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Determinants of Profitability of Listed Banks in the United States: A Panel Data Approach

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Abstract:

Purpose: *This paper explores the relationship between financial performance in terms of profitability and the determinants for listed banks in the United States since the end of 2014 when banks under the Basel III framework are required to maintain minimum capital ratios to ensure there is sufficient capital to withstand and absorb operating losses to ensure the overall stability of the financial system through improved risk mechanisms.*

Design/Methodology/Approach: *The study implements a panel data regression methodological approach. Data are sourced from annual financial statements of listed U.S. banks for the period 2015 to 2019 representing the new banking regulatory capital ratio regime before the onset of the Covid-19 pandemic. Determinants of profitability in the specific context of this study are the factors that cause or significantly influence the nature or occurrence of the financial performance regarding the profitability of listed banks.*

Findings: *Key findings reveal that under the revised regulatory framework, the leverage capital ratio is significantly positively correlated to bank profitability result in the unintended consequence of banks being disincentivized in participating in lower-risk, lower-limit return activities, such as U.S. Treasury intermediation; and incentivized to engage in higher-risk, higher return activities without a commensurate increase in capital requirements. Other findings are the log of assets variable is significantly positively related to bank profitability, and the unemployment variable is highly significantly negatively correlated with bank profitability. There is no evidence of systematic opportunistic management of regulatory risk-based capital ratios. Surprisingly, the net interest margin variable, inflation, and GDP variables are not significant; plausible explanations are offered for these noted anomalies.*

Practical Implications: *The study is important because this topic is under researched and needs to be better understood by the regulators, standard setters, practitioners, and academics, especially as the regulatory standard setting, reviews and tests are ongoing; and U.S. listed banks play a critical role in the global economy evidenced by events such as the 2008 financial crisis.*

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Originality/Value: *The study offers guidance on how regulators, standard setters, and practitioners can better manage risk and uncertainty in banks overall.*

Keywords: *Basle, banks, bank profitability, return on assets, regulation, leverage capital ratio, net interest margin, non-performing loans, inflation, unemployment.*

JEL Classification: *G21, L25, C23, G32, E44.*

Paper type: *Research paper.*

1. Introduction

This paper examines the relationship between financial performance in terms of profitability and the determinants for listed banks in the United States since the end of 2014 when banks are generally required under the Basel III framework to maintain minimum capital ratios comprising a common equity tier 1 ratio of 4 percent, a tier 1 ratio of 5.5 percent, a total ratio of 8 percent, a leverage ratio of 4 percent, and certain larger banks are required to maintain a minimum Supplemental Leverage Ratio (SLR) of percent.

The determinants of profitability in the specific context of this study refer to the variables that are believed and/or have been empirically shown to influence financial performance in terms of the profitability of listed banks. In the United States (U.S.), risk-based capital ratios are used by the supervisors and regulators such as the Office of the Comptroller of the Currency (OCC), the Federal Reserve (The Fed), the Federal Deposit Insurance (FDIC), and the Consumer Financial Protection Bureau (CFPB) to assess the relative strength, security, and safety of lending institutions.

The OCC regulates and supervises all banks chartered as national banks and federal savings associations, ensuring they comply with banking laws and regulations. The Fed is responsible for supervising bank holding companies and the largest, most systemically important financial institutions to promote financial stability.

The FDIC insures customer deposits to maintain public confidence in the banking system and supervises and regulates state-chartered banks that are not members of the Federal Reserve System. The Consumer Financial Protection Bureau (CFPB) is responsible for overseeing the protection of consumers in the market for financial products and services.

The U.S. banking regulation framework is complex. It involves the agencies (OCC, The Fed, FDIC, CFPB); statutes such as the Bank Holding Company Act, Federal

Deposit Insurance Act, Dodd-Frank Act and Volcker Rule, Bank Secrecy Act, and Community Reinvestment Act; as well as the implementation of the international Basel accords by customizing the international rules to its own regulatory structure.

