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The impact of share repurchases on bank operating performance after the global financial crisis: A comparison between the U.S. and Europe

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ABSTRACT

This paper conducts a comparative analysis of the impact of actual share repurchases executed by U.S. and European banking firms between 2008 and 2020 on their subsequent operating performance, as measured by ROE and ROA. The empirical results indicate a significantly positive effect of share repurchases on the operating performance of both U.S. and European banks in the year following these transactions. This evidence is consistent with both the information signaling and free cash flow hypotheses, though it exhibits a slightly stronger inclination towards supporting the latter. This suggests that, in a mature industry like banking where organic growth opportunities are limited, stock repurchases serve as an effective strategy for returning excess cash to shareholders, not only enhancing shareholder value but also mitigating the risk of agency conflicts.

1. Introduction

Share repurchases have been on the spotlight of corporate governance over the past three decades. Since share repurchases, also referred to as stock repurchases or stock buybacks, began to gain economic relevance in the mid-1980s, their popularity has surged dramatically, consolidating their status as one of the preferred methods for remunerating company shareholders. According to S&P Dow Jones Indices, stock repurchases in S&P 500 companies have consistently exceeded dividends in every quarter except two since 2010. Furthermore, in 2022 stock buybacks by the world's top 1200 companies increased by 22%, reaching a record-breaking $1.31 trillion. This figure is nearly equivalent to dividend payouts to shareholders, tripling the volume of share repurchases from a decade earlier.[1] Concurrently, share repurchases have seen a substantial upswing in Europe in recent years, with European companies announcing stock buyback programs worth about $350 billion by 2022, which represents an all-time high for the region.

The debate surrounding share repurchases has intensified recently. On the one hand, detractors argue that returning cash to shareholders through this mechanism comes at the expense of growth investment that would make companies more innovative and resilient. From this point of view, excess of stock repurchases are associated with inefficient capital allocation that can ultimately harm both companies and the overall economy by diminishing long-term investment. On the other hand, proponents of share repurchases contend that this transaction returns cash to shareholders when there are not available projects to deploy capital at the risk-adjusted

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[1] As per the report Janus Henderson's Global Dividend Index of May 2023.

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return required by shareholders, distributing excess profits to the final owners of the company so that they can reinvest the funds in other more lucrative projects. Furthermore, stock repurchases bolster shareholders' stake in the company, elevating earnings per share by reducing the number of shares outstanding. Lastly, share repurchases do not commit companies to continue buying equities on a regular basis, providing greater flexibility in timing alongside tax advantages over dividends.[2]

The phenomenon of share repurchases has been especially remarkable in the banking industry since the early 1990s. The absence of clear opportunities for organic growth in an industry that lacks key innovation drivers and where the competitive edge hinges on factors like scale, operational efficiency, and good capital allocation, makes stock repurchases an appealing corporate strategy for remunerating bank shareholders. Given the heavily regulated nature of the banking industry, it is worth highlighting that bank stock repurchases are unique considering that banks can only engage in buybacks when they meet the minimum capital requirements established by regulators. As indicated by Marsh (2022) Cook and Zhang (2022) and Hirtle and Zebar (2023), the dominance of share repurchases over dividends in the U.S. banking sector has increased since the end of the global financial crisis of 2008–2009. This upward trend was only interrupted during the COVID-19 health crisis, when share repurchases plummeted due to the stringent shareholder payout restrictions implemented by the Federal Reserve following the outbreak of the pandemic (Mazur et al., 2023).

Against this backdrop, the central aim of this paper is to examine the role played by bank share repurchases in the operating performance of international banking firms in the years following such repurchases. More specifically, this study investigates how actual share repurchases made by U.S. and European banks between 2008 and 2020 influenced their operating performance metrics in the subsequent years. The distinctive characteristics of the banking business, coupled with the growing prominence of bank share repurchases, justify the need of a dedicated analysis of stock repurchases within this industry. A change in a bank's capital not only affects its shareholders, depositors, and managers but also the public interest. This is due to the crucial role that banking firms play in maintaining the proper functioning and stability of the financial system, as well as their significant influence on the real economy.

The present paper contributes to the existing literature on several fronts. First, to the best of our knowledge, this study represents the first attempt to conduct a comparative analysis of the impact of actual share repurchases on the future operating performance of both U.S. and European banking firms. Second, the 2008–2020 sample period considered in this study provides a fresh look at how stock buybacks have influenced the operating performance metrics of international banks in recent years, offering valuable insights for shareholders and other stakeholders. The beginning of this period is marked by the severity of the 2008–2009 global financial crisis (GFC hereafter), during which regulators imposed tighter capital requirements on banks to safeguard financial stability. The 2008–2020 period is also characterized by an environment of historically low interest rates in both the U.S. and Europe, resulting in abundant liquidity in the system. These particular conditions laid the groundwork for abnormally low returns for the banking industry, potentially influencing the share repurchase activity of banks. It is important to note that, even prior to the GFC, banks operated with significant leverage, often reaching 30-to-1 ratios. The challenge following the crisis was not the lack of capital but rather the optimal deployment of excess cash generated by these institutions. Third, unlike most prior research, this paper focuses on the actual repurchase transactions rather than merely analyzing the announcements of repurchase programs. Additionally, it adopts a novel perspective by investigating the effect of bank repurchases on performance metrics in the years following the transactions, rather than concentrating on the fluctuations in bank stock returns in the days following the repurchase announcements. This approach offers a more comprehensive understanding of the long-term impact of the share repurchase activity in the banking sector.

The empirical results reveal a significantly positive effect of actual share repurchases on the operating performance of both U.S. and European banks in the year following the repurchase. This conclusion is based on empirical evidence that both the return of assets (ROA) and the return of equity (ROE) improve in the subsequent year of the share repurchase program controlling by several fixed control variables. This finding provides a strong case for the use of share repurchases by bank managers to effectively handle the excess cash generated and, in the absence of growth opportunities offering attractive risk-adjusted returns, to distribute this excess cash to the ultimate shareholders. However, the impact of share repurchases on the banking performance does not linger beyond a one-year horizon. The results indicate the use of the transaction as a proxy indicating the rationale use of cash by managers, particularly in the absence of more lucrative investment options. Concerning the primary rationale behind the favorable effect of share repurchases on banks' future operating performance, the evidence presented in this study leans slightly towards the free cash flow hypothesis introduced by Jensen (1986). In essence, this theory posits that bank managers decide to return excess cash flow to shareholders via share repurchases when there are limited external investment opportunities and after a sustained period of solid financial performance.

The results highlight the importance of regulatory frameworks that enforce discipline on banks' capital ratios, promoting financial stability while constraining the types of business activities they may engage in. This heightened stability and financial discipline on investments facilitate greater returns available for distribution to shareholders, contributing to the increased prevalence of share repurchases in the banking industry. As Jamie Dimon, CEO of J.P. Morgan, the largest bank in the world, stated, the U.S. banking system has significantly strengthened, with capital levels tripling to $900bn since the financial crisis. In the years leading up to the GFC, banks used their flexibility (or lack of regulation/control of tier equity capital ratios) to acquire and include in their balance sheets various assets and pursue diverse business strategies. However, the 2008 crisis revealed the challenges posed by suboptimal assets on their balance sheets. In this context, returning excess cash to shareholders emerges as a logical strategy, reinforcing the free cash flow hypothesis as a driving force behind the rise in share repurchases within the banking industry.

