changes in Holding Company Equity Capital" schedule, which traces the change in equity capital from the end of the previous calendar year through the current quarter. The March 2025 version of this schedule is reproduced as Figure 1. We also use other schedules in the FR Y-9C for information about asset size and dollar amounts of common equity and perpetual preferred

[3] For convenience, we use the terms "bank" and "bank holding company" interchangeably, but the all the data used in the analysis is for bank holding companies.

stock. Additionally, we use the New York Fed's crosswalk between bank holding company regulatory identification numbers (RSSD-ID) and firm identifiers in the Center for Research in Securities Prices (CRSP) data to identify publicly traded bank holding companies (Federal Reserve Bank of New York 2025). Finally, we obtain data on stock-based compensation from Compustat.

Schedule HI-A—Changes in Holding Company Equity Capital

Dollar Amounts in Thousands	BHCK	Amount	
1. Total holding company equity capital *most recently reported* for the end of previous calendar year (i.e., after adjustments from amended Reports of Income)	3217		1.
2. Cumulative effect of changes in accounting principles and corrections of material accounting errors	B507		2.
3. Balance end of previous calendar year as restated (sum of items 1 and 2)	B508		3.
	BHCT		
4. Net income (loss) attributable to holding company (must equal Schedule HI, item 14)	4340		4.
5. Sale of perpetual preferred stock (excluding treasury stock transactions):	BHCK		
a. Sale of perpetual preferred stock, gross	3577		5.a.
b. Conversion or retirement of perpetual preferred stock	3578		5.b.
6. Sale of common stock:			
a. Sale of common stock, gross	3579		6.a.
b. Conversion or retirement of common stock	3580		6.b.
7. Sale of treasury stock	4782		7.
8. LESS: Purchase of treasury stock	4783		8.
9. Changes incident to business combinations, net	4356		9.
10. LESS: Cash dividends declared on preferred stock	4598		10.
11. LESS: Cash dividends declared on common stock	4460		11.
12. Other comprehensive income[1]	B511		12.
13. Change in the offsetting debit to the liability for Employee Stock Ownership Plan (ESOP) debt guaranteed by the holding company	4591		13.
14. Other adjustments to equity capital (not included above)	3581		14.
15. Total holding company equity capital end of current period (sum of items 3, 4, 5, 6, 7, 9, 12, 13, and 14, less items 8, 10, and 11) (must equal item 27.a on Schedule HC)	BHCT 3210		15.

1. Includes, but is not limited to, changes in net unrealized holding gains (losses) on available-for-sale debt securities, changes in accumulated net gains (losses) on cash flow hedges, foreign currency translation adjustments, and pension and other postretirement plan related changes other than net periodic benefit cost.

Figure 1: FR Y-9C Equity Capital Reporting Schedule, March 2025.
Source: Board of Governors of the Federal Reserve System website, https://www.federalreserve.gov/apps/reportingforms/.

The main exercise in this paper is to explain the evolution of equity capital over time for individual banks and for the banking system. The year-over-year change in common equity is defined by the following equation:

$$
\begin{aligned}
&Equity\ Capital_t \\
&\quad = Equity\ Capital_{t-1} + After\ Tax\ Net\ Income_t \\
&\quad + Other\ Comprehensive\ Income_t + Common\ Stock\ Issuance_t \\
&\quad - Common\ Stock\ Dividends_t - Common\ Stock\ Repurchases_t \\
&\quad + Preferred\ Stock\ Issuance_t - Preferred\ Stock\ Dividends_t \\
&\quad - Preferred\ Stock\ Repurchases_t + Other_t
\end{aligned}
$$

Equity capital is defined as common stock plus perpetual preferred stock. As the equation suggests, year-over-year changes in equity capital are driven by after-tax earnings, new common and preferred issuance, dividends paid on common and preferred shares, and common and preferred stock repurchases. Many of these variables can be taken directly from the Y-9C reports, but some must be imputed from reported data. We describe each of these calculations in more detail below.

U.S. accounting standards recognize two broad forms of earnings: net income and other comprehensive income (OCI). Net income is the difference between interest and non-interest income (such as fees, trading revenues, and service charges) and interest and non-interest expense. OCI is composed of a variety of elements including unrealized gains or losses on available-for-sale debt securities, changes in accumulated net gains or losses on hedging instruments, and foreign currency translation adjustments. Under current U.S. GAAP, net income is recognized and reported on a bank's income statement; it is the most commonly accepted and analyzed form of income for banks. OCI, in contrast, does not run through the income statement but does affect equity capital.[4] In the FR Y-9C reports, it is reported on the schedule detailing changes in equity capital, as illustrated in Figure 1.

In our work, we combine after-tax net income and other comprehensive income into a single "earnings" variable.[5] Figure 2 shows industry aggregate net income (the blue bars), other comprehensive income (the purple bars), and total earnings (the dark blue line) for the banks in our sample, both in 2024 dollars (top panel) and as a share of common equity (bottom panel). In most

[4] OCI is used to report changes in market values and risk exposures, rather than a bank's core operating performance (Su et al, 2025). OCI makes fluctuations in the value of available-for-sale securities visible in equity while keeping them separate from net income (Marsh and Laliberte, 2023).

[5] Other comprehensive income is available on the FR Y-9C reports starting in 2001. Prior to that date, we calculate an OCI proxy based on reported income elements that are incorporated into other comprehensive income, including, during various years, changes in net unrealized losses on marketable securities, change in net unrealized holding gains or losses on available-for-sale securities, and foreign currency translation adjustments.

years, net income is the largest component of earnings and the two variables track one another closely. However, other comprehensive income is large and negative in 2008 and 2022, driven largely by unrealized losses on securities, reflecting steep increases in credit spreads in 2008 and sharp increases in interest rates in 2022.

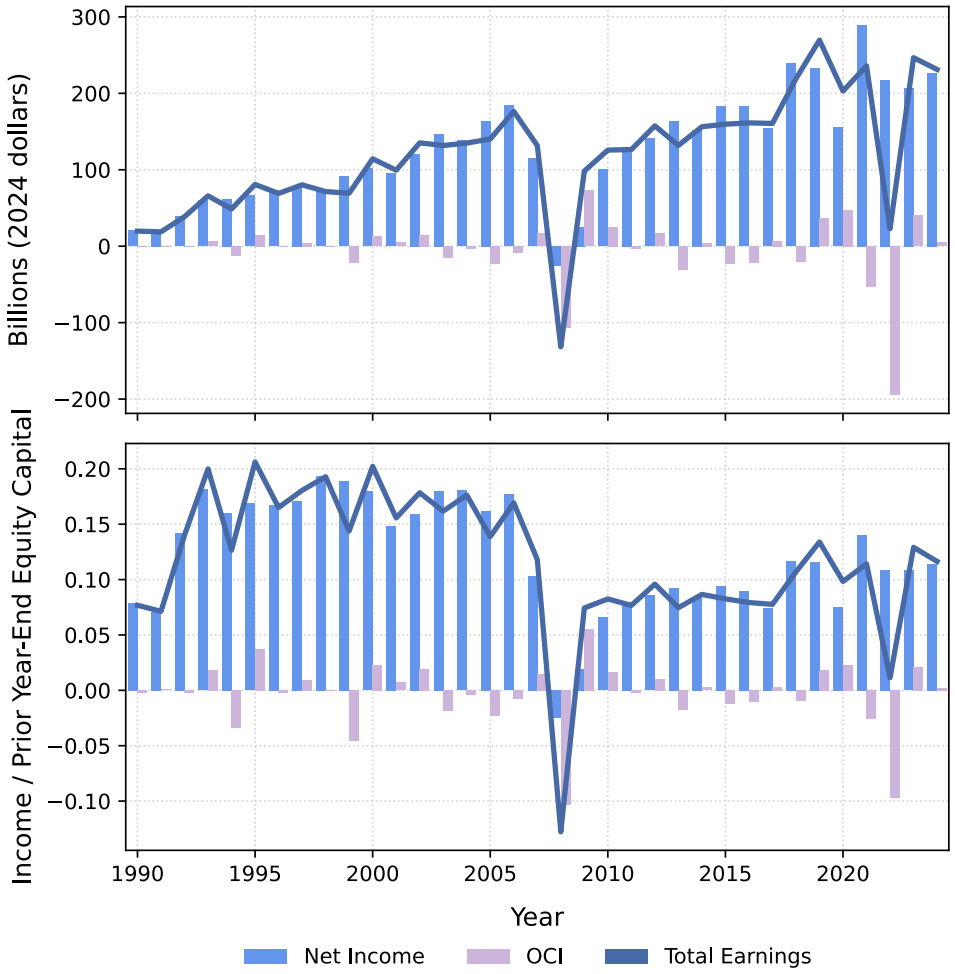

Figure 2: Net Income and Other Comprehensive Income, 1990 – 2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars.
Source: Federal Reserve Y-9C Reports and author calculations.

Total amounts of new issuance of common stock and perpetual preferred stock are not directly available on the FR Y-9C and must be calculated from more detailed reporting items. Issuance of common stock is calculated as the sum of gross sales of common stock, sales of

treasury stock,[6] and the net of conversion or retirement of common stock if this net is positive (that is, if conversions exceed retirements). Issuance of perpetual preferred stock is calculated as gross sales of perpetual preferred stock as reported in the Y-9C plus the net of conversion or retirement of perpetual preferred stock if conversions exceed retirements.[7]

Dividends on common and preferred stock are reported directly on the FR Y-9C reports, but common stock repurchases much be inferred from the reported data. In particular, we calculate common stock repurchases as the sum of treasury stock purchases and the net of common stock repurchases and retirements if retirements exceed repurchases. This definition captures both stock that is repurchased in the open market and retained as treasury stock and stock that is repurchased and retired. We calculate preferred stock repurchases as the net of conversions and retirement of preferred stock, if this net is negative (that is, if retirements exceed conversions).[8]

Finally, we group several other actions that can affect the evolution of equity capital into a combined "other" category, which is typically quite small for most firms in most years.[9] We make adjustments to starting (end-of-prior-year) equity capital values to incorporate the impact of accounting changes and any material error corrections to prior reporting, so that the changes in equity capital we assess are based on bank fundamentals and deliberate actions rather than on errors or changes in accounting policy.

We also adjust end-of-prior-year equity capital values to account for any equity acquired as part of a merger or acquisition during the year in question ("incident to business combinations"). While such changes increase equity capital at the acquiring institution, they reflect a transfer of equity within the banking system rather than growth of equity capital for the system as a whole.

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[6] Treasury stock is stock that has been repurchased by the bank but not retired. Since treasury stock are shares that have been issued but are not owned by shareholders, it does not contribute to equity capital. Hence, sale of treasury stock increases equity capital while purchases of shares held as treasury stock decreases equity capital.

[7] These calculations are not precise for two reasons. First, the Y-9C variables for treasury stock combine holdings of common stock and perpetual preferred stock, which means that our measured value of common stock issuance may be somewhat overstated (and perpetual preferred issuance understated by a corresponding amount). Given that common stock outstanding is generally much larger than preferred stock outstanding, it is likely that this measurement error is small in most cases. Second, the calculations will understate issuance if a bank both has new stock created through conversion of other instruments (i.e., convertible preferred shares or convertible debt) and retires stock in the same year.

[8] As with stock issuance and for the same reasons, the measurement of common and preferred stock repurchases is not precise. Treasury stock purchases include both common and perpetual preferred stock, so can overstate common stock purchased and held as treasury stock, and we only observe the net of conversions and retirements, which means that retirements will be understated in years when other instruments are converted to common stock and treasury stock is retired.

[9] These actions include offsetting debits to liabilities associated with Employee Stock Option Plans (ESOPs) debt guaranteed by the bank and "other" actions reported as a single line item in the schedule.

To ensure that we are capturing these within-banking-system transfers, our sample of banking companies in a year includes only those that report full-year data at the end of the year. In this way, we do not lose bank holding companies that are acquired or merged during the year because the results of those actions would be captured by including the acquiring firm in the sample.[10]

Our sample consists of all U.S.-owned, top tier bank holding companies with assets greater than $3 billion in 2024 dollars from 1990 to 2024. Figure 3 shows the number of banks in sample during each year, broken out by asset size (top panel) and ownership status (bottom panel). The number of organizations in the sample varies over time, falling in the early years of the sample and then rising in the years after the GFC, reflecting patterns of mergers and inflation-adjusted asset growth in the banking industry. While our analysis omits smaller banking companies, collectively, the organizations in our sample represent 94 percent of industry assets on average over time and thus capture the industry-wide evolution of equity capital.

[10] Banking companies could also acquire non-bank firms. Our approach would omit changes in equity capital related to these acquisitions, since the FR Y-9C does not provide detail on the business combinations resulting in changes in equity capital.

