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Financial performance and cash flow: Evidence from the US banking industry

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Abstract

This study examines the relationship between cash flow and financial performance with a sample of 122 American banks covering the period from 2019 to 2022. Panel data analysis is applied in the work. Financial performance is computed as the Return on Assets (ROA) and Return on Equity (ROE). The explanatory variables used are the net cash flow, free cash flow, cash flow from operating activities, cash flow from investing activities, cash flow from financing activities, size of banks, leverage ratio (total liabilities to total assets), liquidity ratio (current assets to current liabilities) and efficiency ratio (total revenue to total assets). The results provide evidence of a negative relationship between financial performance and net cash flow. This is also the case for cash flow from investment and financing activities. On the other hand, the relationship of free cash flow with financial performance is positive. As regards the other explanatory variables, leverage and efficiency are positively related to financial performance.

Keywords

- financial performance
- cash flow
- leverage
- liquidity
- efficiency
- banks

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Introduction

Investors who seek promising investment opportunities in the market tend to assess various micro of macro factors concerning the targeted corporations. This is also the case for lenders and other creditors who aim at cooperating with companies of high financial stability and creditworthiness. Cash flow is among the important factors considered by investors and creditors. Positive and strong cash flow means that a company is able to repay its debts and maintain some cash to undertake future investments or cover other needs. Ongoing positive cash flow indicates that a company is on a strong footing, whereas continued negative cash flow indicates that a company is probably in financial trouble. In other words, sufficient cash flow relates to a company's liquidity, which is vital for its success and longevity.

Analysing cash flow is not only important to investors and creditors but also for the companies themselves. A company has to understand the sources from which its cash comes from as well as the areas in which it is spent. Along with helping the management to maintain a high level of liquidity, efficient cash flow analysis can help managers take corrective actions when necessary. Ultimately, efficient cash flow management can contribute to improving business planning and investment decision making, which in turn can lead to higher profitability and growth.

Based on the above, the cash flow figures reported in a relevant financial statement of a company can be strong indicators or predictors of the company's future performance. However, maintaining a high cash flow level might not always be the best choice for a company. According to Jensen (1986), firms with substantial free cash flow frequently face potential conflicts of interest between shareholders and managers. Free cash flow refers to the cash generated by a company after all the capital expenditure has been accounted for and can be used in various ways such as paying dividends, financing new projects or repaying a debt.

Based on the theory of Jensen (1986), free cash flow is an important tool available to the managers of modern corporations, in which the ownership and management are usually separated to each other. Managers are likely to use free cash flow to projects that are not necessarily to the benefit of shareholders. On the other hand, managers may be reluctant to channel free cash flow to investments of higher risk that could increase the shareholders' value. The fear of losing their jobs upon the failure of such projects withhold managers from undertaking such risky endeavours. Overall, in the context of cash flow management, the fulfilment of own goals or the avoidance of promising investments due to personal fears constitute the agency costs that can affect the financial performance of a company in a negative fashion.

In this study, we assess the relationship between the financial performance and cash flow of 122 American banks over the period of 2019–2022. In our analysis, financial performance is measured as the Return on Assets (ROA) and Return on Equity (ROE), respectively. Five cash flow variables are considered, namely, the cash flow from operating activities, cash flow from investing activities, cash flow from financing activities, net cash flow and free cash flow. Along with cash flow, we use four control variables, which are the size of banks, the leverage ratio, i.e. total liabilities to total assets, the liquidity (current) ratio, i.e. current assets to current liabilities, and the efficiency ratio, i.e. total revenue to total assets.

Our results reveal that net cash flow is negatively related to performance. By contrast, the relationship of free cash flow with performance is positive. As far as the other three cash flow figures are concerned, cash flow from operating activities has no significant relationship with financial performance, while the impact of investing and financing cash flows on performance is significantly negative, especially in the case of ROE. Going further, the size of banks bears no influence on their financial performance. The leverage ratio is important in explaining return on equity but not return on assets. The liquidity ratio has no significant relationship with performance. Finally, the efficiency ratio is positively related both to ROA and ROE.

The main contribution of our study is the fact that it provides new insights into the relationship between the financial performance and cash flow for a large sample of American banks with the most recent data that are publicly available. In addition, to the best of our knowledge, most studies dealing with cash flow management in the banking industry of the United States focus on the information value of the cash flow statements of banks compared to the relevant value for the manufacturing and other non-financial companies (e.g. Mulford and Comiskey, 2009; Gao et al., 2019).[2] Therefore, our study is quite novel because it deals with the relationship of financial performance with cash flow in the banking industry of the United States, an issue that is under-researched.

Furthermore, our results can form a useful practical selection tool for investors trying to detect banks with the strongest indicators of financial performance, which may reward them with more generous dividend payouts and, possibly, higher stock returns. Finally, our study can be relevant when assessing the causes of the recent collapses in the banking industry of the United States, that is, the failures

[2] In fact, as reported by Gao et al. (2019), banks argue that, unlike the cash flow statements of industrial companies, the relevant statements of banks provide little additional information because banks deem that cash flow is not a useful measure of the operating performance or the financial condition for them. Banks also argue that the distinction between cash flow from operating, investing and financing activities is not as meaningful for them as it is for industrial companies. Such a stance of banks may explain the relevant lack of studies on the relationship between performance and cash flow for the American banks.

of the Silicon Valley Bank – SVB, the Signature Bank – SB, and the First Republic Bank – FRB.

In particular, SVB's failure can be explained in several ways including limited diversification and a classic bank run, where many customers withdrew their deposits simultaneously due to the bank's solvency issues reflected in poor financial ratios. In regard to diversification, SVB invested large amounts of customers' deposits in long-term US treasuries and agency mortgage-backed securities, whose value is negatively related to interest rates. When the Federal Reserve Bank increased interest rates in 2022 trying to combat the galloping inflation, SVB's bond portfolio started to drop. When economic factors hit the tech sector, many bank customers withdrew money. At this point, SVB did not have sufficient liquidity to meet these deposits because its assets were tied up in long-term investments. As a corollary, the bank started selling its bonds at a significant loss, which caused distress to customers and investors. Within 48 hours after disclosing the sale of assets, the bank collapsed.[3]

As noted in a report by the Federal Deposit Insurance Corporation released in April 2023, the collapse of the Signature Bank was due to poor management, especially of the risks associated with accepting crypto deposits, which comprised more than 20% of the bank's total deposits. When the crypto industry started to turn and interest rates started to rise, those deposits started leaving the bank. In addition, the failure of the SVB, which happened just days before the SB was forced to close, helped ignite the run on the SB's deposits.[4] The collapse of the FRB is connected to the rise in interest rates by the Federal Reserve Bank as well, which led depositors to seek better returns elsewhere. In this respect, the FRB suffered a 41% outflow in deposits during the first quarter of 2023.[5]

More or less the three recent bank failures in the United States referred to above reflect poor cash flow management and mistaken investment decisions. That said, we deem that our study could be a useful basis for improving decision making and cash flow management policies, which would contribute to ensuring the stability of the banking institutions in the United States.

This paper is structured as follows: the next section discusses the main findings of the literature on the relationship between financial performance and cash flow. Section 3 concerns the methodological approach and the sample of our study. Section 4 presents the empirical findings of our study. Finally, Section 5 summarises the conclusions of our study and offers some suggestions for future research on the subject.

[3] Information on the SVB's collapse has been found on: Hetler (2024).

[4] Information on the SB's collapse has been found on: Buchwald (2023).

[5] Information on the FRB's collapse has been found on: Saul (2023).

1. Literature review

Several studies have examined the relationship between financial performance and cash flow. Brush et al. (2000) investigate the argument in the agency theory that the sales growth in firms with free cash flow and without strong governance is less profitable compared to sales growth in firms without free cash flow. The empirical findings verify this hypothesis. The authors suggest that having substantial management stock ownership mitigates the influence of free cash flow on performance, despite allowing higher sales growth.