The remainder of the paper is organized as follows. Section 2 briefly reviews the most relevant literature on stock repurchases.

[2] For example, Warren Buffett, the investor and CEO of Berkshire Hathaway Inc., sarcastically defended the practice of stock repurchases in his 2022 annual report letter to investors. In this letter, Mr. Buffett described as economic illiterates or silver-tongued demagogues all those who claim that stock buybacks are harmful to shareholders or to the country.

Section 3 describes the dataset used in this study, highlighting the most striking features of share repurchase activity undertaken by U. S. and European banks throughout the study period, and outlines the model specification employed in the analysis. Section 4 presents and discusses the major empirical findings. Finally, Section 5 provides some concluding remarks and suggests potential avenues for future research.

2. Review of the literature

The phenomenal surge in share repurchases over the last twenty years has been accompanied by a considerable amount of academic research dedicated to this subject, principally within the U.S. context. The bulk of this work has centered around non-financial firms, reflecting the widespread popularity of this transaction across a range of industries (Skinner, 2008). In particular, existing literature has predominantly focused on two fundamental aspects of stock buybacks: the motivations driving companies to repurchase their shares and the short-term response of stock prices to share repurchase announcements. Two prominent theories are proposed in the literature to explain why companies repurchase their own shares. Firstly, the information signaling hypothesis is grounded in the concept of asymmetric information between firm managers and external investors, highlighting the exclusive information that managers possess regarding a company's future prospects (Bhattacharya, 1979; Miller & Rock, 1985; Vermaelen, 1981). According to this hypothesis, companies repurchase shares to send a positive signal to the market, suggesting that the company's future looks promising and that its shares may be undervalued. Empirical support for the information signaling theory has been found in Ikenberry et al. (1995), Evans et al. (2003), and Wang et al. (2013), among others. Secondly, the free cash flow hypothesis postulated by Jensen (1986) posits that companies with excess cash and limited investment opportunities are prone to overinvest in projects with negative net present values. This can erode shareholder value and exacerbate agency conflicts between managers and shareholders. Based on this theory, share repurchases serve as a mechanism for returning excess cash flows to shareholders, mitigating potential mismanagement of funds and ultimately boosting firm value. Researchers such as Nohel and Tarhan (1998) and Grullon and Michaely (2004) regard the free cash flow hypothesis as one of the most compelling justifications for the decision to repurchase shares. As emphasized by Hirtle (2004), these two competing hypotheses are not mutually exclusive, rather they may coexist and interact in influencing corporate decisions about share repurchases.[3]

Given the increasingly important role of stock repurchases, understanding their impact on firms' long-term operating performance is essential. However, with a few notable exceptions, such as Grullon and Michaely (2004), Lie (2005), and Gong et al. (2008), this aspect has been scarcely explored. Most existing research has focused on the short-term positive abnormal returns associated with the announcement of share repurchase plans across various industries (Chan et al., 2004; Dann, 1981; Lakonishok & Vermaelen, 1990; Stephens & Weisbach, 1998; Vermaelen, 1981). In general, these studies provide strong evidence of positive cumulative abnormal returns following share repurchase announcements. Other contributions, such as Guay and Harford (2020) and Jagannathan et al. (2000), emphasize the higher flexibility inherent in share repurchases as a pivotal factor contributing to their growing prevalence over dividends.

Stock repurchases within the banking industry have attracted much less academic attention than in non-financial industries. This is surprising given the implications of share repurchases for bank capital adequacy and the critical role that a healthy banking industry plays in ensuring the smooth functioning of the financial system. Pioneering studies in this field, such as Laderman (1995) and Hirtle (1998), document an extraordinary increase in stock repurchases by U.S. banking firms since the early 1990s. This trend is attributed to the improved profitability achieved by the U.S. banking industry after the turbulence of the late 1980s. More recently, Hirtle (2017) reports a steady increase in payouts to shareholders in the years following the GFC. This growth is primarily driven by a surge in share repurchases among the large U.S. bank holding companies involved in the Comprehensive Capital Analysis and Review (CCAR) supervisory program conducted by the Federal Reserve. Furthermore, several papers have explored stock price reactions to stock buyback announcements by banking institutions, with most finding positive abnormal returns in the short-term. For example, Akhigbe and Madura (1999), Howe and Jain (2006), Niu (2015), and Floyd et al. (2015) present evidence supporting the information signaling hypothesis. In turn, Webb (2008) also finds a positive market response to bank buyback announcements, but notes that corporate governance measures like board structure and insider equity ownership, have little influence on the shareholder response to the repurchase announcement. Differently, Billingsley et al. (1989) conclude that stock repurchase announcements by U.S. bank holding companies do not materially affect the wealth of bank shareholders.

On the contrary, scant attention has been devoted to exploring the relationship between bank stock repurchases and future operating performance over long time horizons. To address this gap, Hirtle (2004) examines the impact of actual share repurchases undertaken by a large sample of U.S. bank holding companies on their operating performance in the years following the repurchases. Her findings suggest that bank stock repurchases are associated with improved financial performance in the year after the repurchase, but the impact diminishes substantially beyond that one-year horizon. This paper extends prior research on bank share repurchases by examining on the relationship between repurchase activity and the operating performance of a sample of prominent U.S. and European publicly listed banks during the post-repurchase years, rather than solely focusing on the short-term stock price reaction. It is worth noting that the existing studies in this area are clearly outdated and none of them have conducted a comparative analysis of the effects of stock buybacks by publicly traded banks across various countries or regions. The present paper, by contrast, encompasses a more

[3] Furthermore, it is worth highlighting that there are other alternative explanations of share repurchases, including the capital structure hypothesis (Hovakimian et al., 2001), the dividend substitution hypothesis (Grullon & Michaely, 2002), the personal taxation saving hypothesis (Lie & Lie, 1999), the dilutive effect of stock options (Kahle, 2002), and defense against unwanted takeovers (Billett & Xue, 2007).

recent timeframe characterized by unique interest rate policy and liquidity conditions that have sparked a renewed interest in bank stock repurchases. Additionally, it allows for an assessment of potential variations between U.S. and European banks in terms of the impact of share repurchases on their operating performance over longer than usual time horizons. By doing so, this study offers an updated and more comprehensive understanding of the role of stock repurchases in long-term value creation within the international banking industry.

3. Data and methods

3.1. Dataset

The dataset used in this study is constructed from the pool of banking firms publicly listed on the U.S. and European stock exchanges that carried out share repurchases between 2008 and 2020, and for which a sufficient amount of data is available. The data employed is sourced from S&P Capital IQ and 10-K filings for U.S. banks, as well as annual reports for European banks.[4] The sample period spans from the fiscal year 2008 to the fiscal year 2020. This endpoint is determined by the need to have a couple of fiscal years following the share repurchases to be able to assess their impact on the operating performance of banking firms over a relatively extended horizon. The selected timeframe covers an era of exceptionally low-interest rate levels, sharply contrasting with the rapid interest rate hikes implemented by central banks since early 2022 to combat inflationary pressures, a new landscape with a potential impact in stock repurchases that shall be analyzed in due time when enough data will be available to cover a meaningful period.