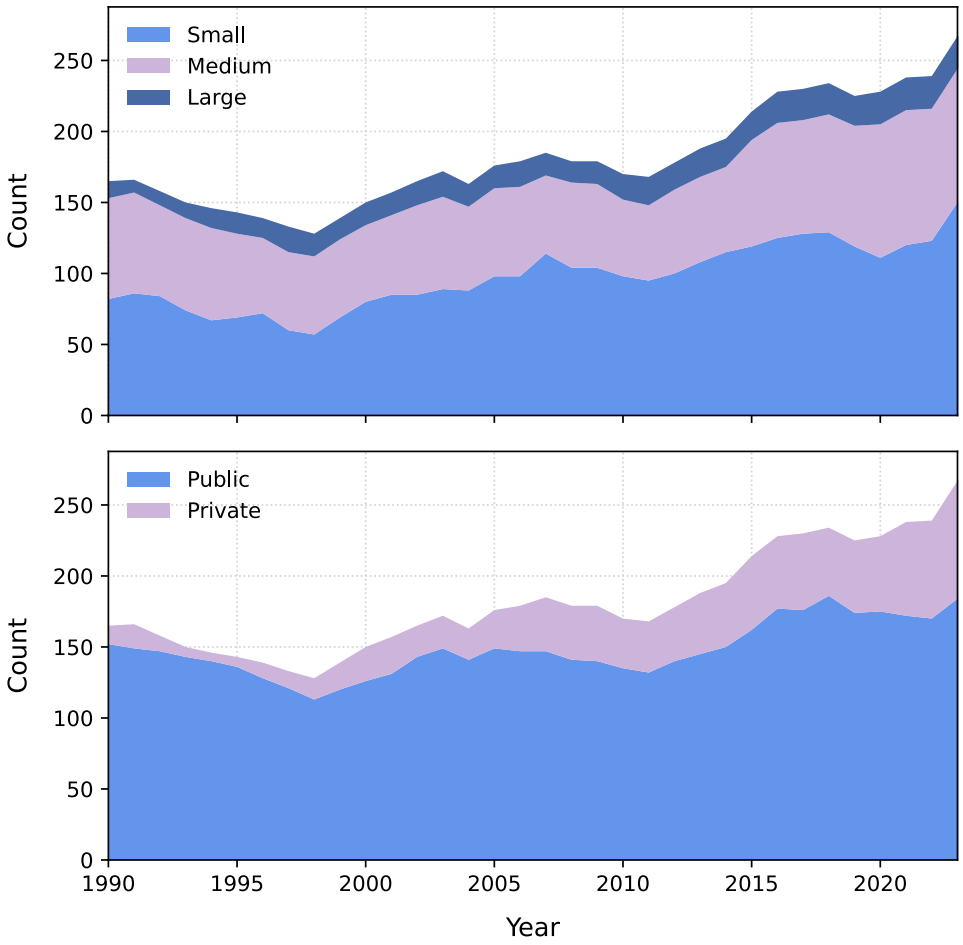

Figure 3: Number of Sample Banks over Time, 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. Small banks are those with less than $10 billion in assets, medium banks are those with assets between $10 and $100 billion, and large bank are those with assets greater than $100 billion, all in 2024 dollars. Public banks are those with stock traded on a major exchange, while Private banks are the remainder.
Sources: Federal Reserve Y-9C reports; New York Fed CRSP-FRB link.

As Figure 3 illustrates, we divide the sample by asset size cohort – less than $10 billion, $10 to $100 billion, and greater than $100 billion in 2024 dollars – and by whether the bank has publicly traded common stock. Most bank holding companies in our sample are in the two smaller size cohorts, with assets of less than $100 billion. The number of organizations in the largest size cohort roughly doubles over the sample period, consistent with the impact of consolidation and growth in the industry. Finally, since the sample focuses on larger banking organizations, most are publicly traded, though the share of non-publicly traded banks in the sample grows over time. There is a significant relationship between asset size and ownership status, with 70 percent of small bank holding companies being publicly traded, as compared to 94 percent for medium-sized banks,

and all large banking companies. Conversely, roughly 86 percent of privately owned banks are in the smallest size cohort.

3 Equity Capital Growth: Key Drivers and Stylized Facts

In this section we present our core findings about the evolution of equity capital in the banking industry. We begin with an overview of the evolution of equity capital and its main drivers over our sample period, then examine the relative size and importance of each of these factors in determining annual changes in equity capital, first for the industry as a whole and then for cohorts based on asset size and whether the bank is publicly traded. We end by examining bank-level data to develop some stylized facts about banks' common stock payout behavior and its impact on common equity growth.

3.1 Industry Aggregate and Cohort Results

Figure 4 shows the industry-level growth of equity capital from 1990 to 2024, both in levels (in 2024 dollars, top panel) and relative to total asset (bottom panel). As the top panel illustrates, equity capital has increased steadily in inflation-adjusted terms over the sample period, rising from $260 billion in 1990 to more than $2 trillion by 2015. While much of this growth mirrors the overall growth of the banking industry, equity capital has also increased relative to industry assets (bottom panel). Equity capital increased from less than 6 percent of assets in 1990 to a peak of 11 percent of assets in the years immediately following the GFC, before declining to 9 percent at the end of the sample period.

The figure also separates equity capital into its two components, common stock (in purple) and perpetual preferred stock (in blue). Equity capital is primarily composed of common stock, which represents 90 percent or more of aggregate industry equity capital in each sample year, with the exception of 2008, when banks held comparatively large amounts of preferred stock associated with TARP issuance. The share of preferred stock in aggregate equity capital has been higher in the post-GFC years than prior to that crisis, but remains relatively low for most banks, with just 9 percent having more than 10 percent of equity capital in the form of preferred shares in 2024. For this reason, much of our firm-specific analysis will focus on common stock.

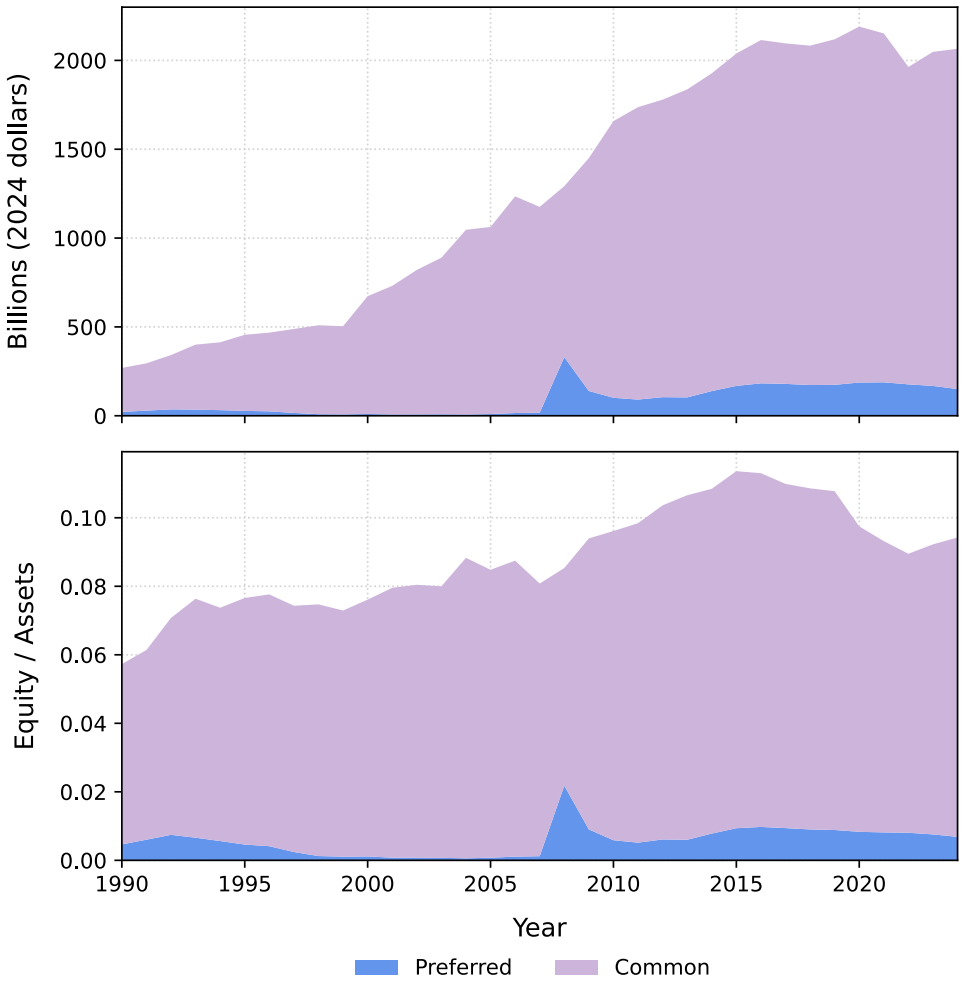

Figure 4: The Growth of Equity Capital in the U.S. Banking System, 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. Source: Federal Reserve Y-9C reports.

Figure 5 provides an overview of the major components of equity capital growth. The figure shows the range of annual aggregate banking industry values for six components of equity capital growth, based on the equation above: income (the sum of net income and other comprehensive income), common stock issuance, common stock dividends and common stock repurchases, the net impact of perpetual preferred stock actions (issuance, dividends, and repurchases), and "other" actions affecting equity capital. The figure shows the interquartile range of values (the box), the median (the line inside the box), the $5^{th}/95^{th}$ percentile values (the "whiskers") and values outside this range (the dots). All values are expressed as shares of prior year-end equity capital.

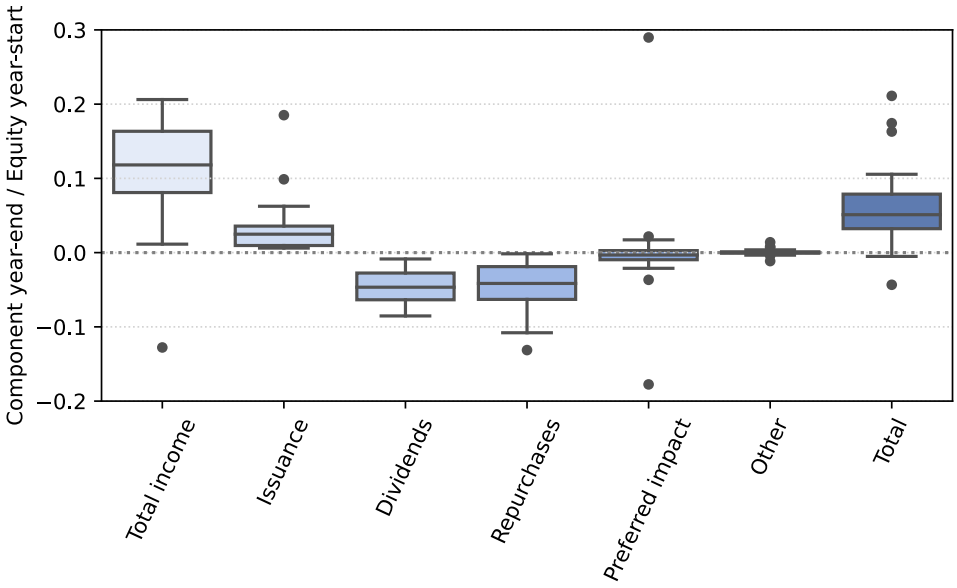

Figure 5: Contributions to Equity Capital Growth, Annual Data 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. Total income is the sum of net income and other comprehensive income. Common issuance is issuance of common stock via sales and conversions. Dividends and repurchases are for common stock. Preferred impact is the net of issuance, dividends, and repurchases of perpetual preferred stock. Other is all other changes to equity capital. All values are as a share of prior end-of-year equity capital. The figure shows the range of annual aggregate values of each component over the sample period (1990 to 2024), with the solid box showing the 25th/75th percentile range and the line within the box showing the median value. The "whiskers" show the 5th/95th percentile range and dots outside the whiskers show values beyond that range.
Source: Federal Reserve Y-9C reports.

In nearly every year in our sample period, aggregate banking industry equity capital increased (see the righthand segment of Figure 5). In typical years, the increases ranged between 3 and 8 percent (the inter-quartile range), though there are outlier years of both growth and decline. In particular, equity capital growth was strong in 1992 and 1993, reflecting strong bank earnings and higher preferred issuance combined with comparatively low common stock repurchases, and in 2008, generated by the very large perpetual preferred stock issuance related to the TARP program. On the other end, aggregate banking industry common equity fell by more than 4 percent in 2022, reflecting interest rate-related declines in earnings and sustained common stock shareholder payouts.

Consistent with the drivers of these outlier years, the most significant contributor to equity capital growth in the banking industry is earnings. In a typical year, the combination of net income and OCI equals 11.6 percent of prior year equity capital. Aggregate industry earnings are positive during each year of the sample period, except in 2008 (the dot at the bottom of the figure). Common stock issuance, in contrast, contributes significantly less to equity capital growth in most

years, equaling just 2.5 percent of prior year equity capital in a typical year. That said, common stock issuance made notably larger contributions during and immediately after the GFC in 2008 and 2009 (the two dots at the top of the figure), when banks issued new common stock to raise capital levels and to redeem TARP preferred stock. The Appendix discusses the GFC period in more detail.

Common stock shareholder payouts in the form of dividends and repurchases are the next most significant contributors to changes in equity capital. In a typical year, common stock dividends and repurchases reduce equity capital by 4.7 and 4.2 percent, respectively. Finally, in most years, the impacts of changes in perpetual preferred stock and "other" equity capital actions are negligible at the industry level, with most annual values clustered around zero. The exceptions, as noted, are two years when perpetual preferred actions had large impacts on equity capital growth: 2008, when issuance associated with the TARP program increased equity capital by nearly 30 percent of the prior-year value (the dot near the top of the figure), and 2009, when redemptions of preferred stock drew down equity capital by nearly 20 percent of the prior-year value (the dot near the bottom of the figure).