The Bank Holding Company Act concerns the regulation of the conduct of bank holding companies and financial holding companies, requiring regulatory approval for acquisitions and expansions. The Federal Deposit Insurance Act stipulates deposit insurance protections and defines regulatory powers of the FDIC over insured banks.

The Dodd-Frank Act and Volcker Rule introduced the post-2008 financial crisis reforms such as the restrictions on proprietary trading and investments in hedge funds and private equity funds.

The Bank Secrecy Act, which comprises the primary anti-money laundering (AML) and countering the financing of terrorism (CFT) laws, requires banks to implement customer due diligence (CDD), suspicious activity reporting (SARs), and risk-based monitoring measures and programs. The Community Reinvestment Act encourages banks to extend credit and provide services to low-income communities as well as prevent discriminatory lending practices.

The Basel Committee on Banking Supervision (BCBS) is responsible for developing the Basel framework that sets global standards for bank capital and liquidity, with each member country, including the US assuming the responsibility for its own tailored implementation. The U.S. uses the tiered application to apply Basel rules differently based on criteria such as the size and international activity of the bank.

The largest and most complex banks are required to conform to the most advanced Basel approaches. The smaller banks are, however, allowed to comply with the capital rules based on Basel 1, with the option to opt-in and abide by the advanced approaches.

Basel I, II, and III are international banking regulations that set capital requirements to protect against financial risks, with the most recent version, Basel III, addressing issues exposed by the 2008 financial crisis through stricter capital and liquidity rules. US banks must comply with these global standards, and the Basel III Endgame proposal seeks to apply more granular and rigorous requirements to larger US banks, a move that could increase required capital for some institutions (Labonte and Scott, 2023).

Basel I, which was introduced in 1988, established the concept of capital adequacy. Basel I requires banks to hold a minimum amount of capital relative to their risk-weighted assets (8%) to withstand potential losses.

Basel II, which was introduced in 2004, refined the risk assessment by permitting the use of more sophisticated internal models to calculate credit risk and introduced requirements for operational and market risk.

Basel III, introduced in 2010, was developed because of the 2008 financial crisis. Basel III significantly strengthened the earlier accords by boosting capital requirements in terms of higher quality capital, like Common Equity Tier 1 (CET1), introduced stricter liquidity standards, and created a capital buffer to absorb losses.

The Basel III Endgame is a recent ongoing set of proposed rules for the final implementation of Basel III in the US. Partly due to the failure of Silicon Valley Bank and First Republic Bank, the Federal Reserve published a proposal of revisions to Basel III Endgame in July 2023. Because of the 2023 changes, the new requirements applied to a larger number of banks (those with $100 billion or more in assets), implementing a more standard measure for computing their capital requirements instead of the banks performing the calculations themselves.

Thus, the aim of the Basel III Endgame proposal, which is still being debated and finalized, is to modify how large US banks calculate their risk-weighted assets, potentially resulting in an average increase of about 16% in the capital requirement for certain U.S. banks with larger trading operations (Cecchetti et al., 2025).

The new minimum capital ratio requirements imposed on U.S. banks commencing at the end of 2014 vary in terms of what they consist of, how they are computed, and to which institutions they apply. To reflect different risk levels, banks are subject to regulatory risk-based capital requirements that utilize a risk-weighted approach where assets and off-balance sheet exposures are assigned different weights based on their varying risks, thus requiring banks to set aside more capital against riskier assets to ensure banks are adequately capitalized.

However, risk-based requirements are prone to a high level of subjectivity and susceptible to manipulation via minimizing risk-weighted assets to increase profits. Consequently, risk-based requirements are not sufficient on their own and may unintentionally encourage excessive risk taking.