Our primary focus is on prominent publicly listed banking institutions operating as general lenders in either the U.S. or Europe. To ensure sample homogeneity, banks that do not rank among the largest by total assets in either of these two regions are excluded. Moreover, only banks that remain publicly traded throughout the entire sample period and are not involved in corporate mergers or acquisitions are considered. Banking firms with missing or incorrect data, as well as those with negative equity capital, are also excluded from the analysis. To further enhance data reliability, following Nohel and Tarhan (1998) and Lie (2005), we adopt a trimming approach to mitigate the influence of outliers. This entails removing 1% of observations from each tail of the distribution of bank stock repurchases. After this data cleaning process, the final sample comprises 240 share repurchases conducted by 32 banking firms between 2008 and 2020. This sample group includes the 15 largest U.S. banks, with an average market capitalization of $93 billion, and 17 major European banks, averaging a market capitalization of €34 billion. Table 1 details the U.S. and European banking firms considered in this study, showing the number of years each bank conducted share repurchases during the sample period.

The variable Share repurchases/Market Cap, defined as the dollar amount of common stock repurchases by a bank in a given fiscal year divided by the bank's average total market capitalization during that period, is used as the primary proxy for share repurchases in this study.[5] This variable measures the magnitude of share repurchases relative to the bank's total market value of the bank, reflecting the market reality of bank shareholder compensation through stock buybacks.[6]

Following the common practice in the related literature (Billingsley et al., 1989; Hirtle, 2004; Howe & Jain, 2006; Kuo et al., 2006), two well-known metrics, namely return on assets (ROA) and return on equity (ROE), are employed in this study to assess the operating performance of banking firms. In particular, ROA is calculated by dividing a bank's net income in a given year by its total assets at the end of that year, thus indicating the bank's capacity to generate earnings from its asset base. Similarly, ROE is computed by dividing a bank's net income in a given year by shareholders' equity at the end of that year, illustrating how efficiently a bank uses shareholders' capital to yield net income. Elevated values for both ROE and ROA indicate superior operating performance by banks.

Banking is a risky business and, according to traditional corporate finance theory, the ROE of banks should be high enough to adequately compensate shareholders for the underlying risks associated with investing in bank stocks. Moreover, banks face several systemic vulnerabilities, such as runs, asset devaluation due to errors by other banks, general financial market turbulence, and/or adverse macroeconomic conditions. Additionally, unlike companies in many other industries, banks operate under a highly leveraged business model, where debt significantly outweighs equity, introducing a substantial risk of default. Despite all these inherent risks in the banking business, banks' ROE is not particularly high, which has contributed to the growing popularity of share repurchases in the banking industry. Stock repurchases have become an increasingly favored mechanism for aligning shareholder remuneration with the level of risk undertaken by banks.

To provide a detailed overview of the scale of bank repurchase activity, Table 2 presents several key indicators related to the number, magnitude, and importance of actual share repurchases conducted by U.S. and European banking firms. It also reports the average operating performance of banks engaged in repurchases for each fiscal year in the sample period, measured through ROE and ROA. Several noteworthy observations emerge from this table. The number and total dollar amount of share repurchases have considerably increased over the sample period, underscoring the growing relevance of this transaction in the international banking

[4] The Standard & Poor (S&P) Capital IQ is the research division of S&P Global data, one of the world's largest providers of ratings, research and market indices. S&P Capital IQ analyzes more than 135 billion data points to offer thorough research and analysis of the stock market.

[5] We exclude preferred stock repurchases as preferred stocks are associated with specific shareholder conditions, entitling their owners to priority claims over dividends, asset distributions or remunerations. The preferred stock status is determined on a bank-by-bank basis and does not contribute to obtaining a comprehensive overview of general shareholder remuneration and the impact of share repurchases on bank operating performance. In addition, very few of the sampled banks made preferred stock repurchases during the period of study.

[6] It is also worth pointing out that the empirical results of this study remain qualitatively the same if the magnitude of share repurchases is measured using an alternative indicator, such as the ratio of the dollar amount of common stock repurchases over net income in a given fiscal year.

Table 1
Share repurchases of U.S. and European banks.

Panel A. U.S. banks	
Entity	Years with share repurchases
Bank of America	8
Citibank	11
Goldman Sachs	13
JP Morgan Chase	13
Morgan Stanley	13
PNC Bank	13
Wells Fargo Bank	13
TD Bank (Canada)	13
Truist FC	3
State Street	12
Key Corp	9
Bank of NY Mellon	11
Citizens	7
Capital One	5
US Bancorp	10
Panel B. European banks	
Entity	Years with share repurchases
BNP Paribas (France)	11
Société Générale (France)	7
Intesa Sanpaolo (Italy)	3
ING (Netherlands)	5
BBVA(Spain)	13
Banco Sabadell (Spain)	13
Banco Santander (Spain)	11
Bankinter (Spain)	13
CaixaBank (Spain)	7
Barclays Bank (UK)	12
Deutsche Bank (Germany)	3
KBC (Belgium)	7
UBS (Switzerland)	2
Lloyds (UK)	1
Schartered (UK)	6
UniCredit (Italy)	2
NatWest (UK)	2

Notes. This table presents the selected U.S. and European banks that made stock repurchases between 2008 and 2020. It also indicates the number of years during which each banking firm has carried out share repurchases within this sample period.

industry. Remarkably, the aggregate amount of bank repurchases reached a historic peak of $145 billion in 2019. However, repurchase activity sharply declined in 2020, reflecting the severe impact of the COVID-19 pandemic on bank profits and the associated supervisory restrictions imposed on repurchases during this period. The average Share repurchases/Market Cap ratio is 4.4%, although this figure experienced pronounced drops in 2009, 2013–2014 and 2020, coinciding with various major adverse shocks, including the GFC, the Eurozone sovereign debt crisis, and the COVID-19 pandemic, respectively. This evidence corroborates the findings of Hirtle (2014) and Floyd et al. (2015), who documented a strong cut in bank share repurchases. This reduction can be attributed to financial strains resulting from the GFC and also, to some extent, to bank managers' efforts to avoid closer scrutiny from regulators and the media during such delicate periods. These swings in the level of bank share repurchases highlight the flexibility that share repurchases offer compared to dividends, enabling managers to adjust their payout policies in response to changing economic conditions.

In turn, the average ratio of Share repurchases to Net income over the 2008–2020 period is 64%, confirming the pivotal role of bank stock repurchases as a recurring mechanism for returning cash to shareholders. This ratio hit historical highs in 2012 and 2013. One possible explanation for this surge is that these years marked the height of the GFC's impact on the European banking sector, further aggravated by the Eurozone sovereign debt crisis, leading to substantially lower net income for many European banks. In contrast, the proportion of net income paid out to shareholders in the form of share repurchases fell drastically in 2020, which can be attributed to the outbreak of the pandemic and the stringent restrictions on share repurchases imposed by banking supervisors.

Table 3 displays the key indicators related to actual bank stock repurchases disaggregated by geographic area. As can be seen, the frequency and size of share repurchase activity from 2008 to 2020 are high and show an upward trend over time for both European and U.S. banks. However, this favorable trajectory was significantly disrupted by major negative revenue shocks, such as the GFC and the COVID-19 health crisis. It is worth noting that the proportion of share repurchases over market capitalization is typically lower for U.S. banks compared to their European counterparts. This discrepancy can be largely explained by the fact that U.S. bank stocks typically trade at a premium, whereas European bank stocks tend to be priced lower. The ratio of Share repurchases to Net income remains

Table 2
Summary indicators of share repurchases for the U.S. and European banks.