When we break the industry into asset size cohorts (Figure 6) and by whether the banking company is publicly traded or privately held (Figure 7), the overall results are generally similar to those for the industry as a whole. The largest differences are for cohorts of smaller and privately held banking companies (there is quite a bit of overlap between these two categories). In particular, privately held banking companies as a cohort experience more years in which equity capital decreases, though years with increases are also the norm for this set of firms. Smaller banking companies also experience more years with negative net income in the aggregate than the industry as a whole. Finally, in a typical year, smaller and privately held banking companies rely more on dividends than on share repurchases to return funds to shareholders.

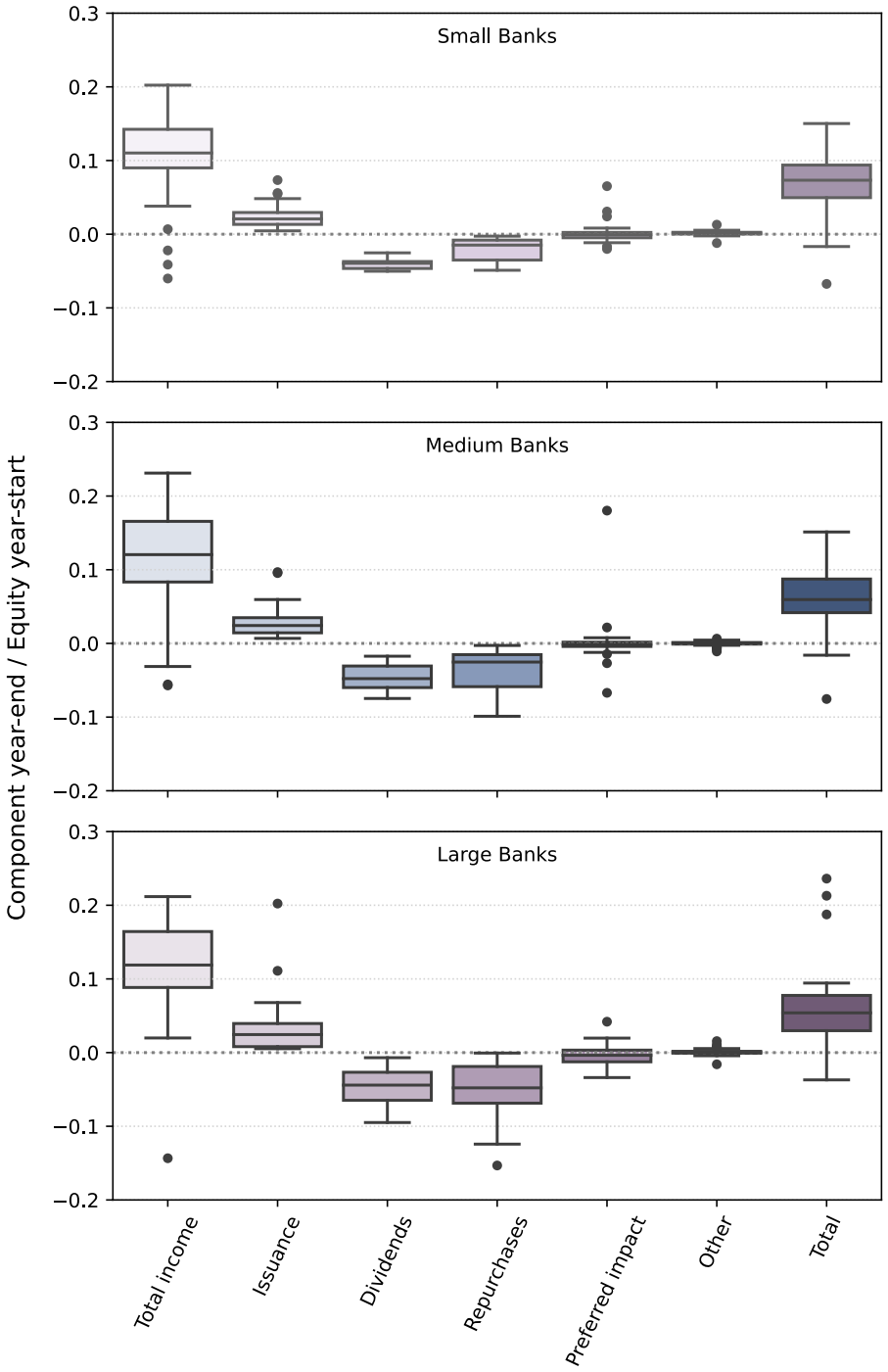

Figure 6: Contributions to Equity Capital Growth By Bank Size Cohort, Annual Data 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. Small banks are those with less than $10 billion in assets, medium banks are those with assets between $10 and $100 billion, and large banks are those with assets greater than $100 billion, all in 2024 dollars. Total income is the sum of net income and other comprehensive income. Common issuance is issuance of common stock via sales and conversions. Dividends and repurchases are for common stock. Preferred impact is the net of issuance, dividends, and repurchases of perpetual preferred stock. Other is all other changes to equity capital. All values are as a share of prior end-of-year equity capital. The figure shows the range of annual aggregate values of each component over the sample period (1990 to 2024), with the solid box showing the 25th/75th percentile range and the line within the box showing the median value. The "whiskers" show the 5th/95th percentile range and dots outside the whiskers show values beyond that range. Source: Federal Reserve Y-9C reports.

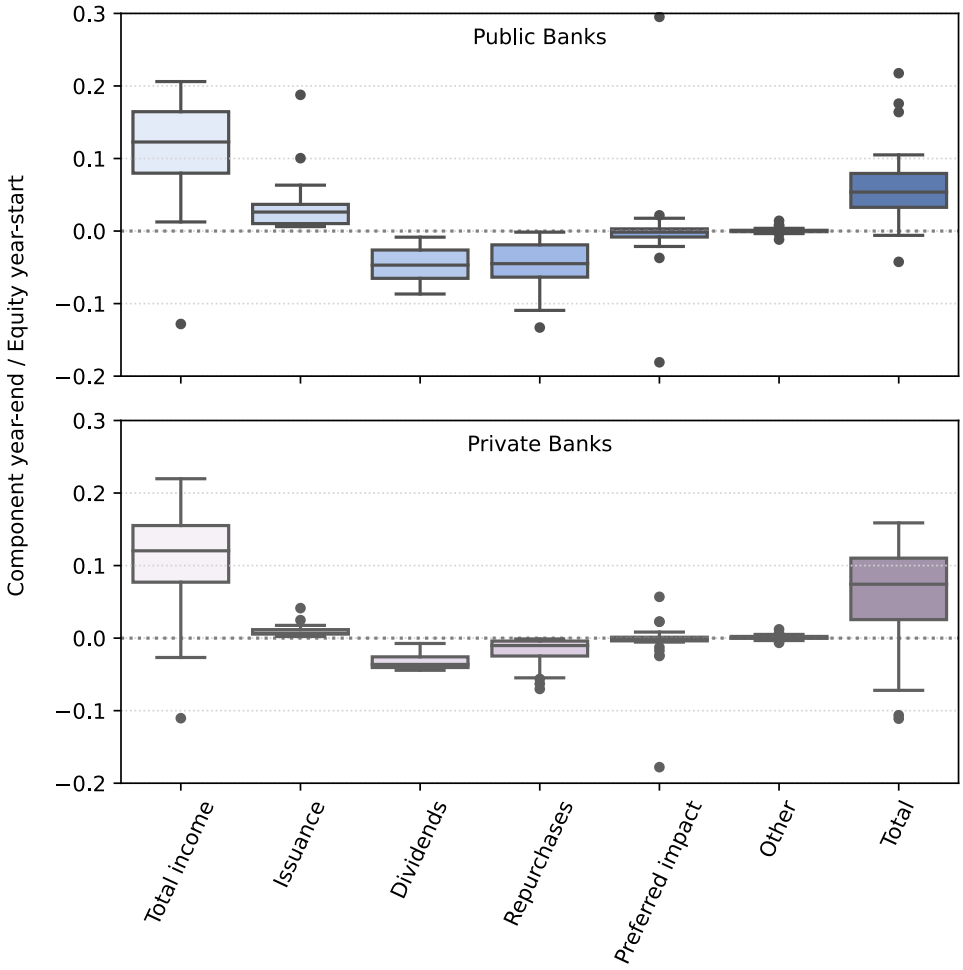

Figure 7: Contributions to Equity Capital Growth By Ownership Status, Annual Data 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. Public BHCs are those with equity traded on major exchanges, while Private BHCs are those without equity traded on major exchanges. Common issuance is issuance of common stock via sales and conversions. Dividends and repurchases are for common stock. Preferred impact is the net of issuance, dividends, and repurchases of perpetual preferred stock. Other is all other changes to equity capital. All values are as a share of prior end-of-year equity capital. The figure shows the range of aggregate annual values of each component over the sample period (1990 to 2024), with the solid box showing the 25th/75th percentile range and the line within the box showing the median value. The "whiskers" show the 5th/95th percentile range and dots outside the whiskers show values beyond that range.
Sources: Federal Reserve Y-9C reports; Federal Reserve Bank of New York CRSP-FRB link.

3.2 Stylized Facts: Earnings, Shareholder Payouts, and Common Stock Issuance

The discussion thus far has focused on data aggregated at the industry or cohort level. We now examine the main drivers of equity capital growth at the individual bank level and use this granular data to establish some stylized facts about how banks use shareholder distributions and new common stock issuance to manage their equity capital positions.

To begin, Figure 8 shows the main components of equity capital growth based on bank-year data.[11] The overall pattern is generally similar to the industry aggregate results in Figure 5, though with more outlier observations. Earnings continue to be the most significant source of equity capital growth. Common stock issuance plays an important role for some banks in some years (see the concentration of dots above the 95th percentile "whisker"), but contributes only small amounts to equity capital growth for most banks in most years. The impact of perpetual preferred stock and "other" common equity actions is small in general, with exceptions for preferred stock impact coming mainly from the GFC period. Common stock dividends continue to be the largest source of shareholder payouts in most bank-years, though the role of common stock repurchases appears to be somewhat smaller at the bank-year level than in the aggregate. The cluster of dots below the 5th percentile "whisker" suggests that impactful actions by a limited set of banks likely drive industry aggregate repurchase results.

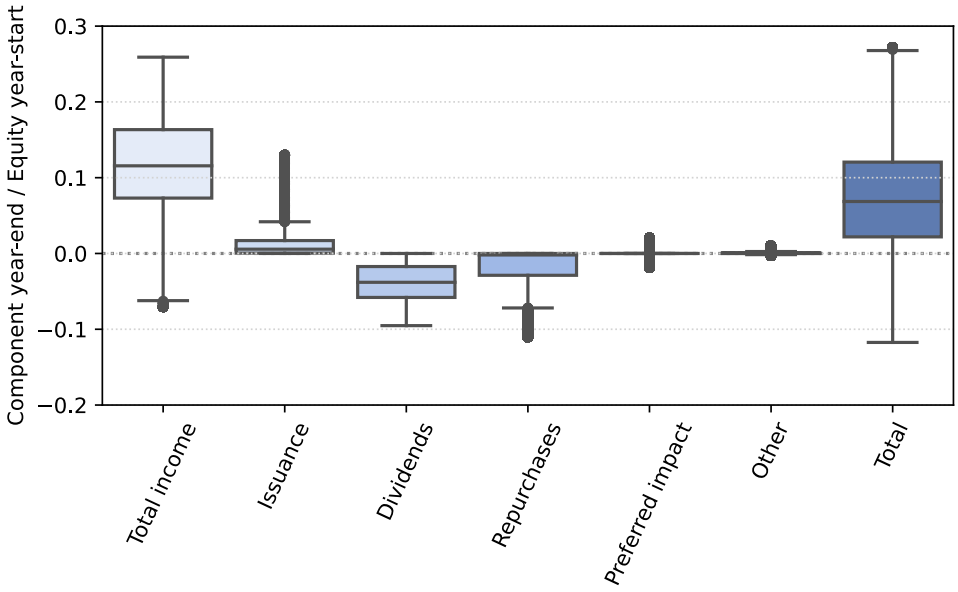

Figure 8: Contributions to Equity Capital Growth Bank-Year Data, Annual Data 1990-2024, Winsorized at the 5th / 95th Percentiles. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. Total income is the sum of net income and other comprehensive income. Common issuance is issuance of common stock via sales and conversions. Dividends and repurchases are for common stock. Preferred impact is the net of issuance, dividends, and repurchases of perpetual preferred stock. Other is all other changes to equity capital. All values are as a share of prior end-of-year equity capital. The figure shows the range of individual bank annual values of each component over the sample period (1990 to 2024), with the solid box showing the 25th/75th percentile range and the line within the box showing the median value. Data are winsorized at the 5th and 95th percentiles. The "whiskers" show the 5th/95th percentile range and dots outside the whiskers show values beyond that range, both after winsorization.
Source: Federal Reserve Y-9C reports.

[11] We winsorize the data at the 5th and 95th percentiles for clarity.