Kroes and Manikas (2014) examine the impact of cash flow management, that is, changes in cash flow measures, on company financial performance, as well as the sign of this impact. The authors use quarterly data from 1233 manufacturing companies in the United States. The results show that changes in the cash conversion cycle (CCC) metric do not affect firm performance. However, changes in the operating cash cycle are significantly associated with changes in Tobin's Q.

Wang (2010) uses data from publicly listed companies in Taiwan to examine the association between free cash flow and agency costs and how these two factors influence firm performance. The results show that free cash flow can induce agency costs. However, the achievement of free cash flow resulting from internal operating efficiency could lead to better firm performance despite the existence of agency costs.

For Taiwan as well, Ni et al. (2019) study the impact of cash flows from operating, investing and financing activities on firm value for a total of 7,598 firm-year observations during the period 2005–2014. Tobin's Q is the firm value proxy, also being the dependent variable of the applied panel data analysis. The results show that inflows from financing activities and outflows to investing activities can enhance firm value, whereas cash inflows from operating activities probably cannot contribute to firm value.

Heydari et al. (2014) assess the relationship between free cash flow and the performance of 63 companies listed on the Tehran Stock Exchange. The study covers the period 2006–2012. Panel analysis is applied with four alternative measures of performance, i.e. return on assets, return on equity, Tobin's Q and stock return. The findings show that there is a significantly negative relationship between free cash flow and all performance measures. For Iran as well, Gheshlaghi et al. (2014) report that there is a significantly negative relationship between performance and investing cash flow but there is no relationship between cash flow from operational and financing activities.

Frank and James (2014) examine the relationship between cash flow and firm performance in the food and beverages sector of Nigeria using a sample of six companies listed on the Nigerian Stock Exchange. The results show that cash

flows from operating and financing activities are positively related to corporate performance, whereas cash flows from investing activities are negatively related to financial performance.

Nwanyanwu (2015) also focuses on Nigeria. In particular, the author examines the relationship between cash flow and corporate performance of 45 small and medium enterprises from the hospitality and media sectors of the country. The data of the study are collected through 135 questionnaires and correlation analysis is applied. The results indicate a significantly strong positive relationship between cash flow position and financial performance expressed in net profit terms.

Next, Amah et al. (2016) focuses on the banking sector of Nigeria. The authors examine the relationship between cash flow and financial performance of four banks listed on the Nigerian Stock Exchange. The results indicate that operating cash flow has a significant and strong positive impact on performance, while investing and financing cash flows have a negative but weak relationship with the banks' performance.

In Turkey, Kadioglu et al. (2017) investigate whether free cash flow affects the performance of companies. The authors apply panel regression analysis with data consisting of 2,175 observations belonging to 370 companies listed on the Borsa Istanbul Stock Exchange. The study period spans from 2009 to 2015. A significantly negative relationship is found between free cash flow and firm performance, with the latter measured as Tobin's Q. Overall, the results on the Turkish companies support the free cash flow hypothesis of Jensen (1986).

In the insurance sector of Jordan, Alslehat and Al-Nimer (2017) evaluate the impact of cash flow management, that is, cash flow from operating, investing and financing activities, on the financial performance of 23 local companies. The study covers the period 2009–2013. The results reveal that cash flow from operating activities is the highest among the three cash flow components. With respect to performance, the study provides evidence of a significant relationship between cash flows from operating and investing activities and return on assets. By contrast, the relationship between financing cash flow and performance is not significant.

Furthermore, Hau (2017) tests the validity of the Jensen's (1986) theory using data of the Vietnamese companies listed on the Hochiminh Stock Exchange. The focus is on manufacturing, trade and real estate companies. The empirical findings show that free cash flow has a positive effect on firm performance for all the examined sectors.

Joshi (2019) investigates the relationship between free cash flow and firm performance with data of non-financial companies included in the S&P BSE 500 Index, which covers all major industries in the economy of India. The study period spans from 2006 to 2016. Financial performance is measured as return on equity. The independent variable of the analysis is the free cash flow, which is found to have a significant and strong positive relationship with corporate performance.

Next, Rahman and Sharma (2020) examine whether a firm with proper cash flow management can increase its financial performance. More specifically, the effect of cash flow from operations on the financial performance of the insurance and manufacturing companies in Saudi Arabia is examined. The performance measures considered here are return on assets and return on equity. The results show a positive and significant association between financial performance and operating cash flow.

Rasheed and Shahzad (2020) focus on the association between free cash flow and financial performance of 126 companies from the textile sector in Pakistan during the period 2010–2014. The results indicate that free cash flow is positively related to corporate performance.

Finally, Abughniem et al. (2020) assess the impact of free cash flow on the performance of 100 firms listed on the Amman Stock Exchange, with data covering the period 2010–2015. Several elements of cash flows are taken into consideration, while performance is computed as return on assets, market value per share and Tobin's Q. The empirical results obtained from the panel data regression analysis show that free cash flow affects the return on assets and market value per share in a positive way.

2. Research methodology

In this section, we describe the research methodology applied to assess the relationship between cash flow and financial performance of the American banks.

2.1. Correlation analysis

First, we apply correlation analysis of the key variables considered in our study using the correlation coefficient. The variables analysed are financial performance, i.e. return on assets calculated as the fraction of earnings before tax to total assets, and return on equity, computed as the ratio of earnings before tax to total equity, cash flow from operating activities, cash flow from investing activities, cash flow from financing activities, net cash flow, free cash flow, banks' size, computed as the natural logarithm of total assets, leverage ratio, that is, total liabilities to total assets, liquidity ratio, calculated as the ratio of current assets to current liabilities, and efficiency ratio, which is computed as the fraction of total revenue for each year under study to total assets at the balance sheet date, i.e. as at December 31 of each year of the study period.

The main benefit of correlation analysis is that it helps identify which variables we should investigate further and it allows for rapid hypothesis testing. This analysis is primarily concerned with finding out whether a relationship exists between variables, and then determining the magnitude and sign of that relationship. However, correlation does not entail causation. That means that correlation analysis identities and evaluates a relationship between two variables, but a positive correlation does not automatically mean that one variable affects the other. This type of correlation only reflects a linear correlation of variables and ignores non-linear types of relationships or correlations.

2.2. Regression analysis of financial performance

2.2.1. Single-factor regression analysis

In the first step, we run the following single-factor panel regression model on the relationship between financial performance and cash flow:

$$Pnce = \beta_0 + \beta_1 CF + u \tag{1}$$

where $Pnce$ stands for ROA or ROE and CF stands for cash flow. ROA is calculated as the fraction of earnings before tax to total assets, and ROE is computed as the ratio of earnings before tax to total equity, u refers to the residuals of the model.

Two alternative versions of model (1) are applied. The first one uses net cash flow as an independent variable. Net cash flow is the sum of cash flow from operating activities, cash flow from investing activities and cash flow from financing activities and is found in the published financial statements of the examined US banks.[6] Farris and Hutchison (2002) find that a shorter cash conversion cycle leads to higher present value of net cash flow generated by assets, which contributes to higher firm value. If this is true for our sample as well, the coefficient of the net cash flow variable in model (1) will be positive and significant.

The second version of model (1) uses free cash flow as an explanatory variable of financial performance. The calculation of free cash flow is based on publicly available data and is conducted with the following formula:

[6] The published financial statements of the banks under analysis have been collected manually from Nasdaq.com

Factor:	Found in:
+ Cash Flow from Operating Activities	Statement of Cash Flows
+ Interest Expense	Income Statement
– Tax Shield on Interest Expense	Calculable
– Capital Expenditures	Statement of Cash Flows (Cash Flow from Investing Activities)
= Free Cash Flow (2)	

The Tax Shield on Interest Expense concerns tax savings resulting from the deduction of interest expense for taxation purposes. The payment of interest expense reduces the amount of taxable income, as well as the amount of taxes payable by an enterprise. To compute the interest tax shield, we use the following formula:

$$Tax\ Shield\ on\ Interest\ Expense = Interest\ Expense \times Effective\ Tax\ Rate \quad (3)$$

The effective tax rate refers to the percent of income a company owes or pays in taxes. We chose to use this tax rate to achieve consistency among the examined banks, given that corporate taxation in the United States is somehow complex as taxes are imposed at the federal, most state and some local levels. State and local taxes may vary among different states or local jurisdictions. The effective tax rate is easily computed as follows:

$$Effective\ Tax\ Rate = \frac{Income\ Tax}{Earnings\ Before\ Tax} \quad (4)$$

If Jensen's (1986) theory applies to the examined sample of American banks, the coefficient of free cash flow in model (1) will be significantly negative.