Year	Number of share repurchases	Repurchases ($ billion)	Market Cap ($ billion)	Share repurchases/Market Cap (%)	Share repurchases/Net Income (%)	ROA (%)	ROE (%)
2008	13	31,340	41,528	6.5%	55.9%	0.6%	8.9%
2009	15	18,755	51,650	3.2%	33.0%	0.8%	9.0%
2010	16	27,880	61,548	4.0%	41.2%	0.7%	9.3%
2011	19	39,170	49,554	4.5%	58.8%	0.7%	8.4%
2012	19	33,890	53,291	4.5%	107.2%	0.6%	6.9%
2013	23	47,955	67,442	3.8%	164.9%	0.6%	7.2%
2014	24	50,193	71,699	3.1%	50.1%	0.7%	7.5%
2015	24	61,316	72,123	4.0%	50.4%	0.8%	8.4%
2016	20	57,989	73,822	4.0%	51.4%	0.8%	8.4%
2017	22	97,754	93,330	4.2%	59.7%	0.7%	7.9%
2018	26	126,604	82,541	4.9%	63.3%	0.9%	9.7%
2019	22	145,463	83,939	6.6%	69.9%	0.9%	9.6%
2020	21	44,547	64,027	3.3%	26.7%	0.6%	6.7%
Average	*20*	*60,220*	*66,653*	*4.4%*	*64.0%*	*0.7%*	*8.3%*

Notes. This table provides a set of indicators concerning the number, size, and relative importance of share repurchases conducted by U.S. and European banking firms, along with operating performance metrics for companies making those repurchases for each fiscal year of the sample period. Share repurchases indicates the total number of bank share repurchases carried out per fiscal year. Repurchases represents the total amount of bank share repurchases (in billions of dollars) per fiscal year. Market Cap denotes the average total market capitalization (in billions of dollars) for each fiscal year of the group of banks making repurchases at that year. This calculation involves averaging the market capitalization data at the end of each quarter. Share repurchases/Market Cap is defined as the total amount of common stock repurchases undertaken by the sample banks in a given fiscal year relative to the average total market capitalization of those banks at that fiscal year. Share repurchases/Net Income represents the total amount of share repurchases in a fiscal year relative to the total net income of banks making stock repurchases in that year. As for the operating performance metrics, ROA is computed by dividing the net income of each bank engaged in share repurchases in a given fiscal year by its total assets at the end of that year. The ROA shown in this table represents the weighted average ROA for all banks in the sample. Likewise, ROE is calculated by dividing the net income of each bank conducting share repurchases in a given fiscal year by its total equity at the end of that year. The ROE presented in this table is the weighted average ROE for the sample banks.

consistently high for both U.S. and European banks throughout the sample period, indicating that a substantial portion of banks' net income is regularly distributed through share repurchases. The only exceptions occur in 2008 and 2009 for U.S. banks, coinciding with the peak impact of the GFC on the U.S. banking sector. Notably, this ratio reached its highest values for European banks in 2012–2013, the most tumultuous years of the GFC for the European banking sector, when European banks continued to repurchase their own stock despite the strong decline in net income caused by the delayed impact of the GFC and the ongoing sovereign debt crisis in the euro area. Since 2010, the ROA and ROE of U.S. banks have consistently exceeded those of European banks. This indicates that the most severe repercussions of the GFC on the European banking sector became apparent a few years later compared to the U.S. sector, illustrating the low profitability faced by European banks over the past decade. As previously mentioned, despite all the risks faced by bank shareholders, ROE is not particularly high, typically in the upper single digits. To be more specific, from 2008 to 2020, the average ROE was 9.0% for U.S. banks and 7.1% for European banks. The consistently higher equity returns of U.S. banks translate into better market valuations, impacting the metrics reflected in Tables 2 and 3, as market capitalization is used in this study to weight and calculate the magnitude of share repurchases per bank.

Finally, a control sample consisting of 14 U.S. and European banking firms that have not conducted significant share repurchase activity from 2008 to 2020 has been created for comparison purposes. Specifically, the significance threshold is set to 0.25% of total market capitalization of the bank in the year when the stock repurchase occurs. This control sample will help assess whether there are significant differences between banks that frequently repurchase shares and those that do not. Table 4 details the composition of the control group of banks, specifying the number of years each bank did not engage in share repurchases during the study period.

3.2. Model specification

In this sub-section, we present the model specifications used to evaluate the impact of share repurchases on the operating performance of banks in the post-repurchase years. A linear single-equation regression model that relates the operating performance metrics of banking firms to the extent of their actual share repurchases, along with some pertinent control variables, is employed for that purpose. The primary aim is to elucidate how share repurchases influence the future performance of banks engaged in these transactions. As discussed earlier, ROE and ROA are utilized as indicators of the operating performance of banking firms, while the ratio Share repurchases/Market Cap is used as a proxy for the magnitude of actual bank share repurchases. Following Hirtle (2004), several control variables, such as asset size, the equity capital ratio, and the non-performing loans ratio, are included to account for additional factors that might also affect banks' operating performance. In particular, asset size represents the size of a bank, determined by the value of its total assets at the close of a given fiscal year. The equity capital ratio is calculated by dividing a bank's total book equity by its total assets at the fiscal year's end. Lastly, the non-performing loans ratio, calculated by dividing a bank's non-performing loans by its total assets at the end of a fiscal year, serves as a reliable indicator of the credit quality of the bank's loan portfolio.

Table 3
Summary indicators of bank share repurchases broken down by geographic area.

Year	Number of share repurchases	Repurchases	Market Cap	Share repurchases/Market Cap (%)	Share repurchases/Net Income (%)	ROA (%)	ROE (%)
A. European banks.							
2008	7	23,166	23,311	9.6%	102.1%	0.9%	11.6%
2009	7	16,372	29,150	6.0%	61.0%	0.9%	10.2%
2010	7	16,968	37,108	7.2%	72.2%	0.5%	9.0%
2011	9	16,933	27,185	6.2%	73.7%	0.4%	6.9%
2012	8	15,066	31,380	6.4%	164.9%	0.2%	3.7%
2013	10	15,035	38,722	4.3%	323.0%	0.3%	4.5%
2014	10	11,470	40,037	2.7%	52.8%	0.4%	5.7%
2015	10	12,861	39,111	3.8%	43.6%	0.5%	7.6%
2016	7	8197	39,669	3.5%	48.0%	0.5%	7.3%
2017	8	7580	42,761	2.7%	57.1%	0.4%	6.6%
2018	11	13,760	37,640	4.0%	64.4%	0.5%	7.5%
2019	8	10,113	28,813	5.0%	50.7%	0.5%	7.5%
2020	8	4673	25,687	3.3%	21.0%	0.3%	4.5%
Average	*8*	*13,246*	*33,890*	*5.0%*	*87.3%*	*0.5%*	*7.1%*
B. U.S. banks.							
2008	6	8174	62,782	2.9%	2.0%	0.3%	5.1%
2009	8	2383	71,337	0.6%	8.4%	0.7%	8.0%
2010	9	10,912	80,556	1.4%	17.1%	0.9%	9.6%
2011	10	22,237	69,686	2.9%	45.4%	0.9%	9.7%
2012	11	18,824	69,226	3.1%	97.0%	0.9%	9.2%
2013	13	32,920	89,535	3.3%	42.9%	1.0%	9.3%
2014	14	38,723	94,315	3.4%	48.2%	0.9%	8.8%
2015	14	48,455	95,703	4.2%	55.3%	1.0%	9.1%
2016	13	49,792	92,212	4.2%	53.2%	0.9%	9.0%
2017	14	90,174	122,227	5.1%	61.1%	0.9%	8.6%
2018	15	110,844	115,467	5.6%	63.1%	1.2%	11.3%
2019	14	135,350	115,439	7.5%	80.9%	1.1%	10.8%
2020	13	39,874	87,621	3.3%	47.6%	0.8%	8.1%
Average	*12*	*46,820*	*89,700*	*3.7%*	*47.9%*	*0.9%*	*9.0%*

Notes: This table contains a variety of indicators related to the number, magnitude, and relative importance of share repurchases executed by European banks (Panel A) and U.S. banks (Panel B). It also presents several operating performance metrics for the banks conducting these repurchases, with data for each fiscal year within the sample period. For detailed definitions and further information on the various indicators, refer to Table 2.