Both the aggregate and bank-level data suggest that common stock dividends and repurchases play a significant role in the evolution of equity capital in the banking industry. Figure 9 presents another perspective on this role by showing the share of banks in each year that pay common stock dividends (blue line) or make repurchases (purple line). Nearly all banks pay dividends nearly all of the time – the share of banks paying dividends ranges between 80 and 95 percent over most of the sample period, with a dip during the GFC years. The share of banks doing common stock repurchases is lower, ranging between 40 and 80 percent, and varies more significantly over time, with fairly steep declines during periods of banking industry stress (the mid-1990s and the GFC most notably). As illustrated in Figure 10, the share of banks making either form of common stock payouts rises with bank asset size. The share paying dividends ranges between 70 and 90 percent for small banks; is consistently above 90 percent for medium-sized banks; and is 100 percent in most years for the largest size cohort. Nearly all large banks do common stock repurchases in most years, though the share drops steeply during periods of banking industry stress.

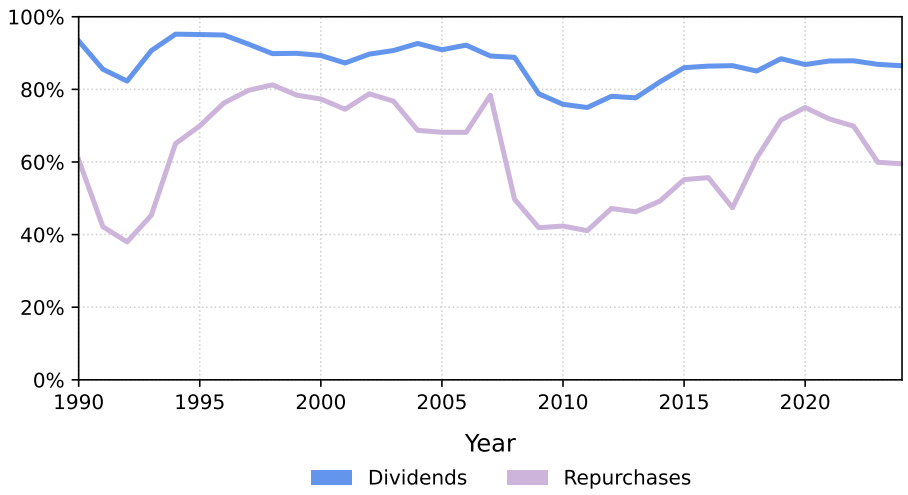

Figure 9: Share of Banks Making Common Stock Payouts, 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars.
Source: Federal Reserve Y-9C reports.

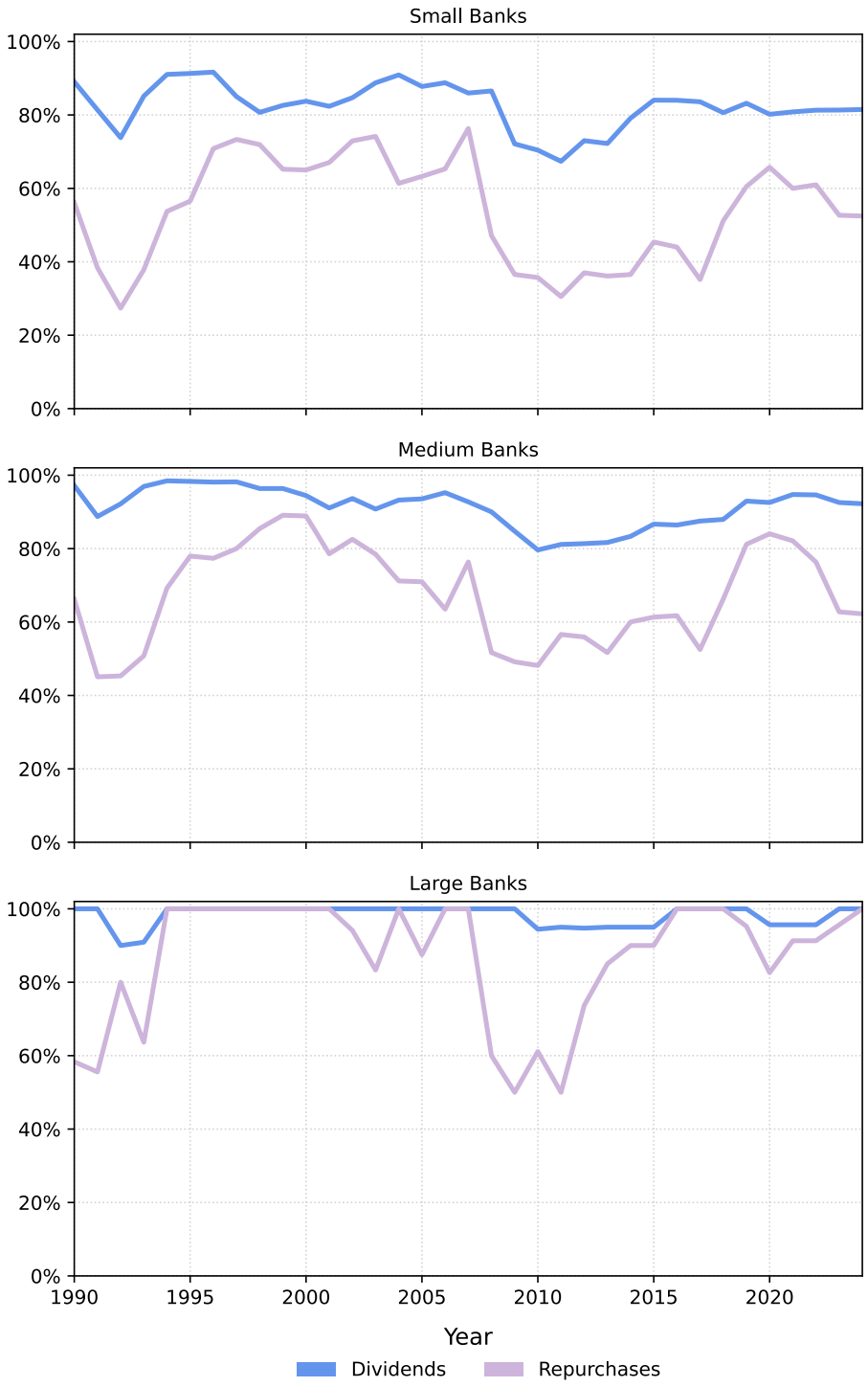

Figure 10: Share of Banks Making Common Stock Payouts By Asset Size Cohort, 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. Small banks are those with less than $10 billion in assets, medium banks are those with assets between $10 and $100 billion, and large banks are those with assets greater than $100 billion, all in 2024 dollars.
Source: Federal Reserve Y-9C reports.

The prevalence of common stock payouts, particularly dividends, suggests that these distributions play an important role in banks' management of their equity capital positions. And indeed, it is not uncommon for common stock payouts to exceed bank earnings – a payout ratio greater than one – so that the net impact reduces equity capital. Figure 11 shows the frequency of bank-years with negative earnings minus payouts (EMP) as well as the typical impact of these negative EMPs on equity capital. As the top panel illustrates, the share of banks with negative EMP ranges between 10 and 40 percent in most years, with higher spikes during periods of banking stress (the GFC and during the 2022 interest rate cycle). The bottom panel of the figure shows the mean and median impact on equity capital. In a typical year, the median impact is between 2 and 5 percent, but in stress years (the early 1990s, the GFC, and the 2022 interest rate cycle), the typical impact is considerably larger. The mean impact exceeds the median, sometimes by large amounts, indicating that common stock payouts exceeding earnings were a very significant drain on equity capital for some banks. We will explore the key factors associated with negative EMP in Section 4.

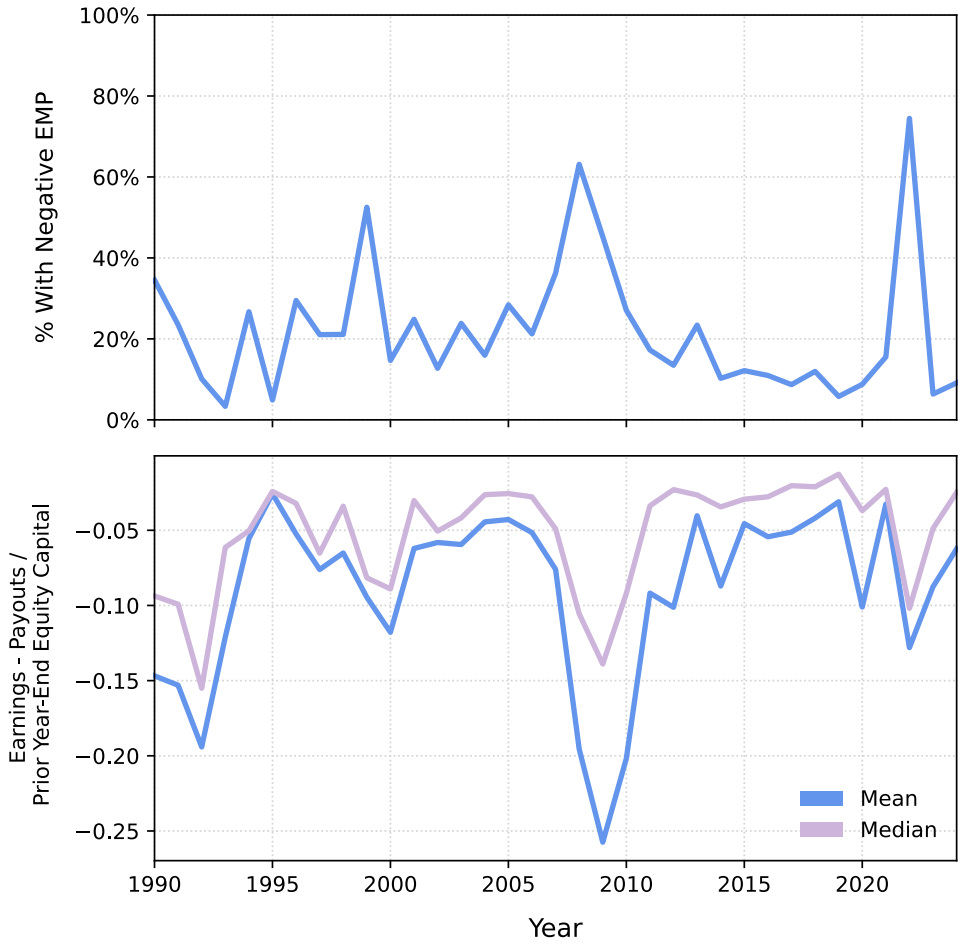

Figure 11: Frequency and Size of Common Stock Payouts That Exceed Earnings, 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. EMP is earnings (net income plus OCI) minus common stock payouts (dividends plus repurchases). The top panel shows the share of banks with negative EMP in a given year. The bottom panel shows the EMP scaled by end of prior year equity capital for those banks with negative EMP in a given year. Source: Federal Reserve Y-9C reports.

As we have documented, nearly all banks pay dividends and/or make repurchases in most years, sometimes in amounts that exceed earnings. While these payouts reduce equity capital, banks can increase equity capital by issuing new common stock. In fact, most banks issue some amount of new common stock in every year in our sample. Figure 12 shows that the share of banks issuing new common stock ranged between 80 and 90 percent prior to the GFC and has declined to about 70 percent in more recent years. As Figure 13 shows, larger banks are more likely to issue common stock than smaller ones – about 60 percent of banks in the smallest size cohort have issued common stock in recent years as compared to 80 to 90 percent of banks in the largest size cohort. Issuance is also more common for publicly traded banks than for privately held ones, with

about 80 percent of the former issuing common stock in recent years as compared to 40 percent of the latter.

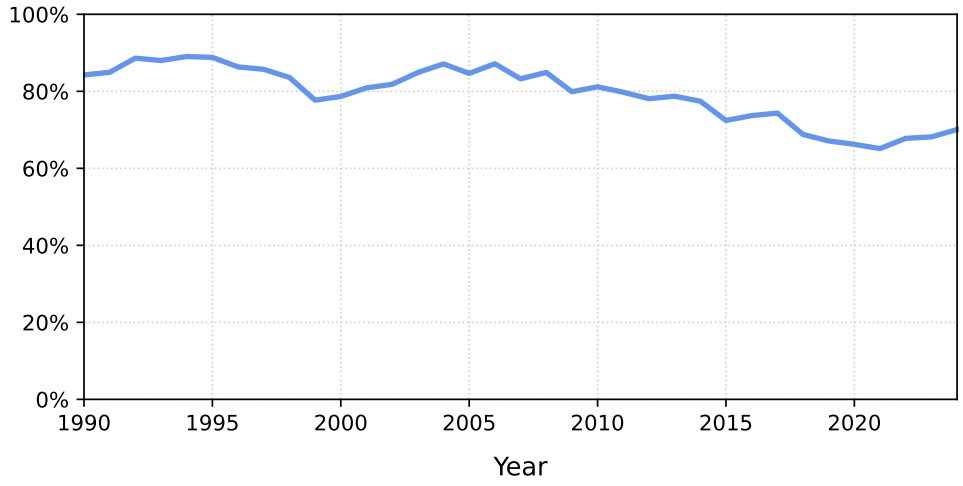

Figure 12: Share of Banks that Issue Common Stock, 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars.
Source: Federal Reserve Y-9C reports.