To address these shortcomings, banks are subject to regulatory leverage capital requirements that were introduced as a component of the Basel III framework after the 2007-2009 financial crisis to act as backstop to the other risk-based requirements comprising the common equity tier 1 capital ratio, tier 1 capital ratio and total capital ratio. In contrast to these risk-based capital requirements, leverage capital ratios give equal treatment to all assets and exposures and require minimum capital levels depending on the bank's total assets and exposures, irrespective of their individual risk profiles, thus requiring a bank to provide more capital (Basel Committee on Banking Supervision, 2014).

As a result, as at the end of 2014, U.S. banks are mandated to maintain a minimum leverage ratio of 4%, which is calculated by dividing the bank's tier 1 capital by its average total consolidated assets. In addition, in 2014, as part of the implementation of Basel III introduced by U.S. banking regulators, certain larger banks are required to maintain a minimum Supplemental Leverage Ratio (SLR) of 3% calculated by dividing a bank's Tier 1 capital by its total leverage exposure that includes certain off-balance sheet items.

The SLR is an attempt to address pitfalls that banks had previously used off-balance sheet items to hide a bank's true gearing due to their exclusion from the Tier 1 capital calculations. Furthermore, the largest U.S. banks (referred to as global systemically important banks (GSIBs)) are subject to an enhanced SLR (ESLR), which is an additional leverage buffer of 2% or face restrictions on capital distributions and certain bonus payments. This therefore meant that U.S. GSIBs will have an SLR amounting to at least 5% (Skadden, 2025)

The new stringent capital regulatory requirements are meant to ensure banks are not controlled by investments that swell the risk of default. The new requirements also ensure that banks have adequate capital to suffer and sustain operating losses while still fulfilling their withdrawals. In sum, the new capital requirements help to reduce the risk of earnings management by banks managers through increasing the costs of opportunistic earnings management and improving the overall stability of the financial system.

For the period 2015 to 2019, U.S. interest rates, primarily the Federal Funds Rate, increased from near zero following the 2008 financial crisis to a high of around 2.4% in 2019, to commence gradual monetary policy tightening by the Federal Reserve after several years of low rates after the financial crisis. In 2019, the Fed shifted policy and began cutting rates due to concerns about the global economy and trade tensions (Board of Governors of the Federal Reserve System, 2019).

Due to the onset of the Covid-19 pandemic in early 2020, the Fed made emergency rate cuts to support the economy, lowering interest rates to a target range of 0% to 0.25% in March 2020. Interest rates stayed at this historically low level through the end of 2021 (Board of Governors of the Federal Reserve System, 2021). The Fed increased interest rates to fight high inflation, rising significantly in 2022 and 2023 peaking at over 7.2% in June 2022 (Labonte, 2024a).

The Fed maintained a target range of 5.25% to 5.5% from July 2023 until the first rate cut in September 2024 since March 2020, lowering the target range to 4.75% to 5% (Labonte, 2024b). The Fed has initiated further cut rates, with another curtailment in September 2025 reducing the target range to 4.00% to 4.25% (Board of Governors of the Federal Reserve System, 2025). Higher rates imply greater borrowing costs, which exerts pressure on firms, especially venture-backed start-ups

that require funds from banks. Lofty interest rates mean reduced values of the bonds in which banks invested their customers' deposits when the rates were lower.

These factors contributed to the recent failure of Silicon Valley Bank, Signature Bank and First Republic Bank. The collapse of these high-profile banks led to increased volatility of stock markets and extensive panic, especially at regional banks where institutional customers had huge amounts of uninsured deposits. This study is important because this topic relating to the determinants of bank profitability under the new regulatory capital regime in the United States is under researched.

The U.S. implements the Basel standards via rules issued by the U.S. banking regulators and supervisors. In general, the U.S. applies standards that are as strict as, or more stringent than, the applicable international agreements (BPI, 2023). Thus, there is need for a better understanding of this topic by regulators, practitioners, and academics, given the critical role banks play not only in the U.S. but also the overall global economy due to the size of the U.S. economy being the largest in the world.