Table 4
Control group of U.S. and European banks.

Entity	Years without share repurchases
Intesa	10
Firstbank	4
Truist FC	10
KBC	5
ABN Amro	13
UBS	2
Commerzbank	13
Lloyds	10
Unicredit	13
NatWest	7
Nordea	11
Credit Agricole	13
Key Corp	4
Capital One	6

Notes: This table lists the group of U.S. and European banks that have not made relevant stock repurchases between 2008 and 2020, based on the defined significance threshold of 0.25% of total market capitalization It also shows the number of years each banking firm has abstained from share repurchases during the sample period.

The baseline model captures the impact of stock repurchases made during a given year on bank performance metrics in the subsequent year and can be expressed as follows:

$$OPM_{it+1} = \beta_0 + \beta_1 Repurch_{it} + \beta_2 Size_{it} + \beta_3 Capital_{it} + \beta_4 Non - perform_{it} + \alpha_i + \gamma_t + \varepsilon_{1it+1} \quad (1)$$

where OPM_{it+1} denotes the operating performance metric of bank i in year $t+1$, using either ROE and ROA as proxies for banks' operating performance. *Repurch* represents the Share repurchases/Market Cap variable for bank i in year t. *Size*, *Capital*, and *Non-perform* are asset size, the equity capital ratio, and the non-performing loans ratio, respectively, of bank i in year t. Furthermore, β_j, with $j = 0, 1, \ldots, 4$, are coefficients, α_i is a bank-specific fixed effect, and γ_t stands for a year dummy. Finally, ε_{1t+1} denotes the error term.

This model is subsequently extended to assess the impact of share repurchases on bank operating performance over a longer time horizon following such repurchases. To that end, an extra lagged value of the repurchase variable is incorporated into the model specification. Thus, the resulting regression model allows us to examine whether stock repurchases conducted two years earlier have a significant effect on banks' operating performance while also controlling for repurchases and control variables from the previous year. The expanded model can be written as follows:

$$OPM_{it+2} = \beta_0 + \beta_1 Repurch_{it+1} + \beta_2 Repurch_{it} + \beta_3 Size_{it+1} + \beta_4 Capital_{it+1} + \beta_5 Non-perform_{it+1} + \alpha_i + \gamma_t + \varepsilon_{2it+2} \quad (2)$$

Given the dataset's panel structure, Equations (1) and (2) are estimated with bank-specific fixed effects as well as year dummies. The fixed effects model allows for unobserved bank-level individual effects, which may vary across banks but remain constant over time. Heteroskedasticity and within-panel serial correlation robust standard errors are used in the estimation. To check the robustness of the results, the above equations have been re-estimated by replacing the fixed effects model with ordinary linear regression incorporating robust standard errors. Overall, the estimation results without fixed effects are qualitatively similar to those obtained from the panel data fixed-effects model in terms of coefficient signs, although the significance levels of the coefficient estimates are generally lower than in the fixed-effects specification.

4. Empirical findings

4.1. Preliminary analysis

Table 5 shows the descriptive statistics for the bank share repurchase indicators and operating performance metrics considered in this study. The average ratio of share repurchases to market capitalization for banks engaged in stock buybacks is 5.6% across the total sample, representing approximately $2.9 billion worth of stock repurchased annually. Similarly, the average proportion of share repurchases relative to Net income for these banks stands at 22% across the total sample. These statistics reveal the considerable importance of share repurchases for both U.S. and European banking firms throughout the period of study. The average ROA and ROE for banks engaging in share repurchases are 0.6% and 7.2%, respectively. It is worth highlighting once again the relatively low ROE levels in an industry characterized by high leverage and systemic risks. The banking industry has evolved into a commoditized space, with most banks offering nearly identical products and services, making it difficult for customers to distinguish among them. In such a scenario, economies of scale and operational efficiency are critical, which contributes to the low average ROE levels, as there are no other competitive advantages that can sustain consistently higher returns for shareholders. Consequently, the strategic deployment of excess cash through share repurchases emerges as a crucial component of total shareholder returns.

Table 5 also breaks down descriptive statistics for U.S. and European banks. The most striking difference between the two groups is that the average scale of share repurchases, as measured by both the Share repurchases/Market Cap and Share repurchases/Net Income ratios, is much higher for European banks compared to U.S. banks. As stated before, these metrics are influenced by the market value of the bank institutions, captured by the market capitalization used in both ratios. Meanwhile, U.S. banks tend to outperform their European counterparts in terms of ROE and ROA, with both metrics showing less variability in the U.S. context. Several factors contribute to this superior operating performance of U.S. banks. On the numerator side of the ratios, the higher prevalence of value-accretive projects in the U.S. banking industry often results in lower share repurchases, as management retains cash for reinvestment. On the denominator side, the traditionally stronger growth prospects of the U.S. banking industry have led to higher valuation multiples and net income, thus resulting in greater market capitalization. Conversely, European banks face stricter regulatory constraints imposed by the European central bank and have fewer expansion opportunities, which contributes to lower valuations and market capitalization. The larger scale and more favorable growth environment of the U.S. market further accentuate these differences.

Comparing these figures with those from previous related studies, Hirtle (2004) found that the average volume of share repurchases by U.S. banks, including both publicly traded and non-publicly traded banking institutions, from 1987 to 1998 was considerably lower than that reported in this study. This suggests that stock repurchases are becoming increasingly important in the modern corporate governance of banking firms.

4.2. Impact of share repurchases on operating performance in the subsequent year (t+1)

The results of the fixed-effects estimation for the baseline model specified in Eq. (1) encompassing the total pool of U.S. and European banks engaged in share repurchases are displayed in Table 6. This table illustrates the impact of bank stock repurchases on the operating performance of international banks in the year following the repurchase (year *t+1*). In this analysis, ROE and ROA are used alternatively as the dependent variables. The coefficient on the Share repurchases/Market Cap variable is positive and statistically significant at the 1% level, regardless of whether ROE or ROA is utilized as the performance metric. This implies that, after controlling for various bank characteristics such as asset size, equity capital ratio, and non-performing loans ratio, stock repurchases in a given fiscal year are associated with increased ROE and ROA in the subsequent year. This finding reveals the critical role of share repurchases

Table 5
Descriptive statistics of the share repurchase and operating performance variables.