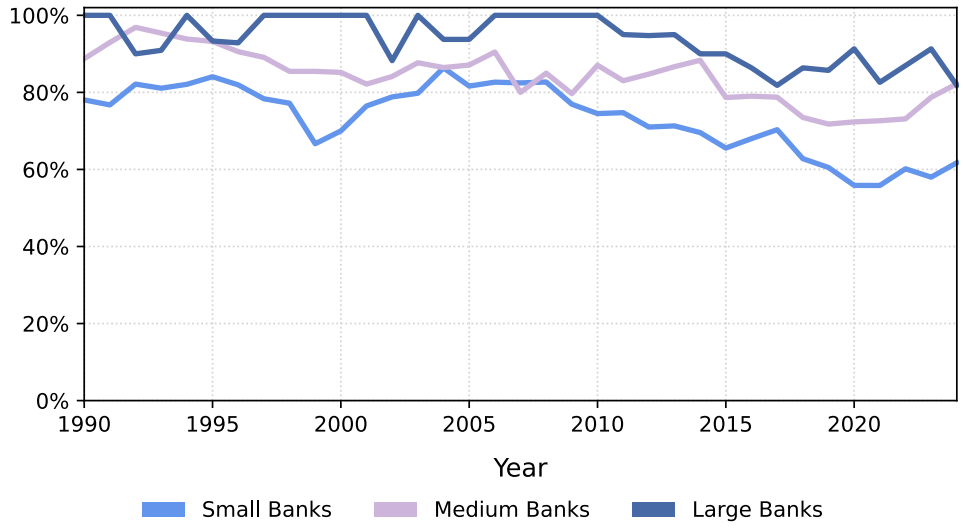

Figure 13: Share of Banks that Issue Common Stock By Asset Size Cohort, 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. Small banks are those with less than $10 billion in assets, medium banks are those with assets between $10 and $100 billion, and large banks are those with assets greater than $100 billion, all in 2024 dollars.
Source: Federal Reserve Y-9C reports.

While common stock issuance by U.S. commercial banks is common, the typical amount of issuance is small.[12] Figure 14 show the median size of common stock issuance as a share of prior year equity capital for the years in our sample period. While there is considerable year-to-year variation, in most years the typical common stock issue size is 1.5 percent or less of prior year equity capital. This is consistent with the industry aggregate results in Figure 5 and the bank-level results in Figure 8, both of which also suggest that equity issuance is not a large contributor to equity capital growth in most years. That common stock issuance is generally small suggests that it is driven primarily by factors other than management of equity capital resources for most banks in most years. One potential explanation is that issuance is related to stock-based compensation of bank employees, a relationship we explore in the following section.

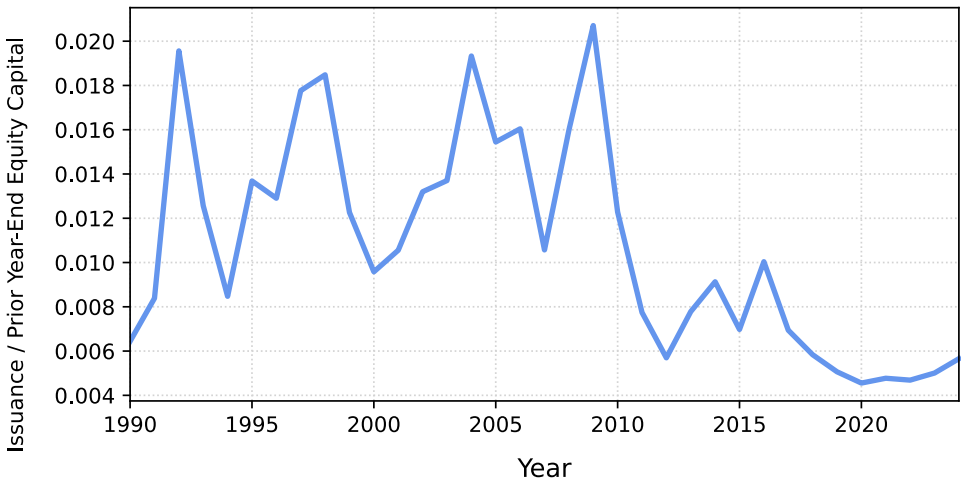

Figure 14: Median Size of Common Stock Issuance For Banks that Issued, 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars that issued common stock in a given year. The figure shows the amount issued scaled by end of prior year equity capital.
Source: Federal Reserve Y-9C reports.

[12] This finding stands in contrast to findings in Baron (2020), which finds that small banks raise common stock frequently and in large amounts. That paper focuses on issuance greater than 5 percent of equity capital and finds that these are frequent for smaller banks. Our work examines the full range of common stock issuance so contains a significant portion of the distribution that is excluded in Baron (2020).

Both common stock issuance and common stock repurchases are widespread with a large share of banks undertaking each of these activities in most years of our sample period (see Figures 9 and 12). Surprisingly, a meaningful portion of banks take both actions in the same year, simultaneously increasing and decreasing their equity capital resources. The top panel of Figure 15 shows that the share of banks that both issue and repurchase common stock in the same year has ranged between 35 and 70 percent over the sample period, with somewhat lower (though rising) shares in the post-GFC period. Since common stock issuance tends to be small, repurchases typically exceed issuance, resulting in a net decrease in equity capital (see the bottom panel of Figure 15). We will explore these offsetting actions in more detail in the following section.

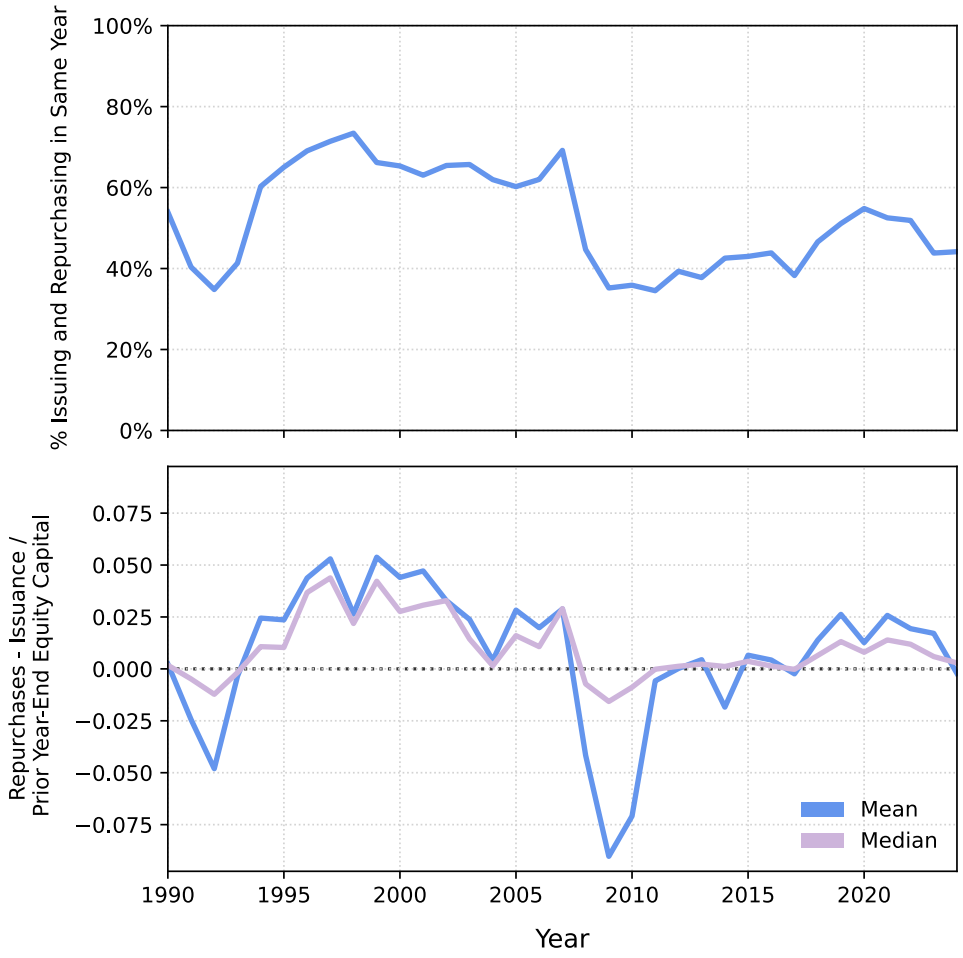

Figure 15: Frequency and Net Impact of Concurrent Common Stock Issuance and Repurchases, 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. The top panel shows the share of banks that both issued common stock and made common stock repurchases in a given year. The bottom panel shows mean and median size of repurchases minus issuance scaled by prior end-of-year equity capital for those banks that both issued and repurchased in a given year.
Source: Federal Reserve Y-9C reports.

4 Bank-Level Analysis

After documenting aggregate industry trends, we now turn to the cross-section of banks to study how earnings, payouts, and issuance interact at the firm level. We focus on two behaviors introduced in Figures 11 and 15: (i) years in which common stock payouts exceed earnings (negative EMP), and (ii) years in which a bank both issues and repurchases common stock.

Our main sample follows Section 2, including all top-tier bank holding companies with assets greater than $3 billion in 2024 dollars. Variables are winsorized at the 1st and 99th percentiles, and all regressions include log assets, equity scaled by assets, and the Tier 1 buffer as controls.[13] Table 1 presents summary statistics for the main set of variables used in the analysis. On average, earnings and net income are positive, with values near 1 percent of assets. OCI averages slightly negative, though the median of 0 implies that most banks report small OCI values in normal years, while infrequent large losses drive the negative mean. Year-over-year changes in both earnings and net income are slightly negative. Dividends are larger than repurchases on average when scaled by assets (0.37 percent versus 0.22 percent), though repurchases exhibit greater dispersion with a higher standard deviation and a maximum that exceeds that for dividends. The indicator for negative EMP has a mean of 0.21, implying about one fifth of bank-year observations have common stock payouts that exceed earnings.

[13] The Tier 1 buffer equal each bank's Tier 1 risk-based capital ratio (Tier 1 capital divided by risk-weighted assets) minus the applicable regulatory Tier 1 requirement at year-end. Starting in 1996, Tier 1 capital and risk-weighted assets are taken directly from the FR Y-9C. For 1990-1995, we reconstruct both from component line items. The required ratio incorporates the time-varying phase-in of minimums and capital buffers under Basel I and Basel III so that the buffer consistently measures distance to the binding Tier 1 requirement in each year.

	Mean	SD	Median	Min	Max	N
ln(Assets)	16.42	1.36	16.02	14.95	21.49	6448
Equity / Assets	9.10	2.65	8.79	4.18	17.68	6448
Tier 1 Buffer	6.74	3.69	6.13	0.52	22.30	6394
Earnings / Assets	0.90	0.89	0.99	-3.43	3.33	6448
Net Income / Assets	0.95	0.79	1.02	-3.20	3.32	6448
OCI / Assets	-0.03	0.37	0.00	-2.02	0.87	6448
Δ Earnings / Assets	-0.02	0.92	-0.01	-3.46	3.42	5778
Δ Net Income / Assets	-0.02	0.66	0.01	-3.24	2.54	5778
Δ OCI / Assets	0.00	0.59	-0.01	-1.86	2.54	5778
Dividends / Assets	0.37	0.54	0.33	0.00	16.31	6448
Repurchases / Assets	0.22	0.59	0.02	0.00	20.73	6448
Issuance / Assets	0.20	0.60	0.05	-0.18	11.23	6448
Neg EMP	0.21	0.41	0.00	0.00	1.00	6448
SBC / Assets	0.05	0.03	0.04	-0.01	0.40	2806

Table 1: Summary Statistics, 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. Assets, Equity, Tier 1 buffer, Earnings, Net Income, OCI, and their change counterparts are winsorized at the 1st and 99th percentiles. Assets are scaled to 2024 dollars. Variables scaled by assets are reported as percentages (×100) for readability. SBC prior to 2006 is set to missing for consistency.
Source: Federal Reserve Y-9C reports; Compustat.

4.1 Probability of Negative EMP

We begin by exploring the micro-founders associated with years in which common stock payouts (dividends plus repurchases) exceed earnings. Figure 11 shows that this behavior occurs across a range of banks and time periods, not just during stress years. We focus on two, not mutually exclusive, channels. The first is the capital-management channel, where banks with relatively elevated levels of equity capital (or capital buffers above their desired target) may be more likely to have negative EMP. This pattern is consistent with capital-planning where banks with more capital can allow payouts to exceed earnings without approaching minimum requirements. The second is an earnings shock channel, where unexpected declines in income, which we proxy using the annual change income, can result in payouts, often based on earlier expectations, to exceed current earnings.

Table 2 quantifies the persistence of negative EMP. Across all specifications, the one-year lag of negative EMP is positive and highly significant, indicating that the behavior is persistent from one year to the next. The two-year lag is significant without bank fixed effect but becomes insignificant once they are included in Column 4, suggesting that longer-run persistence is likely explained by systemic differences across banks rather than continuing shocks for a single bank.