2.2.2. Multi-factor regression analysis

In the second step, along with the cash flow factors in model (1), we consider four additional control variables. The first variable is the size of banks. The second control variable is the leverage ratio. Next is the liquidity ratio and the fourth variable is the efficiency ratio. The five-factor panel model we run is shown in the following equation:

$$Pnce = \beta_0 + \beta_1 CF + \beta_2 Size + \beta_3 Leverage + \beta_4 Liguidity + \beta_5 Efficiency + u \quad (5)$$

where $Pnce$ and CF are defined as in model (1). Banks' size is computed as the natural logarithm of total assets. $Leverage$ ratio is the fraction of total liabilities to

total assets. Liquidity ratio is calculated by dividing current assets by current liabilities. *Efficiency* ratio is computed as the fraction of total revenue for each year under analysis to total assets at the balance sheet date, i.e. as at December 31 of each year of the study period; u refers to the residuals of the model. Similar to model (1), we run two versions of model (2): one with net cash flow in the explanatory variables and one with free cash flow.

Size is frequently considered to be positively related to firm performance. If this is true in our case, the coefficient of size will be positive and significant. With respect to leverage, there are studies that report a negative impact of this factor on firm performance (e.g. Yameen et al., 2019). If this is also the case for our sample, the coefficient of leverage must be negative. According to Zygmunt (2013), the importance of liquidity for the financial performance of a company might determine its level of profitability and, consequently, its financial performance. Based on this analysis, the coefficient of the liquidity ratio in model (5) should be positive. Efficiency is positively related to corporate financial performance (Khan et al., 2021). If this is the case for our sample too, the estimate of the efficiency ratio in model (5) is expected to be positive.

In the next step, we examine the impact of the three main components of cash flows (i.e. cash flow from operating activities, cash flow from investing activities and cash flow from financing activities) on financial performance. The relevant model is shown in the following equation:

$$Pnce = \beta_0 + \beta_1 OpCF + \beta_2 InvCF + \beta_3 FinCF + u \tag{6}$$

where performance is defined as ROA or ROE, $OpCF$ stands for cash flow from operating activities, $InvCF$ refers to cash flow from investing activities and $FinCF$ concerns cash flow from financing activities. Based on the findings from the literature, the coefficient of operating cash flow is expected to be positive. However, based on the empirical results of several studies, the coefficient of cash flow from investing activities is expected to be negative, which is also the case for the cash flow from financing activities.

In the last step, we add to model (6) the four control variables considered in model (5), thus obtaining the following model (7):

$$\begin{aligned} Pnce = {} & \beta_0 + \beta_1 OpCF + \beta_2 InvCF + \beta_3 FinCF + \beta_2 Size + \beta_3 Leverage + \\ & + \beta_4 Liguidity + \beta_5 Efficiency + u \end{aligned} \tag{7}$$

where all variables are defined as in the previous models, while the expectations about the sign of coefficients are as above.

2.3. Sample

The study focuses on US listed banks and covers a four-year period between 2019 and 2022. The main selection criterion applied for the preparation of the sample was the size of the banks at the end of the study period, i.e. the magnitude of their assets at the end of 2022. Another criterion applied concerned the financial reporting period of each bank. In particular, for consistency purposes, we only considered banks whose fiscal year spans from the January 1 to December 31 each year. Based on this requirement, banks with year-end other than December 31 have been excluded from the sample. This process resulted in 122 of the biggest banks operating in the US being included in our sample, the names of which are presented in Appendix.[7]

Total assets of these 122 banks at the end of 2022 amounted to 16.7 trillion USD. At the same date, total assets of the entire banking industry in the United States amounted to 23.6 trillion USD.[8] Based on assets, our sample covers 71% of the entire banking industry. Therefore, we deem our sample as quite representative of the whole banking market in the US.

Table 1 provides basic accounting figures of the examined banks over the period 2019–2022. The data are presented in average terms over the entire period under analysis and include total assets, current assets, equity, total liabilities, current liabilities, total revenue, earnings before tax (EBT), income tax, and net income, i.e. earnings after tax.[9] An equity to assets ratio is reported as well. The data for the entire sample are presented in five clusters, which have been prepared by descending the assets of banks. Based on this technique, cluster 1 reports the accounting of the 25 biggest banks over the study period, cluster 2 presents the accounting data of the second group of the biggest banks over the study period and so on.[10]

At the balance sheet level, average assets amount to 127 billion USD, with the largest bank in the sample presenting assets of 3.4 trillion USD. This is the banking giant JPMorgan Chase Bank. On the other hand, the smallest bank in the sample is the Regions Bank, which is headquartered in the Regions Center in Birmingham,

[7] Refer to: "Largest U.S. Banks by Asset Size" (2023), for a report on the assets of the 250 largest listed banks in the US at the end of 2022.

[8] Refer to: "US Banks Total Assets (I:USBTA)" (2023).

[9] Average terms over the entire period under analysis means that the reported values of the financial statements figures at the end of each of the four years under study have been summed. Afterwards, the sum has been divided by number 4 to obtain the average annual term of each figure. The same process has been applied for the calculation of the average financial ratios reported in Table 2 and the average cash flow figures provided in Table 3.