	Share repurchases/Market Cap (%)	Share repurchases/Net Income (%)	Market Cap ($ million)	ROA (%)	ROE (%)
A. Total sample of banking firms					
Mean	5.6%	21.8%	61,391	0.6%	7.2%
Std. Dev	9.2%	112.2%	66,768	0.5%	5.3%
Minimum	0.0%	(174.2)%	1680	(0.8)%	(14.1)%
Maximum	36.0%	512.3%	379,870	2.9%	19.7%
B. European banking firms					
Mean	7.0%	88.0%	32,855	0.4%	5.7%
Std. Dev	11.9%	210.2%	20,977	0.4%	5.9%
Minimum	0.0%	(174.8)%	1680	(0.1)%	(14.1)%
Maximum	36.0%	1974.9%	94,155	2.9%	19.7%
C. U.S. banking firms					
Mean	3.7%	61.2%	96,830	0.9%	9.0%
Std. Dev	2.3%	168.7%	84,892	0.3%	3.6%
Minimum	0.0%	(188.3)%	7892	(0.4)%	(3.1)%
Maximum	9.6%	2063.6%	379,870	1.6%	14.7%

Notes: This table reports the descriptive statistics for several indicators related to the magnitude of share repurchases, along with various operating performance metrics for a large sample of U.S. and European banks that conducted share repurchases over the period 2008 to 2020. For detailed definition of the different variables, please consult Table 2. Panel A represents the overall sample of banks, while Panels B and C refer to European and U.S. banks, respectively. Parentheses denote negative values.

Table 6
Impact of share repurchases on operating performance of banks in the post-repurchase year (*t+1*).

Variables	ROE_{t+1}	ROA_{t+1}
Intercept	0.0517***	0.0008***
Share repurchases/Market Cap_t	0.1542***	0.0061***
Asset $size_t$	0.0000	0.0000
Equity capital $ratio_t$	0.1171*	0.0625
Non-performing loans $ratio_t$	−0.0232	−0.046**
Adjusted R^2(%)	7.8	21.3
Observations	240	240

Notes: This table displays the results of the panel data fixed-effects estimation of the linear model described in Eq. (1) for the overall sample of U.S. and European banks involved in share repurchases over the period 2008–2020. All regressions include bank-specific fixed effects and year dummies. ROE and ROA, calculated for the year following the share repurchase, are used alternatively as the dependent variable. ROE, ROA, and Share repurchases/Market Cap are defined as in Table 2. Concerning the control variables, Asset size is quantified as the value of total assets of a bank at the end of a specific fiscal year. The equity capital ratio is derived by dividing a bank's total equity capital by its total assets at the conclusion of a fiscal year. The non-performing loans ratio is calculated by dividing non-performing loans of a bank by its total assets at the end of a fiscal year. As usual, ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

in the banking sector, demonstrating their importance not only as a major component of total shareholder returns but also as a driver of enhanced operating performance in banking firms. The observed improvement in future profitability is entirely consistent with the evidence presented by Hirtle (2004), who conducted a comprehensive study on the impact of share repurchases on U.S. bank holding companies between 1987 and 1998. In the same vein, Lie (2005) and Gong et al. (200) corroborate that share repurchase

Table 7
Impact of share repurchases on operating performance in the post-repurchase year (*t+1*) for U.S. and European banks.

Variables	ROE Europe	ROA Europe	ROE U.S.	ROA U.S.
Intercept	0.0616**	0.0007*	0.0746***	0.0039
Share repurchases/Market Cap_t	0.1549***	0.0054***	0.3354***	0.0386***
Asset $size_t$	0.0000	0.0000	0.0000	0.0000
Equity capital $ratio_t$	0.01009	0.0627***	−0.1379	0.0371*
Non-performing loans $ratio_t$	−0.0175	−0.0023*	0.3725	0.305
Adjusted R^2(%)	7.7	26.8	24.3	17.9
Observations	135	135	105	105

Notes: This table reports the results of the panel data fixed-effects estimation of the linear model outlined in Eq. (1), conducted separately for U.S. and European banks involved in share repurchases over the period 2008–2020. All regressions include bank-specific fixed effects and year dummies. ROE and ROA, calculated for the year following the share repurchase, are used alternatively as the dependent variable. ROE, ROA, and Share repurchases/Market Cap are defined as in Table 2. For more details on the remaining variables, refer to Table 5. As usual, ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

announcements are linked to long-term gains in the operating performance of U.S. companies.

Regarding the control variables, the coefficient on asset size is not statistically significant and presents negligible values, regardless of the operating performance metric considered. This outcome is not surprising, given our sample consists of the largest publicly listed U.S. and European banking firms, minimizing the potential impact of asset size on operating performance. The coefficient on the equity capital ratio is significant, but only at the 10% level when ROE is used as the dependent variable. This indicates that the level of bank equity capital is not a major driver of profitability for these large banks in the year after share repurchases. Additionally, the coefficient on the non-performing loans ratio is statistically significant only when ROA is used as the profitability metric. Overall, the control variables in this analysis do not seem to exert a substantial influence on the operating performance of banks in the year following share repurchases.

To explore potential variations in the influence of share repurchases on future operating performance depending on the geographical origin of banks, Eq. (1) is re-estimated separately for U.S. and European banking firms. Table 7 shows the results of the fixed-effects estimation of the impact of share repurchases on bank operating performance in the year following the repurchase at the disaggregate level for U.S. and European banks. The coefficient associated with the Share repurchases/Market Cap variable is positive and statistically significant at the 1% level for both U.S. and European banks irrespective of the operating performance metric under consideration. However, this coefficient is notably higher for U.S. banking firms, indicating that share repurchases have a stronger impact on operating performance in the U.S. banking sector. Historically, U.S. banks have been more profitable than European banks (see descriptive statistics in Table 5), providing them with more cash available to distribute in the form of share repurchases. The results in Table 7 also confirm the limited impact of the three control variables on the operating performance metrics for both U.S. and European banks.

The results for both the full sample and the subsets of U.S. and European banks reveal a significantly positive relationship between the extent of actual share repurchases and the level of bank ROE and ROA in the subsequent year. This suggests that stock repurchases are linked to enhanced profitability for both U.S. and European banking firms in the year after the repurchase. One of the most notable aspects of the results for U.S. and European banks is their remarkable consistency. In this regard, it is important to recognize that U.S. and European banking institutions are regulated by different central banks, which, while generally adhering to similar guidelines, sometimes implement different specific measures. For example, the European Central Bank is renowned for imposing stricter capital requirements and more rigorous oversight of banks' excess liquidity compared to other central banks. Furthermore, the timing of central bank actions may vary. For instance, the GFC peaked in Europe during 2012 and 2013, whereas the most critical years in the U.S. were 2008 and 2009.

4.3. Impact of share repurchases on bank operating performance over longer horizons

Next, we turn our attention to examine whether the significant impact of share repurchases on bank operating metrics extends beyond the one-year horizon considered so far. To address this question, we estimate Eq. (2), an expanded version of the baseline specification in Eq. (1), which includes an additional lagged value of the share repurchase variable; In other words, this updated specification incorporates share repurchases lagged both one and two years. This enables us to assess whether banks' operating performance is influenced by share repurchases conducted two years earlier while controlling for both the previous year's repurchases and the aforementioned control variables.[7]

Table 8 presents the fixed-effect regression results showing the impact of share repurchases on operating performance two years after the repurchase, broken down by U.S. and European banks. To save space, the coefficients on the three control variables are omitted from this table. For European banks, the coefficient on the one-year lagged repurchase variable remains positive and statistically significant at the 1% level, regardless of which profitability metric is used. This result corroborates our earlier finding that share repurchases enhance bank operating performance in the year following the repurchase. However, for U.S. banks, the introduction of the two-year lagged repurchase variable renders the coefficient on the one-year lagged repurchase variable insignificant, irrespective of whether ROE or ROA is used. More importantly, the coefficients on the two-year lagged repurchase variable are not statistically significant in any instance, suggesting that share repurchases made two years earlier do not have a noticeable impact on the current operating performance of U.S. and European banks. Therefore, the combined results from Tables 7 and 8 indicate that the relationship between share repurchases and bank operating performance is confined to the one-year horizon for both the U.S. and European banking sectors. This conclusion is consistent with the findings of Hirtle (2004), who similarly observed that share repurchases are associated with improved operating performance over a one-year horizon for U.S. bank holding companies.