	(1) Neg. EMP_t	(2) Neg. EMP_t	(3) Neg. EMP_t	(4) Neg. EMP_t
Neg. EMP_{t-1}	0.201***	0.201***	0.208***	0.097***
	(0.060)	(0.060)	(0.029)	(0.029)
Neg. EMP_{t-2}	0.070**	0.070**	0.085***	0.015
	(0.033)	(0.033)	(0.014)	(0.017)
$\ln(Assets_{t-1})$	0.020**	0.020**	0.017**	0.059**
	(0.009)	(0.008)	(0.008)	(0.023)
$Equity_{t-1}$ / $Assets_{t-1}$	0.152	0.152	0.910***	2.331***
	(0.723)	(0.720)	(0.311)	(0.543)
Tier 1 $Buffer_{t-1}$	0.002	0.002	-0.000	0.007*
	(0.007)	(0.007)	(0.003)	(0.004)
Sample	Full	Full	Full	Full
FE	No	No	Year	Year, Bank
Err Cluster	Year	Year, Bank	Year, Bank	Year, Bank
N	5148	5148	5148	5091
R-squared	0.06	0.06	0.24	0.34

Table 2: Persistence of Negative EMP. The dependent variable is equal to one if a bank's earnings after subtracting common stock payouts is negative in year t. The sample includes all top-tier bank holding companies with assets greater than $3 billion in 2024 dollars. Assets are scaled to 2024 dollars. Assets, Equity, and Tier 1 Buffer are winsorized at the 1st and 99th percentiles. Column (3) includes year fixed effects, while Column (4) adds bank fixed effects. Standard errors are clustered by year in Column (1) and by year and bank in Columns (2)-(4).

The coefficient on log assets is positive and significant in all columns, implying that larger banks are more likely to exhibit negative EMP. Equity scaled by assets becomes positive and significant when year fixed effects are included (Column 3) and remains large and significant with bank fixed effects (Column 4). After controlling for common time shocks and time-invariant bank characteristics, years in which a given bank is more highly capitalized are more likely to have payouts that exceed earnings. This pattern is consistent with the capital-management channel with banks managing toward capital targets and paying out more when equity is high.

Table 3 examines how different earnings measures relate to the likelihood of negative EMP. We consider both lagged earnings, to capture how profitable the bank is, and an earnings shock, which we proxy using the annual change in earnings.

	(1) Neg. EMP_t	(2) Neg. EMP_t	(3) Neg. EMP_t	(4) Neg. EMP_t	(5) Neg. EMP_t	(6) Neg. EMP_t
$Earnings_{t-1}$ / $Assets_{t-1}$	-5.461**		-21.326***			
	(2.000)		(2.011)			
Δ $Earnings_t$ / $Assets_t$		-13.313***	-22.158***			
		(1.449)	(1.794)			
Net $Income_{t-1}$ / $Assets_{t-1}$				-8.870***		-20.889***
				(1.468)		(1.845)
Δ Net $Income_t$ / $Assets_t$					-13.620***	-21.188***
					(1.562)	(1.792)
OCI_{t-1} / $Assets_{t-1}$				3.498		-38.580***
				(3.951)		(3.723)
Δ OCI_t / $Assets_t$					-17.934***	-36.898***
					(4.206)	(3.154)
ln($Assets_{t-1}$)	0.051*	0.036	0.023	0.050*	0.035	0.019
	(0.025)	(0.023)	(0.020)	(0.025)	(0.023)	(0.019)
$Equity_{t-1}$ / $Assets_{t-1}$	2.530***	3.241***	2.143***	2.538***	3.251***	2.203***
	(0.531)	(0.587)	(0.506)	(0.518)	(0.569)	(0.497)
Tier 1 $Buffer_{t-1}$	0.007*	-0.002	0.008**	0.009**	-0.002	0.008**
	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)	(0.003)
Sample	Full	Full	Full	Full	Full	Full
FE	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B
Err Cluster	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B
N	5673	5673	5673	5673	5673	5673
R-squared	0.33	0.38	0.44	0.33	0.39	0.46
t: $\beta_{\Delta NI} - \beta_{\Delta OCI} = 0$						4.31
p-value						0.00

Table 3: Negative EMP and Earnings. The dependent variable is equal to one if a bank's earnings after subtracting common stock payouts is negative in year t. The sample includes all top-tier bank holding companies with assets greater than $3 billion in 2024 dollars. Assets are scaled to 2024 dollars. Assets, Equity, Tier 1 Buffer, Earnings, Net Income, OCI, and their change counterparts are winsorized at the 1st and 99th percentiles. All columns include year and bank fixed effects and have standard errors clustered at the year and bank level.

Across all specifications, both the lagged level and the shock to earnings are negatively associated with the probability of negative EMP. Banks with weaker past earnings or negative earnings shocks are more likely to have payouts exceed earnings in the following year. The relationship remains significant when both earnings measures are included, confirming that both the level and the shock matter. When earnings are decomposed, lagged OCI alone is insignificant, but once both lagged and change components are included in Column 6, both become negative and significant. The magnitude on the shock in OCI coefficient exceeds the magnitude on the shock in net income coefficient. We confirm a statistically meaningful difference in the bottom two rows of the table, suggesting year-to-year movements in OCI are more strongly related to the likelihood of

negative EMP than net income. Thus, shocks to OCI are disproportionately likely to increase the probability that a bank pays out more than it earns.

Table 4 extends this specification by adding lagged common stock dividends and repurchases, each scaled by assets, to assess whether a bank's payout behavior affects the likelihood of negative EMP by effectively "locking in" shareholder payouts. The results for the earnings measures are unchanged. Considering payouts, repurchases are consistently positive and significant across all columns, while dividends are smaller and only marginally significant in one specification. This result is somewhat surprising considering that dividends are typically regarded as the "stickier" payout method, whereas repurchases are more discretionary. If dividend smoothing causes banks to maintain current dividend levels even when earnings decline, one might expect dividends to have a stronger association with negative EMP. Instead, the data for the full sample suggests that repurchases are the components of payouts that are more closely related.

	(1) Neg. EMPt	(2) Neg. EMP_t	(3) Neg. EMP_t	(4) Neg. EMP_t	(5) Neg. EMP_t	(6) Neg. EMP_t
$Earnings_{t-1}$ / $Assets_{t-1}$	-6.311***		-22.107***			
	(2.017)		(2.140)			
Δ $Earnings_t$ / $Assets_t$		-13.103***	-22.052***			
		(1.442)	(1.824)			
Net $Income_{t-1}$ / $Assets_{t-1}$				-10.241***		-21.974***
				(1.363)		(2.004)
Δ Net $Income_t$ / $Assets_t$					-13.252***	-20.934***
					(1.546)	(1.820)
OCI_{t-1} / $Assets_{t-1}$				3.549		-38.059***
				(4.029)		(3.692)
Δ OCI_t / $Assets_t$					-17.804***	-36.474***
					(4.183)	(3.121)
$Dividends_{t-1}$ / $Assets_{t-1}$	4.598	-1.171	5.372	5.966*	-0.633	6.207
	(3.043)	(2.476)	(3.634)	(3.469)	(2.385)	(3.689)
$Repurchases_{t-1}$ / $Assets_{t-1}$	9.771***	7.089**	8.915**	10.273***	6.684**	8.138**
	(2.618)	(2.727)	(3.275)	(2.699)	(2.939)	(3.729)
ln($Assets_{t-1}$)	0.059**	0.042*	0.030*	0.058**	0.041*	0.026
	(0.023)	(0.022)	(0.017)	(0.023)	(0.021)	(0.017)
$Equity_{t-1}$ / $Assets_{t-1}$	1.858***	2.846***	1.511***	1.815***	2.872***	1.609***
	(0.469)	(0.556)	(0.470)	(0.437)	(0.542)	(0.483)
Tier 1 $Buffer_{t-1}$	0.009**	-0.001	0.010***	0.011***	-0.001	0.009***
	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)	(0.003)
Sample	Full	Full	Full	Full	Full	Full
FE	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B
Err Cluster	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B
N	5673	5673	5673	5673	5673	5673
R-squared	0.34	0.39	0.45	0.34	0.39	0.46
t: $\beta_{\Delta NI} - \beta_{\Delta OCI} = 0$						4.34
p-value						0.00

Table 4: Negative EMP, Earnings, and Common Stock Payouts. The dependent variable is equal to one if a bank's earnings after subtracting common stock payouts is negative in year *t*. The sample includes all top-tier bank holding companies with assets greater than $3 billion in 2024 dollars. Assets are scaled to 2024 dollars. Assets, Equity, Tier 1 Buffer, Earnings, Net Income, OCI, and their change counterparts are winsorized at the 1st and 99th percentiles. All columns include year and bank fixed effects and have standard errors clustered at the year and bank level.

Perhaps the full sample estimates mask differences in behavior by size. Table 5 repeats the analysis by asset-size cohort. The results for earnings are similar to those in the full sample across all size categories, but the patterns for payout behavior differ meaningfully. For small banks, the coefficient on repurchases is positive and statistically significant, consistent with the full sample. For medium-sized banks, neither dividends nor repurchases are significant. In contrast, for large banks, repurchases are insignificant while dividends are positive and significant.

	(1) Neg. EMP_t	(2) Neg. EMP_t	(3) Neg. EMP_t	(4) Neg. EMP_t	(5) Neg. EMP_t	(6) Neg. EMP_t
$Earnings_{t-1}$ / $Assets_{t-1}$	-21.384***		-20.717***		-33.341***	
	(2.209)		(3.079)		(4.511)	
Δ $Earnings_t$ / $Assets_t$	-20.632***		-22.592***		-31.992***	
	(1.913)		(2.767)		(5.456)	
Net $Income_{t-1}$ / $Assets_{t-1}$		-20.460***		-21.889***		-33.251***
		(2.479)		(2.704)		(5.261)
Δ Net $Income_t$ / $Assets_t$		-19.123***		-23.431***		-28.045***
		(2.058)		(2.571)		(6.014)
OCI_{t-1} / $Assets_{t-1}$		-41.263***		-34.111***		-40.172***
		(4.308)		(4.568)		(6.090)
Δ OCI_t / $Assets_t$		-36.821***		-34.156***		-45.195***
		(3.292)		(4.118)		(5.726)
$Dividends_{t-1}$ / $Assets_{t-1}$	2.143	1.608	3.742	6.694	64.689***	63.008***
	(2.573)	(2.752)	(7.808)	(8.272)	(19.103)	(19.385)
$Repurchases_{t-1}$ / $Assets_{t-1}$	13.511***	12.881***	4.950	3.863	0.083	2.335
	(3.562)	(3.467)	(3.080)	(3.620)	(7.018)	(7.314)
ln($Assets_{t-1}$)	0.122***	0.116***	0.021	0.010	0.076	0.080
	(0.040)	(0.042)	(0.031)	(0.031)	(0.066)	(0.063)
$Equity_{t-1}$ / $Assets_{t-1}$	0.891	0.963	1.935***	2.084***	2.741	2.180
	(0.658)	(0.656)	(0.654)	(0.662)	(1.637)	(1.726)
Tier 1 $Buffer_{t-1}$	0.009*	0.008*	0.021***	0.021***	0.038*	0.039*
	(0.005)	(0.004)	(0.007)	(0.006)	(0.020)	(0.021)
Sample	Small	Small	Medium	Medium	Large	Large
FE	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B
Err Cluster	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B
N	2830	2830	2225	2225	589	589
R-squared	0.53	0.54	0.47	0.48	0.44	0.44
t: $\beta_{\Delta NI} - \beta_{\Delta OCI} = 0$		4.50		2.35		2.60
p-value		0.00		0.02		0.01

Table 5: Negative EMP, Earnings, and Common Stock Payouts by Asset Size Cohort. The dependent variable is equal to one if a bank's earnings after subtracting common stock payouts is negative in year *t*. The sample includes all top-tier bank holding companies with assets greater than $3 billion in 2024 dollars. Assets are scaled to 2024 dollars. Assets, Equity, Tier 1 Buffer, Earnings, Net Income, OCI, and their change counterparts are winsorized at the 1st and 99th percentiles. All columns include year and bank fixed effects and have standard errors clustered at the year and bank level. Columns (1)-(2) include banks with less than $10 billion in assets, Columns (3)-(4) include banks with assets between $10 and $100 billion, and Columns (5)-(6) include banks with assets greater than $100 billion, all in 2024 dollars.

These results suggest systematic differences in payout behavior across bank sizes. Small banks appear more likely to have negative EMP in years following larger repurchases, which tend to be more idiosyncratic. Large banks, on the other hand, are more likely to have negative EMP when dividend payouts are high. This pattern is consistent with dividends being the more rigid component of payout policy for large institutions. Because large banks rarely cut dividends even during periods of weaker earnings, maintaining those payouts can increase the likelihood that distributions exceed contemporaneous earnings.

Table 6 separates positive and negative changes in earnings, net income, and OCI to test whether positive and negative earnings shocks have asymmetric effects on the probability of negative EMP. The corresponding change variable equals that change when it is positive or negative and zero otherwise.