[10] The data reported in Table 1 have been collected manually from Nasdaq.com

Table 1. Accounting data

Stats	Total assets	Current assets	Equity	Equity to assets	Total liabilities	Current liabilities	Total revenue	EBT	Income tax	NetiIncome
Cluster 1: top size companies										
Average	561,986,797,140	224,782,158,000	51,193,443,280	9.14	509,867,623,860	435,497,879,400	25,445,543,333	7,402,170,875	1,327,883,469	6,049,870,740
Min	42,293,288,500	8,032,300,000	0	0.00	37,809,062,000	2,363,250,000	1,679,740,000	524,626,000	110,503,250	414,122,750
Max	3,370,361,500,000	1,619,944,250,000	281,785,750,000	13.70	3,088,575,750,000	2,623,336,000,000	116,454,250,000	46,602,250,000	8,709,250,000	37,893,000,000
Count	25	25	25	25	25	25	25	25	25	25
Cluster 2: second top size companies										
Average	31,073,520,948	8,782,235,833	3,450,272,635	11.26	27,623,248,313	26,862,276,302	1,356,026,396	426,554,698	90,832,250	335,487,688
Min	18,437,987,750	2,792,250,750	1,397,486,250	6.57	15,711,401,000	15,315,655,000	657,168,250	163,970,000	35,905,000	128,065,000
Max	54,911,511,250	19,685,643,750	6,307,028,500	17.80	49,942,605,000	46,639,346,750	4,054,404,500	800,804,250	190,506,000	613,961,000
Count	24	24	24	24	24	24	24	24	24	24
Cluster 3: medium size companies										
Average	13,607,148,323	3,316,503,490	1,596,825,417	11.70	12,010,322,906	11,660,261,156	560,579,552	184,712,656	39,920,573	143,990,219
Min	9,120,494,750	1,468,619,250	877,002,250	7.01	8,060,886,500	7,882,705,500	339,714,250	–36,551,250	13,563,000	–56,092,500
Max	19,429,343,250	6,509,274,750	2,610,985,750	14.06	16,853,243,250	16,757,862,250	778,552,500	283,883,750	72,958,500	212,545,750
Count	24	24	24	24	24	24	24	24	24	24
Cluster 4: second bottom size companies										
Average	7,707,744,896	1,486,349,604	841,253,365	11.02	6,866,491,531	6,635,970,563	349,441,771	99,459,271	20,194,219	79,054,875
Min	4,431,425,000	754,133,500	524,665,500	8.00	3,521,701,500	2,481,002,500	234,388,750	–11,756,750	–34,266,000	22,495,500
Max	9,520,844,750	2,743,517,500	1,239,989,250	20.53	8,280,855,500	8,103,356,000	668,257,250	162,027,500	32,612,500	133,229,750
Count	24	24	24	24	24	24	24	24	24	24
Cluster 5: bottom size companies										
Average	5,560,401,980	1,573,829,800	588,844,260	10.90	4,971,557,720	4,808,225,230	264,305,840	82,569,620	17,258,620	65,143,030
Min	1,361,761,250	474,271,500	268,681,250	7.60	1,070,192,500	38,009,500	94,554,250	29,485,000	5,858,250	23,626,750
Max	7,459,615,500	5,252,404,000	834,511,500	21.41	6,779,259,000	6,665,578,500	560,917,500	139,177,750	31,323,000	124,954,500
Count	25	25	25	25	25	25	25	25	25	25
Total sample										
Average	126,606,573,098	49,056,900,240	11,769,488,709	10.79	114,647,385,619	99,110,301,707	5,522,956,936	1,621,091,875	296,000,836	1,320,008,068
Min	1,361,761,250	474,271,500	0	0.00	1,070,192,500	38,009,500	94,554,250	–36,551,250	–34,266,000	–56,092,500
Max	3,370,361,500,000	1,619,944,250,000	281,785,750,000	21.41	3,088,575,750,000	2,623,336,000,000	116,454,250,000	46,602,250,000	8,709,250,000	37,893,000,000
Skewness	2.71	3.20	3.49	0.35	2.73	1.70	2.91	4.08	3.51	3.07
Kurtosis	4.71	3.16	3.90	2.20	3.03	3.65	2.63	4.52	2.78	4.59
Count	122	122	122	122	122	122	122	122	122	122

Source: own calculation based on data found on www.nasdaq.com

Alabama. Its average current assets amount to 49 billion USD, which captures 39% of total assets.

The average equity in the sample approximates 12 billion USD. The minimum and maximum equity figures amount to 0 and 282 billion USD, respectively. Compared to the total assets, the equity figures are rather low. In fact, the average equity to assets ratio in the sample is just 10.79%. This percentage shows that an average American bank relies heavily on external resources for financing its operations. Going further, average total liabilities amount to 115 billion USD with the maximum total liabilities figure exceeding 3 trillion USD. Average current liabilities amount to 99 billion USD or 86% of total liabilities. Such a high portion of current relative to total liabilities could trigger liquidity issues for the American banks.[11]

At the profit and loss statement level, the average total revenue amounts to 5.5 billion USD. The maximum total revenue figure is 116.4 billion USD and has been achieved by the JPMorgan Chase Bank. The lowest revenue of 94.6 million USD is presented by the Farmers and Merchants Bank of Long Beach in California. When it comes to profitability, the average EBT in the sample amounts to 1.6 billion USD. The worst profitability measure is –36.6 million USD (achieved by Berkshire Bank in Boston, Massachusetts). On the other hand, the maximum EBT of the sample is 46.6 billion USD. JPMorgan Chase Bank reached this maximum profitability level.

Table 2 presents key financial ratios of the banks in the sample, that is, the leverage liquidity and efficiency ratios, along with the return on assets and the return on equity. The average leverage ratio is 88.96%. The minimum and maximum leverage ratios of the sample are 74.75% and 96.76%, respectively. These leverage ratios verify our conclusion above concerning the strong dependence of banks in the United States on external financing. The average liquidity ratio is 66.60%, that is below 100%. This means that the current assets of banks are not enough to repay their current liabilities. This is another indicator of possible liquidity issues for the American banks, as a liquidity ratio that is higher than unity is usually considered in the accounting literature to be a good liquidity ratio.[12] The average effi-

[11] Current liabilities are what an enterprise needs to pay within the next 12 months from the financial reporting period or within its normal operating cycle. Knowing current liabilities is important because it enables the company to plan its finances. If the amount of current liabilities is too high, it can be a sign that the business is not effectively using its current assets or short-term liabilities and, consequently, it may face difficulties in repaying all of its short-term obligations. If a company fails to satisfy short-term creditors, unpleasant negative consequences could be triggered for it. Refer to: Moula (2021) for the significance of managing short-term liabilities.

[12] A liquidity ratio exceeding unity indicates that the company is in good financial condition and is less likely to face financial hardships. The higher the ratio, the higher the safety margin that the business possesses to meet its current liabilities (source: "What is a good liquidity ratio?" (2023).

Table 2. Financial ratios

Stats	Leverage	Liquidity	Efficiency	Return on Assets	Return on Equity
Cluster 1: Top size companies					
Average	90.29	79.22	5.73	1.52	16.51
Min	85.77	20.57	3.08	0.94	0.00
Max	96.76	854.91	22.79	4.09	53.66
Count	25	25	25	25	25
Cluster 2: second top size companies					
Average	88.63	32.66	4.40	1.39	12.64
Min	82.17	14.70	3.29	0.92	6.97
Max	93.39	52.81	13.35	2.60	19.56
Count	24	24	24	24	24
Cluster 3: medium size companies					
Average	88.17	28.06	4.19	1.37	11.78
Min	85.60	16.37	3.72	–0.24	–3.32
Max	92.78	55.41	5.18	2.22	20.07
Count	24	24	24	24	24
Cluster 4: second bottom size companies					
Average	88.71	30.29	4.85	1.18	12.02
Min	74.75	12.37	3.33	–2.20	–3.51
Max	91.87	208.11	16.93	1.84	20.33
Count	24	24	24	24	24
Cluster 5: bottom size companies					
Average	88.98	158.41	5.60	1.58	14.40
Min	77.99	16.00	3.39	0.91	8.41
Max	92.33	3,220.31	30.83	4.96	23.41
Count	25	25	25	25	25
Total sample					
Average	88.96	66.60	4.97	1.41	13.50
Min	74.75	12.37	3.08	–2.20	–3.51
Max	96.76	3,220.31	30.83	4.96	53.66
Skewness	1.77	1.09	2.36	0.58	2.82
Kurtosis	3.60	5.99	3.07	1.05	2.77
Count	122	122	122	122	122

Note: Leverage Ratio: total liabilities/total assets
Liquidity Ratio: current assets/current liabilities
Efficiency Ratio: total revenue/total assets
Return on Assets = earnings before tax/total assets
Return on Equity = earnings before tax/total equity

Source: own calculation based on data found on www.nasdaq.com

ciency ratio is rather low at 4.97%. The minimum efficiency is 3.08% (achieved by Charles Schwab Bank, SSB) and the maximum efficiency ratio is equal to 30.83% (presented by the Regions Bank).

As far as the financial performance of the examined banks is concerned, the average ROA in the sample is 1.41%. The minimum ROA is equal to –2.20% and the maximum ROA is equal to 4.96% (achieved by the Regions Bank). The average ROE is 13.50%, with extreme ROE scores amounting to –3.51% and 53.66%. These minimum and maximum ROE ratios are presented by the LendingClub Bank and the Ameriprise Bank (FSB), respectively.

Table 3 provides information on the five cash flow factors considered in our analysis, namely operating cash flow, investing cash flow, financing cash flow, net cash flow and free cash flow. The data are presented in average terms over the period 2019–2022. The average cash flow from operating activities in the sample amounts to 1.4 billion USD. The average cash flow from investing activities is negative at –5.3 billion USD. The corresponding average cash flow from financing activities is equal to 5.2 billion USD.