4.4. Identification of the primary motivation behind bank share repurchases

Our empirical findings indicate that actual share repurchases exert a significantly positive influence on the operating performance of U.S. and European banks in the year following the repurchases. This relationship aligns well with prior research in this domain and can be explained by both the information signaling hypothesis and the free cash flow hypothesis. However, as highlighted by Hirtle (2004), empirically distinguishing between these two hypotheses is challenging due to the difficulty in identifying variables that accurately capture the private information bank managers possess regarding their firms' future prospects. It is also noteworthy that the

[7] The estimation results remain qualitatively consistent regardless of whether the one-year lagged share repurchase variable is excluded or if the control variables are lagged two years.

Table 8
Impact of share repurchases on operating performance in the year t+2 disaggregated by geographic area.

Variables	ROE_{t+2} Europe	ROA_{t+2} Europe	ROE_{t+2} U.S.	ROA_{t+2} U.S.
Intercept	0.1058***	0.0059***	0.0991***	0.0897***
Share repurchases/Market Cap_{t+1}	0.1483***	0.0069***	−0.0445	0.0495
Share repurchases/Market Cap_t	−0.0930	−0.0065	0.1705	0.0825
Adjusted R^2(%)	7.1	5.6	38.5	2.9
Observations	123	123	78	78

Notes: This table presents the results from the fixed-effects panel data estimation of the regression model specified in Eq. (2), conducted separately for U.S. and European banks. All regressions include bank-specific fixed effects and year dummies. Bank ROE and ROA are again used alternatively as the dependent variable. The Share repurchases/Market Cap ratio is lagged one and two years. For variable definitions, see Table 2. As in prior tables, ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

information signaling and free cash flow hypotheses are not mutually exclusive, but rather both hypotheses can coexist without contradiction.

The period from 2008 to 2020 illustrates how, amid a lack of clear growth catalysts for the banking industry, managers utilized stock repurchases to return excess cash to shareholders when deemed appropriate. As previously mentioned, two main explanations are generally behind the decision to make share repurchases. First, in the absence of attractive external investment opportunities, bank management can opt to distribute excess funds to shareholders, as suggested by the free cash flow hypothesis. This strategy reduces the risk of agency conflicts and prevents free cash flows from being channeled into non-profitable ventures (from the point of view of required cost of equity) thereby potentially enhancing future profitability and market valuations. Consequently, this strategy often results in improved future profitability when compared to a similar bank that retains and possibly misuses excess funds and the discipline use of the excess cash may also translate in higher market valuations. Second, stock repurchases can serve as a signal of management's optimism about the bank's future prospects or the current undervaluation, as postulated by the signaling information hypothesis. This strategy often enhances market perception, with investors interpreting share repurchases as a sign of confidence from management. Consequently, such actions can contribute to improved operating performance in subsequent years. It remains unclear and challenging to empirically prove whether this signaling theory stems from management's belief that the bank is currently undervalued or from their optimism about stronger future benefits.

Despite these complexities, some empirical tests can help shed light on which of these competing hypotheses plays a predominant role. The approach adopted in this study involves comparing the characteristics of banks that engage in share repurchases with those that do not. More precisely, our analysis looks at various characteristics in the years leading up to and following a bank's repurchase, contrasting them against banks abstaining from such actions. In this context, if share repurchases stem from management's intent to signal brighter prospects, then the operating performance of banks in the period leading up to the repurchases is likely to be worse than that of their non-repurchasing counterparts, complemented by higher operating profits and valuation ratios in the years following the repurchase. Conversely, if repurchases are primarily driven by the desire to return excess cash flow, then banks engaging in such activities might show stronger pre-repurchase performance than non-repurchasing banks.

Drawing upon related literature (Hirtle, 2004) and using the control sample outlined in Section 3, we conduct a detailed descriptive analysis comparing the estimation sample group with the control group. This analysis aims to derive some conclusions regarding the dominant motivations behind bank share repurchases.[8] Recognizing the inherent challenges in identifying variables that fully capture the extent of information managers possess, their confidence in future cash flow prospects, and the availability of profitable growth opportunities in the industry, we define several pertinent variables and compare their values across the two groups.

We analyze the evolution of average bank ROE and ROA over the years preceding and following the share repurchases. We also scrutinize the non-performing loans ratio, net income margin and equity capital ratio to assess the business quality at the time of the share repurchase program. Additionally, we evaluate two standard valuation metrics, such as the price-to-earnings (P/E) ratio and price-to-book value (P/BV) ratio to investigate the potential undervaluation as a signaling mechanism. The primary objective of this analysis is to determine whether banks that repurchase their own shares (treatment group) demonstrate superior performance compared to the control group. Enhanced performance in operating, quality, and/or valuation metrics by the treatment group in the years preceding share repurchase provides support for the free cash flow hypothesis. This suggests that banks distribute excess cash to shareholders during prosperous periods, reflecting prudent management practices in the mature banking industry. Conversely, improved performance in operating and/or valuation metrics in the years following the share repurchase is considered supportive evidence for the signaling information hypothesis. Management's belief in the bank's future potential leads them to repurchase shares as a way of signaling this confidence to the market. Table 9 displays the evolution over time of the values of the set of operating performance, business quality, and valuation metrics considered for both the treatment and control groups.

The findings presented in Table 9 appear to be slightly skewed towards supporting the free cash flow hypothesis of Jensen (1986) as the principal motivation behind share repurchases within the banking industry. Specifically, during the year of the repurchase and the preceding year, both mean and median ROE and ROA exhibit higher values in the treatment group compared to the control group. These figures are statistically significant at the 95% confidence interval. This evidence suggests that banking firms engaged in

[8] In a similar vein, Hirtle (2004) compares the characteristics of U.S. bank holding companies that repurchase with those that do not, examining a range of characteristics in the two years before and after the repurchase.