	(1) Neg. EMPt	(2) Neg. EMP_t	(3) Neg. EMP_t	(4) Neg. EMP_t
Positive Δ $Earnings_t$ / $Assets_t$	0.186	-14.591***		
	(1.134)	(2.254)		
Negative Δ $Earnings_t$ / $Assets_t$	-27.057***	-27.958***		
	(1.776)	(2.393)		
Positive Δ Net $Income_t$ / $Assets_t$			0.859	-14.245***
			(1.336)	(2.655)
Negative Δ Net $Income_t$ / $Assets_t$			-25.046***	-25.620***
			(2.220)	(2.346)
Positive Δ OCI_t / $Assets_t$			-1.646	-25.019***
			(1.973)	(3.687)
Negative Δ OCI_t / $Assets_t$			-39.088***	-44.603***
			(6.016)	(4.076)
$Earnings_{t-1}$ / $Assets_{t-1}$		-19.279***		
		(2.248)		
Net $Income_{t-1}$ / $Assets_{t-1}$				-19.747***
				(2.140)
OCI_{t-1} / $Assets_{t-1}$				-31.642***
				(4.211)
$Dividends_{t-1}$ / $Assets_{t-1}$	-0.442	4.830	0.421	5.897
	(2.322)	(3.468)	(2.449)	(3.562)
$Repurchases_{t-1}$ / $Assets_{t-1}$	7.002**	8.650**	6.357**	7.821**
	(2.688)	(3.198)	(2.953)	(3.618)
ln($Assets_{t-1}$)	0.041**	0.031*	0.031*	0.022
	(0.019)	(0.017)	(0.017)	(0.016)
$Equity_{t-1}$ / $Assets_{t-1}$	2.556***	1.555***	2.843***	1.780***
	(0.475)	(0.440)	(0.459)	(0.456)
Tier 1 $Buffer_{t-1}$	-0.001	0.008**	-0.002	0.007**
	(0.004)	(0.003)	(0.004)	(0.003)
Sample	Full	Full	Full	Full
FE	Y, B	Y, B	Y, B	Y, B
Err Cluster	Y, B	Y, B	Y, B	Y, B
N	5673	5673	5673	5673
R-squared	0.42	0.46	0.42	0.47
t(Earnings): $\beta_{neg} - \beta_{pos} < 0$	-12.60	-4.51		
p(Earnings)	0.00	0.00		
t(NI): $\beta_{neg} - \beta_{pos} < 0$			-9.19	-3.52
p(NI)			0.00	0.00
t(OCI): $\beta_{neg} - \beta_{pos} < 0$			-5.51	-3.45
p(OCI)			0.00	0.00

Table 6: Negative EMP, Positive and Negative Earnings Split. The dependent variable is equal to one if a bank's earnings after subtracting common stock payouts is negative in year *t*. The sample includes all top-tier bank holding companies with assets greater

than $3 billion in 2024 dollars. Assets are scaled to 2024 dollars. Assets, Equity, Tier 1 Buffer, Earnings, Net Income, OCI, and their change counterparts are winsorized at the 1st and 99th percentiles. All columns include year and bank fixed effects and have standard errors clustered at the year and bank level. Positive Δ $Earnings_t$ / $Assets_t$ equals the change in earnings scaled by assets when the change is positive and 0 otherwise. Negative Δ $Earnings_t$ / $Assets_t$ equals the change in earnings scaled by assets when the change is negative and zero otherwise. The same definitions apply to Δ Net $Income_t$ / $Assets_t$ and Δ OCI_t / $Assets_t$, where each variable is split into its positive and negative components.

In Columns 1 and 3, only the coefficients on the negative earnings shocks are statistically significant, indicating that declines in earnings are more strongly associated with the probability of negative EMP than positive earnings shocks in reducing the probability of negative EMP. Once lagged earnings levels are added in Columns 2 and 4, both the positive and negative components are significant. The magnitude of the negative coefficients remains substantially larger, implying that reductions in earnings have a stronger effect. The bottom rows of the table report one-sided t-tests comparing the coefficients on the positive and negative components. In all specifications, we reject the null hypothesis that the two coefficients are equal, confirming that negative shocks have a bigger impact on the probability of negative EMP than positive earnings shock, consistent with declines in income being less anticipated or less immediately reflected in payout adjustments.

4.2 Issuance and Repurchases in the Same Year

We next examine cases where a bank both issues and repurchases common stock in the same year. As shown in Figure 15, this behavior is common, ranging from 35 and 75 percent of banks in a given year over the sample. At first glance, issuing and repurchasing in the same year may seem contradictory, since issuance adds to equity capital while repurchases reduce it. In practice, these actions are likely to serve different purposes. Figure 14 shows that in most year, the median level of common stock issuance is relatively small, although large issuance also occurs. This pattern suggests that issuance may reflect more than one motive, with smaller issuance tied to stock-based compensation (SBC) and larger issuance more closely related to capital management. Our analysis of SBC is therefore based on the subset of publicly traded banks from 2006 onward.[14] SBC is small for most observations, with a mean of 0.05 percent of assets (Table 1). Repurchases, on the other hand, are a primary channel for returning capital to shareholders and

[14] SFAS No. 123R required firms to recognize the fair value of stock-based compensation as an expense on the income statement (FASB, 2004). The standard became effective for fiscal periods beginning after December 15, 2005, so comprehensive reporting begins in 2006. Prior to 2006, SBC reporting was voluntary or required only in limited cases, which risks selection bias if early adopters differ systemically from non-adopters and introduces measurement error from inconsistent disclosures. To limit these biases, we restrict SBC analyses to public firms from 2006 onward.

tend to be larger. Viewed in this context, concurrent issuance and repurchases are consistent with bank's broader capital planning and compensation practices.

Figure 16 summarizes how issuance and repurchase behavior evolves over time using a transition matrix from one year to the next. The percentages are row-normalized probabilities that a bank in the row's group in year t is in the column's group in year $t + 1$. The number in parentheses is the count of bank-year transitions. Three patterns stand out. First, issuance and repurchase behaviors are highly persistent. Banks that both issue and repurchase in one year overwhelmingly continue to do so the next year, with 85 percent remaining in the "Both" category. Likewise, banks that do neither tend to remain inactive, with 81 percent staying in the "Neither" category. Second, transitions between issuing-only and repurchasing-only are relatively uncommon. Most banks that rely on one of these capital behaviors continue with the same action in subsequent years. Finally, the most prevalent state overall is "Both," both in levels and in year-to-year persistence. The next most common group is "Issuance Only," which aligns with banks that do not repurchase often still issuing shares for compensation and related programs.

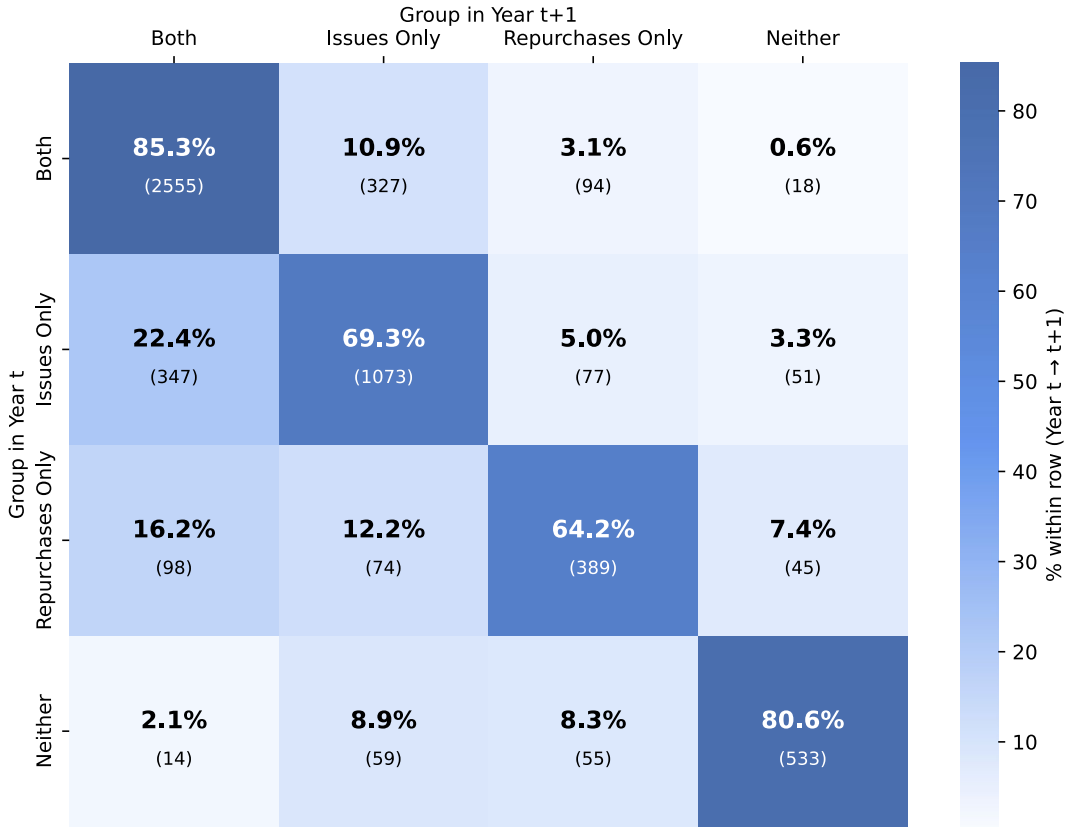

Figure 16: Transition Matrix of Issuance and Repurchase Decisions. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. Cell value is the probability that a bank in the row's group in year *t* is in the column's group in year *t* +1. Observation count is in parentheses.
Source: Federal Reserve Y-9C reports.

We now provide evidence that the small size of most common stock issuance is related to a bank's level of stock-based compensation (SBC). Figure 17 presents a histogram of issuance scaled by lagged common stock equity capital for bank-year observations, capped at 10 percent for clarity. The distribution is highly right-skewed, with most observations between 0 and 1 percent of lagged common equity. Such small levels of issuance are unlikely to meaningfully increase equity. This motivates the subsequent analysis linking small issuance to SBC and examining how repurchases are used to offset dilution.

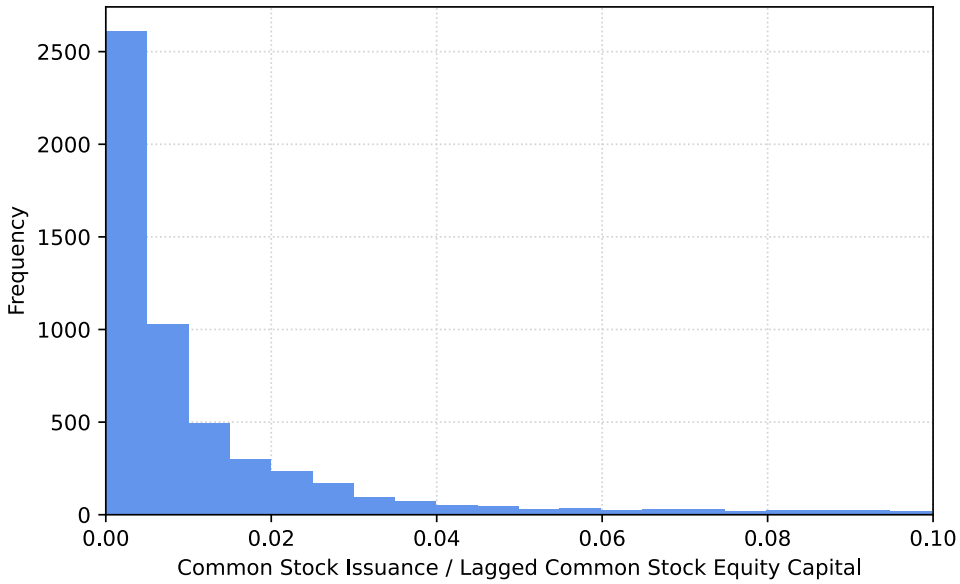

Figure 17: Histogram of Common Stock Issuance, 1990-2024. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. The sample is restricted to bank-year observations with values between 0 and 0.1 to limit the influence of outliers. This covers approximately 93 percent of the sample.
Source: Federal Reserve Y-9C reports.

Table 7 examines whether SBC is related to small common stock issuance, with the sample split by the size of issuance relative to lagged common equity. As Figure 17 illustrates, the distribution does not feature a clear boundary that separates "small" issuance from "large" issuance, so we consider a variety of thresholds. Column 1 uses the full sample of bank-years. Columns 2, 4, and 6 restrict the sample to observations with small issuance, defined as issuance less than 2, 5, and 10 percent of lagged common equity, respectively. Columns 3, 5, and 7 use samples of large issuance, with issuance at least 2, 5, and 10 percent of lagged common equity.

In the full sample (Column 1), the coefficient on SBC is small and statistically insignificant, suggesting that SBC is not driving issuance across the full spectrum of issuance amounts. When we restrict the sample to bank-years with small issuance (Columns 2, 4, and 6), the relationship becomes positive and statistically significant. The size of the coefficient decreases as the cut-off defining "small" issuance rises, suggesting that larger issuance amounts are driven by factors other than SCB. Together, these results support the idea that small levels of common stock issuance are related to a bank's use of SBC, consistent with these issuances reflecting the settlement of equity awards rather than deliberate efforts to raise equity capital.

	(1) Iss_t / $Assets_t$	(2) Iss_t / $Assets_t$	(3) Iss_t / $Assets_t$	(4) Iss_t / $Assets_t$	(5) Iss_t / $Assets_t$	(6) Iss_t / $Assets_t$	(7) Iss_t / $Assets_t$
SBC_{t-1} / $Assets_{t-1}$	0.003	0.255**	0.082	0.130***	0.185	0.070**	8.627
	(0.057)	(0.100)	(0.117)	(0.015)	(2.088)	(0.029)	(5.196)
$\ln(Assets_{t-1})$	-0.003***	-0.000	-0.001	-0.000	-0.001	-0.000*	0.011
	(0.001)	(0.000)	(0.004)	(0.000)	(0.005)	(0.000)	(0.009)
$Equity_{t-1}$ / $Assets_{t-1}$	0.012	-0.001	0.101	0.001	0.125	0.006	0.240
	(0.018)	(0.001)	(0.073)	(0.001)	(0.088)	(0.004)	(0.173)
Tier 1 $Buffer_{t-1}$	-0.001**	-0.000	-0.001**	-0.000*	-0.001*	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
Sample	Full	< 2%	≥ 2%	< 5%	≥ 5%	< 10 %	≥ 10 %
FE	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B
Err Cluster	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B
N	2705	1753	441	1961	229	2050	133
R-squared	0.22	0.81	0.49	0.78	0.51	0.45	0.60

Table 7: Stock-Based Compensation and Common Stock Issuance. The sample includes all top-tier bank holding companies with assets greater than $3 billion in 2024 dollars. Assets are scaled to 2024 dollars. Assets, Equity, Tier 1 Buffer, Earnings, Net Income, OCI, and their change counterparts are winsorized at the 1st and 99th percentiles. All columns include year and bank fixed effects and have standard errors clustered at the year and bank level.