Going further, the average net cash flow is equal to 1.2 billion USD. This average amount is not equal to the sum of the cash flows from operating, investing and financing activities. The difference is due to the effect of exchange rate differences.[13] Finally, the average free cash flow figure in the sample amounts to 7 billion USD. For all cash flow figures reported in Table 3, there is a wide gap between the minimum and maximum figures (amounting to an average of 133 billion USD for the five factors combined).

3. Empirical results

The results of our empirical analysis are reported in this section. We first discuss the correlation coefficients among the key variables considered in our study and then we present the results of the regression analysis on the financial performance of the American banks.

One significant regulatory requirement that must be met by banks in the United States concerns the Liquidity Coverage Ratio (LCR), which refers to the proportion of highly liquid assets that must be held by financial institutions; it must be enough to fund cash outflows for 30 days and ensure their ongoing ability to meet short-term obligations. This ratio is actually a generic stress test that aims to foresee market-wide shocks and ensure that financial institutions have sufficient capital preservation to ride out any short-term liquidity disruptions, that may plague the entire system. For a detailed discussion on the LCR ratio refer to: Murhy (2022).

[13] The cash flow of 14 out of 122 banks in our sample are affected by exchange rate differences.

Table 3. Cash flows

Stats	OpCF	InvCF	FinCF	NetCF	FreeCF
Cluster 1: top size companies					
Average	5,903,676,760	–22,496,588,500	22,584,612,940	5,636,442,510	29,814,332,589
Min	244,825,000	–145,283,500,000	–20,315,500,000	–3,532,500,000	–1,912,880,454
Max	27,346,250,000	10,707,000,000	194,842,000,000	72,110,250,000	186,334,944,238
Count	25	25	25	25	25
Cluster 2: second top size companies					
Average	482,627,781	–1,880,168,406	1,460,025,813	63,144,688	2,399,005,429
Min	134,939,500	–5,155,250,250	–150,662,500	–119,253,250	720,679,672
Max	1,079,546,500	–167,530,000	4,616,591,750	483,048,750	5,764,317,192
Count	24	24	24	24	24
Cluster 3: medium size companies					
Average	191,566,542	–861,974,990	730,174,854	59,891,010	1,065,317,951
Min	81,467,000	–2,592,204,250	–309,142,250	–7,283,500	–134,495,911
Max	292,119,250	292,714,750	2,575,276,000	436,163,750	2,731,112,197
Count	24	24	24	24	24
Cluster 4: second bottom size companies					
Average	110,687,141	–430,560,250	341,314,870	21,441,761	546,906,446
Min	–184,687,250	–1,224,044,250	–807,982,250	–40,674,000	–565,483,576
Max	402,248,250	668,063,750	1,433,062,750	120,106,500	1,230,943,986
Count	24	24	24	24	24
Cluster 5: bottom size companies					
Average	98,837,980	–394,932,630	306,221,400	10,111,920	498,586,506
Min	31,680,750	–1,009,042,750	82,933,500	–31,512,000	279,366,708
Max	377,171,500	–201,294,750	952,811,250	72,015,250	1,073,026,938
Count	25	25	25	25	25
Total sample					
Average	1,384,271,389	–5,318,398,244	5,192,065,963	1,185,291,408	7,003,950,671
Min	–184,687,250	–145,283,500,000	–20,315,500,000	–3,532,500,000	–1,912,880,454
Max	27,346,250,000	10,707,000,000	194,842,000,000	72,110,250,000	186,334,944,238
Skewness	4.73	–2.47	3.83	4.79	5.28
Kurtosis	2.22	4.65	4.75	4.28	4.85
Count	122	122	122	122	122

Note: Free Cash Flows = Cash from Operating Activities + Interest Expense – Tax Shield on Interest Expense + Cash Flow from Investing Activities

Source: own calculation based on data found on www.nasdaq.com

3.1. Correlation analysis

In this section we discuss the correlation among the average ROA and ROE, which are the two types of financial performance considered in our analysis,[14] cash flow from operating activities, cash flow from investing activities, cash flow from financing activities, net cash flow, free cash flow, banks' size, as well as the leverage, liquidity and efficiency ratios over the period 2019–2022. The relevant calculations are presented in Table 5.[15]

However, before analysing correlation coefficients, we examine the stationarity of the financial data series used in our analysis. Stationarity is examined with the Augmented Dickey-Fuller (ADF) Unit Root Test. The null hypothesis of this test is that a data series has a unit root, that is, the series is not stationary. The null hypothesis is rejected when the test value is more negative than the critical values. The results of ADF testing, i.e. t-statistics and probabilities along with critical values at 1%, 5% and 10%, are provided in Table 4. As shown in the table, the eleven variables that are used in our correlation and regression analysis have no unit roots and are stationary, with no exceptions.

After verifying that our data series are stationary, we focus on the correlations among the variables. As shown in Table 5, ROA is positively related to the cash

Table 4. Stationarity testing

Variable	Test critical values			ADF test outcomes	
	1%	5%	10%	*t*-statistic	probability
ROA	–3.44	–2.87	–2.57	–20.77	0.00
ROE	–3.44	–2.87	–2.57	–4.52	0.00
Oper. cash flow	–3.44	–2.87	–2.57	–21.34	0.00
Inv. cash flow	–3.44	–2.87	–2.57	–9.32	0.00
Fin. cash flow	–3.44	–2.87	–2.57	–8.30	0.00
Net cash flow	–3.44	–2.87	–2.57	–10.23	0.00
Free cash flow	–3.44	–2.87	–2.57	–9.56	0.00
Size	–3.44	–2.87	–2.57	–5.54	0.00
Leverage	–3.44	–2.87	–2.57	–19.89	0.00
Liquidity	–3.44	–2.87	–2.57	–17.26	0.00
Efficiency	–3.44	–2.87	–2.57	–22.11	0.00

Source: own calculation.

[14] We note that other studies, such as those by Kroes and Manikas (2014), Ni et al. (2019), Heydari et al. (2014), Kadioglu et al. (2017) and Abughniem et al. (2020), examine financial performance by using Tobin's Q. We do not take this financial performance measure into consideration in our analysis.

[15] We note that the cash flow figures have been scaled by total assets at the end of each year under analysis.

Table 5. Correlations

Variable	ROA	ROE	Oper. cash flow	Inv. cash flow	Fin. cash flow	Net cash flow	Free cash flow	Size	Leverage	Liquidity	Efficiency
ROA	1.00	0.68	0.11	–0.26	0.14	–0.11	0.26	0.00	0.08	0.29	0.37
ROE	0.68	1.00	0.12	–0.18	0.04	–0.15	0.20	0.11	0.38	0.21	0.24
Oper. cash flow	0.11	0.12	1.00	–0.06	–0.18	0.06	0.39	–0.09	–0.33	0.50	0.55
Inv. cash flow	–0.26	–0.18	–0.06	1.00	–0.79	0.12	–0.93	0.09	–0.19	–0.15	–0.04
Fin. cash flow	0.14	0.04	–0.18	–0.79	1.00	0.46	0.66	–0.05	0.20	0.01	–0.10
Net cash flow	–0.11	–0.15	0.06	0.12	0.46	1.00	–0.08	0.00	–0.10	0.02	0.03
Free cash flow	0.26	0.20	0.39	–0.93	0.66	–0.08	1.00	–0.09	0.11	0.27	0.16
Size	0.00	0.11	–0.09	0.09	–0.05	0.00	–0.09	1.00	0.26	–0.10	–0.07
Leverage	0.08	0.38	–0.33	–0.19	0.20	–0.10	0.11	0.26	1.00	–0.28	–0.47
Liquidity	0.29	0.21	0.50	–0.15	0.01	0.02	0.27	–0.10	–0.28	1.00	0.66
Efficiency	0.37	0.24	0.55	–0.04	–0.10	0.03	0.16	–0.07	–0.47	0.66	1.00

Source: own calculation.

flows from operating and financing activities, but it is negatively correlated to the cash flow from investing activities. The correlation of ROA with net cash flow is negative. The opposite is the case for free cash flow. The correlation of ROA with the size of banks is nil. Finally, the correlations of ROA with leverage, liquidity and efficiency ratios are all positive. The direction of ROE's correlation with the examined variables is exactly equal to that of ROA. However, the magnitude of ROE's correlation coefficients differ from that of ROA's correlations.