Table 9
Temporal evolution of banking metrics: Treatment group vs. Control group.

	t-1	t	t+1	t+2
Treatment group (Control group)				
ROE – *mean*	8.3% (4.8%)	8.5% (4.6%)	7.6% (4.9%)	6.9% (4.8%)
ROE – *median*	8.4% (5.4%)	8.5% (6.0%)	8.1% (6.1%)	7.8% (5.9%)
ROA – *mean*	0.7% (0.3%)	0.7% (0.3%)	0.7% (0.4%)	0.6% (0.4%)
ROA – *median*	0.7% (0.3%)	0.8% (0.3%)	0.7% (0.3%)	0.6% (0.3%)
Net Income Margin	19.9% (8.8%)	20.9% (12.4%)	19.6% (8.6%)	19.4% (7.8%)
Equity Capital Ratio	7.8% (6.2%)	7.3% (6.2%)	7.1% (6.1%)	7.1% (5.9%)
Non-performing loans/Total assets	1.3% (2.4%)	1.2% (2.4%)	1.2% (2.2%)	1.2% (2.0%)
P/E	11.6x (11.6x)	11.6x (9.8x)	11.4x (9.4x)	11.3x (8.9x)
P/BV	1.0x (0.7x)	1.0x (0.7x)	0.9x (0.7x)	0.9x (0.6x)

Notes: This table shows the evolution of various operating performance, business quality, and valuation metrics during the year of bank share repurchases, as well as the years before and after these transactions (years t-1, t, t+1 and t+2). These banking metrics are compared between the treatment group, consisting of 32 banks significantly engaged in share repurchases, and the control group, comprising 14 banks not significantly engaged in such activities. The threshold to set the relevant level of share repurchases is 0.25% of total market capitalization. Figures for the control group are displayed in parentheses. ROE, ROA, the equity capital ratio and the non-performing loans ratio have been already defined in previous tables. Net Income Margin is calculated as net income available for shareholders in a given year divided by total revenue of that year. The price-to-earnings (P/E) ratio is defined as the share price at the end of a given year divided by the earnings per share of that year, excluding extraordinaries. In turn, the price-to-book value ratio (P/BV) is calculated as the average market capitalization of a bank in a given year divided by the average book value of the balance sheet in that year.

buybacks demonstrate superior operating performance, as indicated by higher ROE and ROA, during the year of the share repurchase and the year before, and thus have generated higher excess cash, which becomes available for distribution in the absence of more attractive investment opportunities. Interestingly, in the subsequent years the treatment group continues to exhibit higher ROE, although the differences become less pronounced. A similar trend is observed for ROA in the two years following the repurchase. Our interpretation of these findings is that, following a strong financial year, bank managers opt to distribute excess cash to shareholders. This decision reflects their belief that the bank is in good shape to face the future and, above all, the lack of better risk-adjusted investment projects to undertake. This strategy often results in improved future profitability compared to banks that retain and potentially misuse excess funds.

The free cash flow explanation is particularly relevant and well-suited to a mature industry like banking, where the scarcity of accretive risk adjusted projects investment opportunities makes the proper management of excess cash crucial. Additionally, the banking industry, being closely scrutinized by the market, faces lower chances of undervaluation. The elevated valuation ratios, both P/E and P/BV, observed in the treatment group compared to the control group during the year of the repurchase and the preceding year may not necessarily reflect superior growth prospects, given the industry's mature nature and the absence of clear growth catalysts. Instead, these higher ratios could reflect the market premium awarded to banks that are perceived to utilize excess cash more effectively. This is where both hypotheses are complementary. We cannot discern whether the higher valuation ratios are driven by the market's reaction to disciplined cash management and better use of excess cash, by expectations regarding future growth, or by a combination of both factors.

Information signaling theory suggests that undervaluation drives repurchase decisions. However, this theory does not seem to align with the observed valuation ratios. The P/E and P/BV ratios of the treatment group are higher during the year of the share repurchase, indicating that repurchases are not primarily motivated by perceived undervaluation.

Further analysis of quality business metrics supports this view. Specifically, in the year of the stock repurchase, banks engaged in buybacks exhibit significantly better quality metrics, such as net income margin, the equity capital ratio, and the ratio of non-performing loans, compared to the control group. This suggests that banking firms with higher operational quality are more likely to distribute excess cash to shareholders after a year of strong financial performance.

In any case, we view both theories as coexistent. The comparative analysis of banking metrics indicates that stock repurchases are predominantly driven by the intention to return excess cash to shareholders. However, this strategy is implemented with the confidence that the bank's future prospects remain solid and sustainable, ensuring that the banking firm's stability is not compromised. Our findings are in line with those related previous studies, mainly Hirtle (2004). A particularly notable aspect is that the conclusions from prior research, based mainly on data from the 1990s to early 2000s, still hold true when updated with more recent data. Higher share repurchase levels do have a positive impact on the operating performance metrics of U.S. and European banking firms in the year following the transaction.

With the evolving capital rules for banks, many investment-grade lending activities are becoming more punitive for banks to finance due to higher capital charges and banks are going to liberate those activities and free up capital, setting the path to affect share repurchases. Basel III endgame pressures certain lines of business by attracting slightly higher capital charges, forcing banks to de-lever and/or free up capital through strategies such as synthetic risk transfers (SRTs) to private credit providers or selective assets sale. Banks are managing their balance sheet and deciding where to grow and where to free up capital to bolster their strengths as lenders.

5. Concluding remarks

The remarkable surge in bank share repurchases in recent years has sparked substantial interest in determining whether these transactions significantly contribute to long-term value creation within the banking industry. In this context, this study investigates the impact of share repurchases on the future operating performance of a broad sample of large U.S. and European banks from 2008 to 2020, a period marked by an environment of very low interest rates and abundant liquidity in global markets. The empirical results reveal a positive effect of share repurchases on banks' operating performance of banks in the year following the repurchase. This finding provides a strong case for the use of share repurchases by bank managers to effectively handle excess cash and, in the absence of growth opportunities with attractive risk-adjusted returns, distribute this available excess cash to shareholders.

This favorable impact of share repurchases on banks' operating performance is consistent with both the information signaling and free cash flow hypotheses, though it leans slightly more towards the latter. Consequently, share repurchases seem to represent a wise allocation of excess cash from a shareholder perspective, effectively addressing potential agency problems associated with free cash flow agency problems and simultaneously enhancing overall returns. In light of the lack of organic growth opportunities in the banking industry, a common characteristic of mature sectors, share repurchases provide a mechanism for distributing excess cash to shareholders while diminishing the risk of agency conflicts. This strategic use of excess cash not only aligns with shareholder interests but also fosters a more efficient and value-driven environment within the banking sector. During a certainly anomalous period characterized by ultra-low interest rates and expansionary monetary policies, bank managers have utilized stock repurchases to return excess cash to shareholders while being confident in the solid fundamentals of their firms, which are better equipped to weather difficult times following regulatory measures implemented after the GFC. This strategy has proven successful, as the conducted share repurchases have neither jeopardized nor adversely impacted the banks' operating performance in the subsequent years. The evidence presented here advocates for the judicious use of this transaction in the U.S. and European banking industries over the past fifteen years, as stock repurchases are linked to enhanced bank operating performance in the following years. In an industry characterized by numerous systemic risks and a single-digit average ROE, the persistence of share repurchases transactions during the period underscores their important role in total shareholder return and disciplined management of excess cash in mature industries.

A promising avenue for future research could be to identify the key drivers, including, among others, excess cash, capital buffers, and risk management practices, that influence the size and extent of stock repurchases conducted by banking institutions. This exploration would contribute to a deeper understanding of the primary motivations behind bank share repurchases. Furthermore, the current evolving landscape of high liquidity and rising interest rates presents an intriguing context for examining the impact of changing monetary policy conditions on share repurchase programs. Given that these conditions are theoretically advantageous for the banking industry, future studies could investigate whether they indeed lead to an upswing in share repurchase activity and subsequent improvements in bank operating performance.

Author contributions CRediT

Juan Corbalán: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Software, Supervision, Validation, Visualization, Writing-original draft.Román Ferrer: Conceptualization, Investigation, Methodology, Supervision, Validation, Visualization, Writing-original draft.

Declaration of interest statement

The authors declare no potential conflict of interest with respect to the research, authorship, and publication of this article.

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