In contrast, SBC is unrelated to larger issuance events. Columns 3, 5, and 7 show no evidence of a relationship between SBC and issuance. These larger issuances likely reflect capital-raising decisions or other strategies unrelated to compensation programs.

Table 8 repeats the analysis using common stock repurchases as the dependent variable and applies the same sample splits based on the size of repurchases relative to lagged common equity. The results parallel those for issuance. In the full sample (Column 1), SBC is unrelated to repurchases, reflecting the fact that repurchases combine small SBC-related offsets with much larger payouts decisions that are driven by other factors. Once the sample is restricted to small repurchase amounts, SBC becomes positively associated with repurchases.

	(1) Rep_t / $Assets_t$	(2) Rep_t / $Assets_t$	(3) Rep_t / $Assets_t$	(4) Rep_t / $Assets_t$	(5) Rep_t / $Assets_t$	(6) Rep_t / $Assets_t$	(7) Rep_t / $Assets_t$
SBC_{t-1} / $Assets_{t-1}$	-0.211	0.220**	-0.459	0.222*	-0.579	0.240***	-17.707***
	(0.482)	(0.101)	(0.627)	(0.119)	(0.703)	(0.055)	(3.480)
$\ln(Assets_{t-1})$	-0.000	-0.000*	0.000	0.000	-0.000	0.000	0.007
	(0.000)	(0.000)	(0.001)	(0.000)	(0.003)	(0.000)	(0.005)
$Equity_{t-1}$ / $Assets_{t-1}$	0.043***	0.003	0.094***	0.013***	0.108**	0.023***	0.110*
	(0.013)	(0.002)	(0.020)	(0.004)	(0.043)	(0.008)	(0.062)
Tier 1 $Buffer_{t-1}$	0.000**	0.000	0.001***	0.000	0.002**	0.000***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Sample	Full	< 2%	≥ 2%	< 5%	≥ 5%	< 10 %	≥ 10 %
FE	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B
Err Cluster	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B	Y, B
N	2705	958	681	1358	301	1616	72
R-squared	0.59	0.49	0.66	0.41	0.66	0.67	0.97

Table 8: Stock-Based Compensation and Common Stock Repurchases. The sample includes all top-tier bank holding companies with assets greater than $3 billion in 2024 dollars. Assets are scaled to 2024 dollars. Assets, Equity, Tier 1 Buffer, Earnings, Net Income, OCI, and their change counterparts are winsorized at the 1st and 99th percentiles. All columns include year and bank fixed effects and have standard errors clustered at the year and bank level.

In contrast, SBC does not predict larger repurchase levels. In Columns 3 and 5, which focus on repurchases above 2 and 5 percent of equity, the coefficients are insignificant. In Column 7, the coefficient becomes negative and significant for repurchases exceeding 10 percent of common equity. This likely reflects that very large repurchase amounts are driven by factors unrelated to the relatively small contribution of SBC.

Taken together, the results for issuance and repurchases help explain why many banks both issue and repurchase common stock in the same year. SBC drives small, routine issuance and is associated with small repurchases. Meanwhile, large issuance and repurchase programs are driven by broader equity management objectives and are unrelated to SBC.

5 Conclusion

Understanding how bank equity capital evolves over time is central to understanding banks' capital management strategies and evaluating their resilience. In this paper, we document how U.S. bank holding companies built and depleted equity capital from 1990 to 2024 using regulatory data that covers both publicly traded and privately held institutions. By bringing together earnings, stock issuance, and shareholder payouts within a unified framework, we quantify the contributions of these components and characterize the patterns that shape equity capital over time.

Earnings are, by a wide margin, the dominant source of equity capital growth. Although common stock issuance is frequent, it is typically small and contributes little to equity capital. At

the bank level, payouts exceed earnings in a meaningful share of years, reflecting both capital-management decisions and the effects of unexpected earnings shocks. We also show that the widespread practice of issuing and repurchasing common stock within the same year is linked to stock-based compensation. Small issuances are positively related to the level of SBC, and repurchase behavior is consistent with offsetting dilution. Together, these findings indicate that much routine issuance reflects compensation and share-maintenance practices rather than deliberate efforts to raise capital.

More broadly, our results provide a foundation for understanding how equity capital adjusts in normal times and how these patterns change in periods of stress. They also open a number of promising research avenues. Examples include examining how payout behavior interacts with internal capital targets versus supervisory requirements; analyzing the role of other comprehensive income volatility, which our results show differs meaningfully from net income; and further investigating the link between stock-based compensation and equity management in the banking sector, an area where, to our knowledge, no prior work exists. These are only some of the research opportunities enabled by the framework and patterns documented in this study, and further research on these mechanisms can inform analyses of how capital policies, supervisory requirements, and internal capital management interact in practice.

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Appendix:
Common and Preferred Issuance and Redemptions During the GFC

Figures A1 and A2 explore issuance and redemptions of common and preferred stock during the GFC. The figures show quarterly issuance of common and perpetual preferred stock and repurchases of preferred stock from 2006 to 2011. As shown in Figure A1, preferred stock issuance rose sharply at the beginning of 2008 before spiking in the fourth quarter of that year, as the TARP program was implemented. Common stock issuance rose over the course of 2009 and 2010, as banks issued new common shares and, in many cases, used the proceeds to redeem TARP shares. Indeed, repurchases of preferred stock spiked in 2009, consistent with the idea the common stock issuance proceeds were used to redeem TARP shares. Figure A2 further illustrates this point by

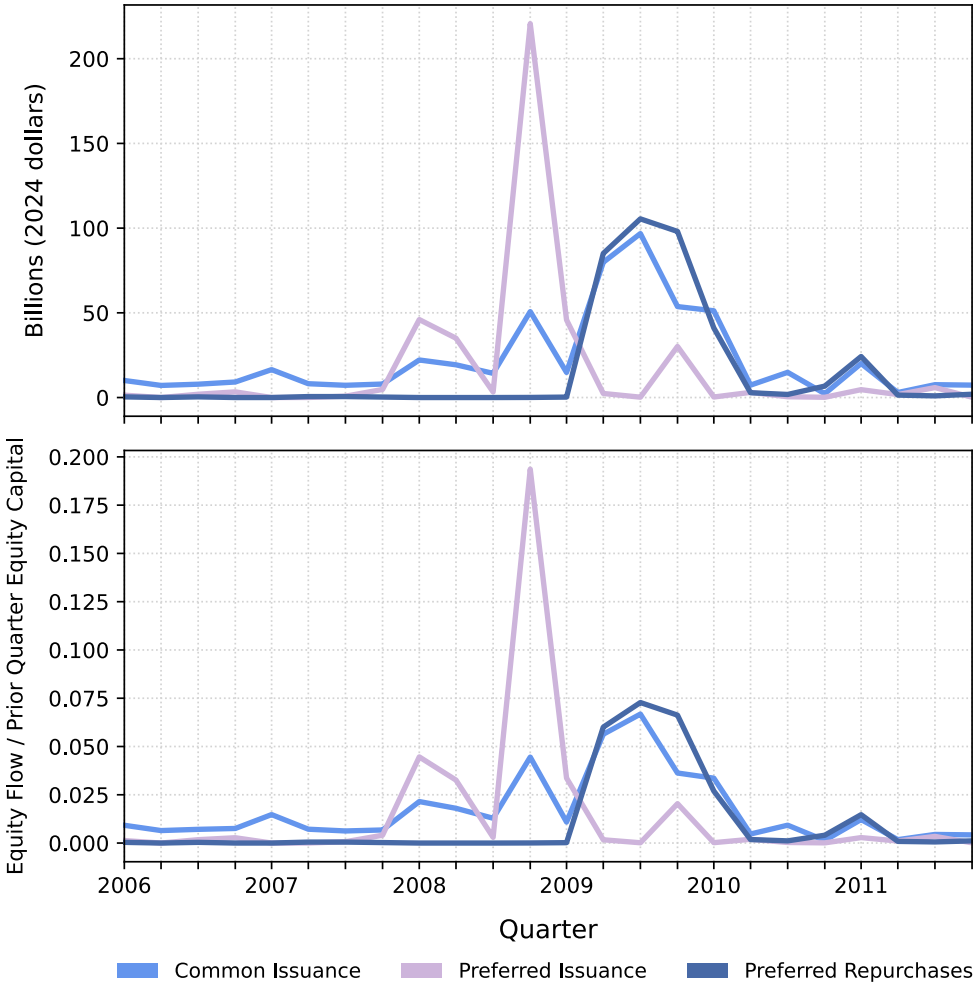

Figure A1: Issuance of Common and Perpetual Preferred Stock and Preferred Repurchases During the Global Financial Crisis Period, Quarterly Data 2006-2011. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars.
Source: Federal Reserve Y-9C reports.

dividing the sample into those banks that received TARP investments (top panel) and those banks that did not (bottom panel). Clearly, the spike in preferred issuance in 2008 followed by a rise in common stock issuance and in preferred repurchases in 2009 was driven entirely by banks receiving TARP injections.

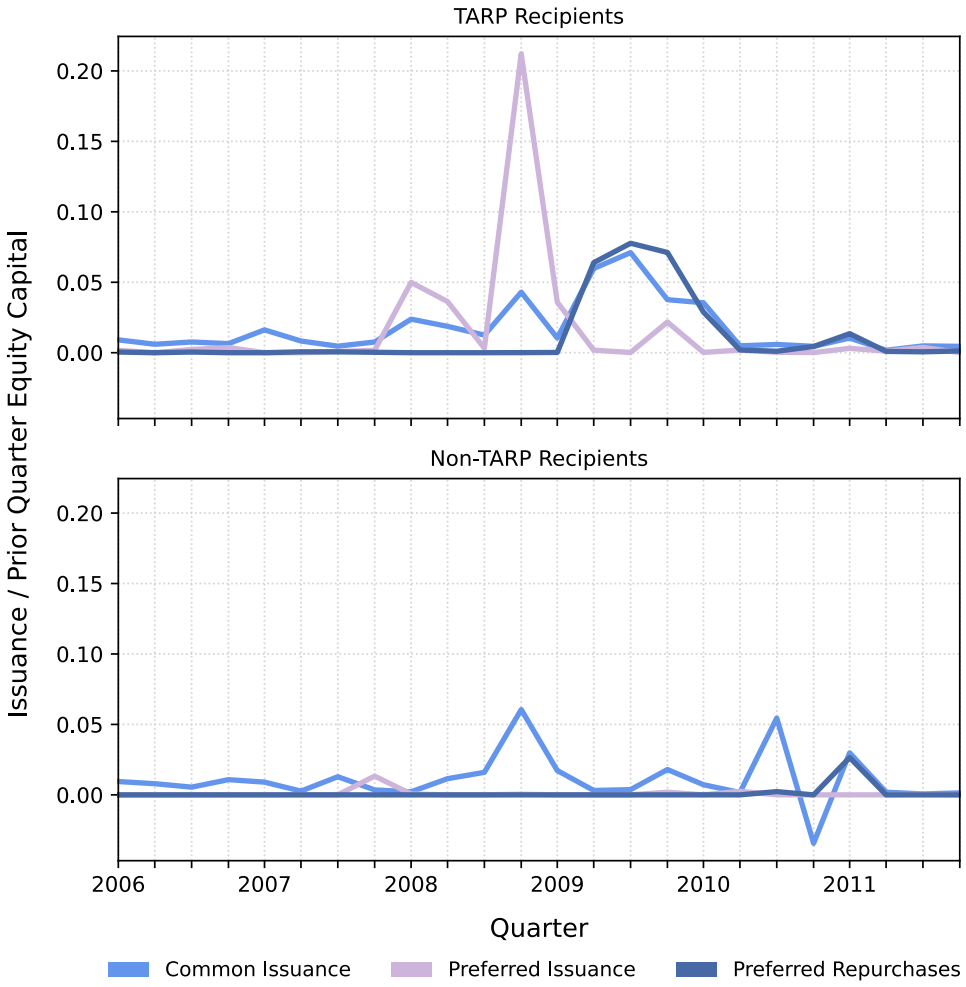

Figure A2: Issuance of Common and Perpetual Preferred Stock and Preferred Repurchases During the Global Financial Crisis Period, TARP Recipients and Non-recipients, Quarterly Data 2006-2012. The sample includes all top tier bank holding companies with assets greater than $3 billion in 2024 dollars. Source: Federal Reserve Y-9C reports; U.S. Treasury Department TARP Transactions Report: Capital Purcahse Program.