The correlation coefficients prove that the variables we have chosen to use in our analysis have some sort of relationship with the financial performance of the American banks. However, the question of whether these linear relationships can be interpreted as if the selected variables could explain or influence financial performance will be answered by the results of the regression analysis presented in the next section.

3.2. Regression analysis of financial performance

3.2.1. Single-factor regression analysis

The results of the single-factor model (1) on banks' financial performance are provided in Table 6, which has two panels: Panel A concerns the results on ROA and Panel B reports the results on ROE. The table presents the coefficients of the variables, the t-statistic regarding their statistical significance and the R-squared coefficient along with the results of the heteroscedasticity and autocorrelation tests.

In the case of ROA, the single-factor model (1) produces a slightly negative but significant estimate for the net cash flow factor (–0.02). The corresponding slope for free cash flow is slightly positive (0.03) and significant. The sign of slopes obtained when ROE is a dependent variable of the regression model is similar to that of ROA's results. However, the economic validity of slopes is more material compared to that of ROA. More specifically, the coefficients of net cash flow and free cash flow are –0.24 and 0.19, respectively, implying that an increase in net cash flow by 1% can reduce firm performance by 0.24%, whereas an increase in free cash flow by 1% may result in an increase in firm performance by 0.19%. With respect to the statistical validity of the reported results, it shall be noted that the relevant testing has shown no heteroskedasticity and autocorrelation issues.

Overall, the empirical results of the single-factor regression analysis contradict our expectations about a positive impact of net cash flow on financial performance and a negative effect of free cash flow on the performance. In addition, the accentuated positive relationship between performance and free cash flow is

Table 6. Single-factor regression analysis of performance

Variable	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Panel A: Return on Assets (ROA)				
Constant	1.42*	35.84	1.19*	22.14
Net cash flow/free cash flow	–0.02**	–2.35	0.03*	5.91
R-squared	0.11	–	0.17	–
Heteroskedasticity testing: *F*-statistic (*P*-value)	4.49 (0.16)	–	0.16 (0.69)	–
Autocorrelation Testing: *F*-statistic (*P*-value)	0.60 (0.55)	–	1.47 (0.11)	–
Panel B: Return on Equity (ROE)				
Constant	13.62*	39.64	12.02*	25.32
Net cash flow/free cash flow	–0.24*	–3.30	0.19*	4.44
Heteroskedasticity testing: *F*-statistic (*P*-value)	0.48 (0.49)	–	0.00 (0.99)	–
Autocorrelation testing: *F*-statistic (*P*-value)	1.42 (0.12)	–	1.09 (0.22)	–
R-squared	0.12	–	0.14	–

Note: * statistically significant at 1%; ** statistically significant at 5%.

Source: own estimation.

in contrast to Jensen's (1986 theory about the negative impact of free cash flow on corporate performance.

3.2.2. Multi-factor regression analysis

The results of the five-factor model (5) are presented in Table 7. The coefficients of the cash flow factors are quite similar to those obtained from the single-factor model. In the case of ROA, net cash flow and free cash flow estimates are slightly negative and positive, respectively, being statistically significant at 5%.

When it comes to the size of banks, the relevant estimates in Table 7 are statistically insignificant. Based on these results, the size of the examined banks cannot affect their financial performance, whether the performance is ROA or ROE. This is also the case for the liquidity ratio.

When ROA is taken into consideration, the coefficient of the leverage factor is positive but statistically insignificant. However, the corresponding leverage estimate in the case of ROE shows a strong positive and statistically significant influence, amounting to 1.60 and 1.61 in the first and the second version of the applied model, respectively.

Table 7. Five-factor regression analysis of performance

Variable	Coefficient	*t*-statistic	Coefficient	*t*-statistic
Panel A: Return on Assets (ROA)				
Constant	–7.02	–1.13	–6.64	–1.05
Net cash flow/free cash flow	–0.02**	–2.35	0.02**	2.33
Size	–0.03	–1.02	–0.02	–0.64
Leverage	0.10	1.32	0.09	1.18
Liquidity	0.00	0.64	0.00	0.25
Efficiency	0.12*	4.87	0.12*	5.31
R-squared	0.23	–	0.24	–
Heteroskedasticity testing: *F*-statistic (*P*-value)	4.33 (0.00)	–	12.10 (0.00)	–
Autocorrelation testing: *F*-statistic (*P*-value)	1.11 (0.19)	–	1.53 (0.13)	–
Panel B: Return on Equity (ROE)				
Constant	–133.42*	–6.99	–134.53*	–6.68
Net cash flow/free cash flow	–0.16*	–2.83	0.13***	1.71
Size	–0.04	–0.18	–0.03	–0.14
Leverage	1.60*	7.89	1.61*	7.32
Liquidity	0.00	0.60	0.00	0.47
Efficiency	1.08*	7.28	1.08*	7.36
R-squared	0.39	–	0.38	–
Heteroskedasticity testing: *F*-statistic (*P*-value)	5.21 (0.00)	–	5.82 (0.00)	–
Autocorrelation testing: *F*-statistic (*P*-value)	1.05 (0.14)	–	1.18 (0.17)	–

Note: * statistically significant at 1%; ** statistically significant at 5%; *** statistically significant at 10%.

Source: own estimation.

Finally, with respect to efficiency, the relevant estimate in the case of ROA is significantly positive, being equal to 0.12 in both versions of the model. This significant estimate indicates that an increase by 1% in the total revenue per assets achieved by an American bank may boost its ROA by 12 basis points. The corresponding estimate of the efficiency ratio in the case of ROE is also positive and significant, being equal to 1.08 in both versions of the model.

Having analysed the results of model (5), it should be noted that the initial results obtained from this model presented heteroskedasticity (but no autocorrelation) issues. The relevant Breuch-Pagan-Godfrey statistics on the initial regression results are reported in Table 7. In the end, the results on the regression vari-

ables reported in Table 7 are those obtained after correcting heteroskedasticity with the White method.

The results of model (6) on the influence exerted by the three key determining components of net cash flow, i.e. cash flow from operating activities, cash flow from investing activities and cash flow from financing activities, are reported in Table 8.

Table 8. Three-factor regression analysis of performance

Variable	Coefficient	*t*-statistic	Coefficient	*t*-statistic
	Panel A: Return on Assets (ROA)		Panel B: Return on Equity (ROE)	
Constant	1.17*	13.89	11.93*	22.81
Operating cash flow	0.02	0.22	0.19	0.46
Investing cash flow	–0.05**	–2.13	–0.38*	–3.47
Financing cash flow	–0.02**	–2.06	–0.22*	–3.18
R-squared	0.18	–	0.12	–
Heteroskedasticity testing: *F*-statistic (*P*-value)	7.40 (0.00)	–	5.51 (0.00)	–
Autocorrelation testing: *F*-statistic (*P*-value)	2.09 (0.22)	–	1.53 (0.11)	–

Note: * statistically significant at 1%; ** statistically significant at 5%.

Source: own estimation.

As expected, the estimates concerning cash flow from operating activities are positive both for ROA and ROE. However, these positive coefficients are not significant in statistical and economic terms. Consequently, we cannot establish a meaningful relationship between financial performance and operating cash flow.

By contrast, the estimates obtained for cash flow from investing and financing activities are all significantly negative. In the case of ROA, the relevant estimates are equal to –0.05 and –0.02. In the case of ROE, the coefficients of investing and financing cash flows are equal to –0.38 and –0.22, respectively.

Similar to the previous model, we have performed heteroskedasticity and autocorrelation testing, which has shown that, although autocorrelation is not an issue, heteroskedasticity is, as indicated by the corresponding F-statistics on the model's (6) initial results shown in Table 8. Heteroskedasticity has been corrected with the White method and the regression results presented in the table are the corrected ones.

The results of the seven-factor model (7) resemble those derived from model (6). These results are provided in Table 9. In particular, the estimates concerning the operating cash flow are statistically insignificant. On the other hand, the coeffi-

Table 9. Seven-factor regression analysis of performance

Variable	Coefficient	*t*-statistic	Coefficient	*t*-statistic
	Panel A: Return on Assets (ROA)		Panel B: Return on Equity (ROE)	
Constant	–5.77	–1.25	–133.79*	–6.73
Operating cash flow	–0.06	–0.62	–0.03	–0.17
Investing cash flow	–0.03*	–2.86	–0.18**	–2.14
Financing cash flow	–0.01***	–1.80	–0.16*	–2.90
Size	–0.01	–0.51	–0.03	–0.12
Leverage	0.08	1.46	1.60*	7.32
Liquidity	0.00	0.60	0.00	0.47
Efficiency	0.13*	3.18	1.05*	7.09
R-squared	0.27	–	0.39	–
Heteroskedasticity testing: *F*-statistic (*P*-value)	6.53 (0.00)	–	4.52 (0.00)	–
Autocorrelation testing: *F*-statistic (*P*-value)	0.49 (0.57)	–	1.98 (0.33)	–

Note: * statistically significant at 1%; ** statistically significant at 5%; *** statistically significant at 10%.

Source: own estimation.

cients of investing and financing cash flows are negative and statistically significant, though lower in absolute value compared to the corresponding estimates in Table 8.

Going further, as in model (5), the size factor presents no significant estimates. Leverage is significant in explaining bank performance only in the case of ROE. The sign of the impact of leverage on performance is positive as was the case in model (5). Liquidity is insignificant, while efficiency is positively related to the financial performance (both ROA and ROE) of the examined American banks. In regard to the statistical validity of these results, we should note that similar to model (6) results, heteroskedasticity was an issue in model (7). This problem was dealt with using the White correction method.

Overall, the results of models (6) and (7) verify our expectations about a negative impact of investing and financing cash flows on performance, but not our assumption about a significantly positive relationship between financial performance and cash flow from operating activities.

Conclusion

In this study, we have examined the relationship between cash flow and financial performance using data from a sample of 122 US banks. The study covers the period 2019–2022. Two alternative types of financial performance are considered, i.e. return on assets and return on equity, as well as five cash flow components, that is, cash flow from operating activities, cash flow from investing activities, cash flow from financing activities, net cash flow and free cash flow. Along with the cash flow factors, we have considered four control variables, namely the size of banks and their leverage, liquidity and efficiency ratios. From a methodological perspective, correlation analysis is applied along with panel single-factor and multi-factor regression analysis.

The empirical evidence of our study has revealed a negative relationship between financial performance and net cash flow, while the opposite is the case for free cash flow. These results contradict the findings of several studies in the literature, which indicate that financial performance is positively related to net cash flow but negatively associated with corporate performance. Regarding the constituting elements of net cash flow, our results show that cash flow from operating activities cannot affect performance. On the contrary, investing and financing cash flows can affect the financial performance of banks in the US but in a negative fashion.

When it comes to the control variables used in our analysis, the results indicate that size is not material in explaining bank performance. This is also the case for liquidity. Leverage is significant in explaining performance only when return on equity is taken into consideration. Finally, the impact of efficiency on banks' performance is positive and quite significant.

Overall, our study provides new empirical evidence on publicly available factors that can be easily exploited as selection tools when examining which banks present high prospects of a significant future financial performance. Such prospects are of particular interest to investors in the capital markets seeking investment opportunities that may reward them with higher dividends and, possibly, higher stock returns.

The main limitation of our study is that it assumes linear relationships between the examined variables. Thus, one could also examine the possibility of a non-linear relationship between financial performance and cash flow components, size, leverage, liquidity and efficiency. Other variables could also be considered in the analysis of performance. Indicatively, these variables could cover corporate governance issues, social issues and environmental risks resulting from or affecting banks' operations. Finally, comparisons between American banks and European banks (or banks from other continents) could also be applied to identify whether there are specific cash flow elements or other variables of a special national or regional nature that could affect financial performance in the banking sector.

Appendix

Study sample

No.	Name	Symbol
1	JPMorgan Chase Bank	JPM
2	Bank of America	BAC
3	Wells Fargo Bank	WFC
4	Goldman Sachs Bank USA	GS
5	U.S. Bank	USB
6	Truist Bank	TFC
7	Charles Schwab Bank, SSB	SCHW
8	Capital One	COF
9	The Bank of New York Mellon	BK
10	State Street Bank and Trust Company	STT
11	American Express National Bank	AXP
12	Citizens Bank	CFG
13	Fifth Third Bank	FITB
14	Ally Bank	ALLY
15	KeyBank	KEY
16	The Huntington National Bank	HBAN
17	Ameriprise Bank, FSB	AMP
18	The Northern Trust Company	NTRS
19	Zions Bancorporation, N.A.	ZION
20	Comerica Bank	CMA
21	Raymond James Bank	RJF
22	First Horizon Bank	FHN
23	Webster Bank	WBS
24	Western Alliance Bank	WAL
25	East West Bank	EWBC
26	Synovus Bank	SNV
27	Valley National Bank	VLY
28	Wintrust Bank	WTFC
29	BOKF	BOKF
30	Old National Bank	ONB
31	First National Bank of Pennsylvania	FNB
32	Associated Bank	ASB
33	UMB Bank	UMBF
34	Prosperity Bank	PB
35	Stifel Bank and Trust	SF

Study sample – cont.

No.	Name	Symbol
36	BankUnited	BKU
37	Hancock Whitney Bank	HWC
38	First Interstate Bank	FIBK
39	Commerce Bank	CBSH
40	Texas Capital Bank	TCBI
41	Simmons Bank	SFNC
42	Fulton Bank	FULT
43	Glacier Bank	GBCI
44	Ameris Bank	ABCB
45	First Hawaiian Bank	FHB
46	United Community Bank	UCBI
47	Bank of Hawaii	BOH
48	Eastern Bank	EBC
49	Cathay Bank	CATY
50	Pacific Premier Bank	PPBI
51	Customers Bank	CUBI
52	Washington Federal Bank	WAFD
53	Atlantic Union Bank	AUB
54	Columbia Bank	COLB
55	Bank of Hope	HOPE
56	Trustmark National Bank	TRMK
57	First Merchants Bank	FRME
58	Renasant Bank	RNST
59	Community Bank	CBU
60	Banner Bank	BANR
61	Northwest Bank	NWBI
62	Sandy Spring Bank	SASR
63	Dime Community Bank	DCOM
64	OceanFirst Bank	OCFC
65	First Foundation Bank	FFWM
66	First Financial Bank	FFIN
67	BancFirst	BANF
68	Busey Bank	BUSE
69	Veritex Community Bank	VBTX
70	Seacoast National Bank	SBCF
71	NBT Bank	NBTB
72	Berkshire Bank	BHLB
73	EagleBank	EGBN

Study sample – cont.

No.	Name	Symbol
74	Lakeland Bank	LBAI
75	Columbia State Bank	CLBK
76	Live Oak Banking Company	LOB
77	The Park National Bank	PRK
78	First Commonwealth Bank	FCF
79	Origin Bank	OBK
80	ConnectOne Bank	CNOB
81	Capitol Federal Savings Bank	CFFN
82	NBH Bank	NBHC
83	HomeStreet Bank	HMST
84	Banc of California	BANC
85	Brookline Bank	BRKL
86	Amerant Bank	AMTB
87	S&T Bank	STBA
88	Nicolet National Bank	NIC
89	Premier Bank	PFC
90	Flushing Bank	FFIC
91	1st Source Bank	SRCE
92	LendingClub Bank	LC
93	Luther Burbank Savings	LBC
94	The Bancorp Bank	TBBK
95	Horizon Bank	HBNC
96	Midland States Bank	MSBI
97	Amalgamated Bank	AMAL
98	Tompkins Community Bank	TMP
99	Southside Bank	SBSI
100	Stock Yards Bank & Trust Company	SYBT
101	Central Pacific Bank	CPF
102	Hanmi Bank	HAFC
103	Byline Bank	BY
104	Univest Bank and Trust Co.	UVSP
105	Peoples Bank	PEBO
106	Heritage Bank	HFWA
107	Westamerica Bank	WABC
108	Pathward	CASH
109	MidFirst Bank	FMBH
110	Washington Trust Bank	WASH
111	CrossFirst Bank	CFB

Study sample – cont.

No.	Name	Symbol
112	MidWestOne Bank	MOFG
113	Peapack-Gladstone Bank	PGC
114	Metropolitan Commercial Bank	MCB
115	German American Bank	GABC
116	Trustco Bank	TRST
117	Republic Bank	RBCAA
118	Cambridge Savings Bank	CATC
119	Independent Bank	IBCP
120	PlainsCapital Bank	SPFI
121	Farmers and Merchants Bank of Long Beach	FMAO
122	Regions Bank	RM

Source: own preparation.

References

Abughniem, M.S., Al Aishat, M.A.H., & Hamdan, A. (2020). Free cash flow and firm performance: Empirical evidence from the Amman Stock Exchange. *International Journal of Innovation, Creativity, and Change*, *10*(12), 668–681.

Alslehat, N., & Al-Nimer, M. (2017). Empirical study of the relationship between cash flow management and financial performance of Jordanian insurance companies. *International Business Management*, *11*(3), 776–782.

Amah, O. K., Ekwe, M. C., & Uzoma, I. J. (2016). Relationship of cash flow ratios and financial performance. *European Journal of Accounting. Auditing and Finance Research*, *4*(4), 89–97.

Brush, T. H., Bromiley, P., & Hendrickx, M. (2000). The free cash flow hypothesis for sales growth and firm performance. *Strategic Management Journal*, *21*(4), 455–472. https://doi.org/10.1002/(SICI)1097-0266(200004)21:4<455::AID-SMJ83>3.0.CO;2-P

Buchwald, E. (2023, April 28). *Signature Bank failed because of 'poor management,' FDIC report finds.* https://edition.cnn.com/2023/04/28/business/signature-bank-fdic-report/index.html

Farris, M. T. II, & Hutchison, P. D. (2002). Cash-to-cash: The new supply chain management metric. *International Journal of Physical Distribution and Logistics Management*, *32*(4), 288–298. https://doi.org/10.1108/09600030210430651

Frank, B. P., & James, O. K. (2014). Cashflow and corporate performance: A study of selected food and beverages companies. *European Journal of Accounting and Finance Research*, *2*(7), 77–87.

Gheshlaghi, F. D. R., Ahmadzadeh, Y., & Faal, F. (2014). The cash flow statement's component effect on management performance in firms enlisted in Tehran Stock Exchange. *Journal of Management and Accounting Studies*, *2*(1), 53–60. https://doi.org/10.24200/jmas.vol2iss01pp53-60

Gao, Z., Li, W., & O'Hanlon, J. (2019). The informativeness of U.S. Banks' statements of cash flows. *Journal of Accounting Literature*, *43*(1), 1–18. https://doi.org/10.1016/j.acclit.2019.03.001

Hau, L. L. (2017). Free cash flow and firm performance: Evidence from sectoral levels for Vietnamese listed firms. *International Journal of Advanced Engineering, Management and Science*, *3*(4), 296–300. https://doi.org/10.24001/ijaems.3.4.2

Hetler, A. (2024, March 13). *Silicon Valley Bank collapse explained: What you need to know.* https://www.techtarget.com/whatis/feature/Silicon-Valley-Bank-collapse-explained-What-you-need-to-know

Heydari, I., Mirzafar, M., & Javadghayedi, M. (2014). Investigating the relationship between free cash flow and firm performance: Evidence from Tehran Stock Exchange. *Indian Journal of Scientific Research*, *4*(6), 269–279.

Jensen, M. C., (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, *76*(2), 323–329.

Joshi, P. (2019). Relationship between free cash flow and firm performance: Evidence from Indian Stock Market. *Think India Journal*, *22*(10), 3334–3340.

Kadioglu, E., Kilic, S., & Yilmaz, E. A. (2017). Testing the relationship between free cash flow and company performance in Borsa Istanbul. *International Business Research*, *10*(5), 148–158. https://doi.org/10.5539/ibr.v10n5p148

Khan, M. N., Parksh, R., Shamim, M., & Ali, S. (2021). Does audit quality matter for firm performance? Empirical evidence from Pakistani public listed companies. *Elementary Education Online*, *20*(5), 3953–3960.

Kroes, J. R., & Manikas, A. S. (2014). Cash flow management and manufacturing firm financial performance: A longitudinal perspective. *International Journal of Production Economics*, *148*, 37–50. https://doi.org/10.1016/j.ijpe.2013.11.008

Largest U.S. Banks by Asset Size. (2023, January 16). https://www.mx.com/blog/biggest-banks-by-asset-size-united-states/

Moula. (2021, September 13). Current Liabilities and What They Mean for Businesses. https://moula.com.au/finance/current-liabilities

Mulford, C., & Comiskey, E. (2009). *Cash flow reporting by financial companies: A look at the commercial banks*. Working Paper, College of Management, Georgia Institute of Technology, Atlanta.

Murhy, Ch. (2022, June 20). *Liquidity Coverage Ratio (LCR): Definition and How To Calculate*. https://www.investopedia.com/terms/l/liquidity-coverage-ratio.asp

Ni, Y., Huang, P., Chiang, P., & Liao, Y. (2019). Cash flow statements and firm value: Evidence from Taiwan. *Quarterly Review of Economics and Finance*, *71*, 280–290. https://doi.org/10.1016/j.qref.2018.09.004

Nwanyanwu, L. A. (2015). Cashflow and organizational performance in Nigeria: Hospitality and print media industries perspectives. *European Journal of Business, Economics and Accountancy*, *3*(3), 66–72.

Rahman, A., & Sharma, R. B. (2020). Cash flows and financial performance in the industrial sector of Saudi Arabia: With special reference to insurance and manufacturing sectors. *Investment Management and Financial Innovations*, *17*(4), 76–84. https://doi.org/10.21511/imfi.17(4).2020.07

Rasheed, I., & Shahzad, K. (2020). The impact of free cash flow on a firm's performance: Evidence from textile sector of Pakistan. *Asian Finance Research Journal*, *2*(1), 62–72.

Saul, D. (2023, May 1). First Republic Bank Failure: A timeline of what led to the second-largest bank collapse in U.S. history. https://www.forbes.com/sites/dereksaul/2023/05/01/first-republic-bank-failure-a-timeline-of-what-led-to-the-second-largest-bank-collapse-in-us-history/?sh=6656886e67b7

US Banks Total Assets (I:USBTA). (2023). https://ycharts.com/indicators/us_banks_total_assets

Wang, G. Y. (2010). The impacts of free cash flows and agency costs on firm performance. *Journal of Service Science and Management*, *3*(4), 408–418. https://doi.org/10.4236/jssm.2010.34047

What is a good liquidity ratio? (2023, 13 April). https://www.freshbooks.com/hub/accounting/good-liquidity-ratio

Yameen, M., Farhan, N. H. S., & Tabash, M. (2019). The Impact of Liquidity on Firms' Performance: Empirical Investigation from Indian Pharmaceutical Companies. *Academic Journal of Interdisciplinary Studies*, *8*(3), 212–220. https://doi.org/10.36941/ajis-2019-0019

Zygmunt, J. (2013). Does liquidity impact on profitability? A case of Polish listed IT companies. In: *Conference of Informatics and Management Sciences*, Poland, March 25–29.