This is particularly important as the performance of U.S. listed banks is a key indicator of overall economic health. In addition, regulators and practitioners conduct research, such as annual stress tests, to assess U.S. banks' abilities to offset losses and withstand economic turmoil and to formulate ongoing policy such as the Basel III Endgame, to ensure banks maintain adequate capital and robust risk management.

For this study, data are sourced for the period 2015 (beginning of 2015 to 2019 (end of 2019) which represents the new banking regulatory capital ratio regime before the onset of the Covid-19 pandemic to avoid introducing model bias. The results of this study will therefore assist academics, governments, central banks, standard setters, regulators, supervisors and industry practitioners all over the world with formulating policy.

Hence, for the aforementioned reasons and motivations, the objective of this paper is to answer the research question – "What is the relationship between financial performance in terms of profitability and the determinants for listed banks in the United States since the end of 2014 when banks are required to generally maintain minimum capital ratios comprising a common equity tier 1 ratio of 4 percent, a tier 1 ratio of 5.5 percent, a total ratio of 8 percent, a leverage ratio of 4 percent, and certain larger banks are required to maintain a minimum Supplemental Leverage Ratio (SLR) of percent?"

The rest of the paper is structured as follows. Following the present introduction, section 2 provides a literature review. Section 3 furnishes the data and the methodology. Section 4 discusses empirical results. Section 5 offers the findings. Section 6 details the conclusions of the study.

2. Literature Review

The determinants of bank profitability have been widely investigated in the extant literature, with studies identifying a wide range of bank-specific and macroeconomic factors that impact banks' financial performance. Accordingly, this section reviews relevant empirical studies that shed light on the determinants of banks' profitability and their implications for the banking sector. Previous studies on the determinants of banks' profitability can be divided into two strands.

The first strand of studies incorporates bank-specific and macroeconomic variables in examining the determinants of profitability (Chukwuogor *et al.,* 2021; O'Connell, 2023; Almaqtari *et al.,* 2018; Karadžić and Đalović, 2021; Mijoč *et al.,* 2025; Horobet *et al.,* 2021). The second strand of earlier studies focuses solely on bank-specific determinants of profitability (Hoffmann, 2011; Islam and Rana, 2017; Al-Matar, 2023, Bourke, 1989; Rhoades, 1985; Molyneux and Thornton, 1992: Thalassinos *et al.,* 2016).

A recent research paper - "An empirical analysis of the determinants of the U.S. banks' profitability", by Chukwuogor *et al.* (2021) utilizes variables including the net interest margin (NIM), loan loss reserves, and external (or exogenous) macroeconomic variables, such as the 30-year average mortgage rate, gross domestic product (GDP) economic growth rate, unemployment rate, interest rate, and inflation rate. The study uses aggregate data on bank specific and macroeconomic variables to investigate the determinants of bank profitability.

Econometrically, the authors adopt the General Methods of Moments (GMM) estimation technique, since unlike the standard Ordinary Least Squares (OLS), GMM can correct for endogeneity and heteroscedasticity that might be present between the variables in the model. Using data for the period spanning 1996 quarter 1 through to 2019 quarter 4, the authors find that the results from the GMM estimator model reveal that the average mortgage rate, loan loss reserves, and changes in openness have a significantly negative influence on bank profitability.

The authors also find that economic growth, inflation rate, net interest margin, non-performing loans, and unemployment rate have a significantly positive impact on bank profitability in the United States. Overall, the study provides overwhelming evidence that both the bank-specific and macroeconomic variables are consequential to bank profitability in the United States.

In a comparable work, O'Connell (2023) investigated the determinants of bank profitability in the United Kingdom using the GMM estimator for the period 1998 to 2018. The author regressed capital-to-asset ratio the ratio of deposits to assets, the ratio of cash and other liquid assets to total assets, income per employee, bank size to total assets, the 10-year bond rate, short-term interest rates, the consumer price index, and loan growth were regressed on return on average assets (ROAA).

The author found that the capital-to-asset ratio, the ratio of deposits to assets, cash and other liquid assets to total assets, income per employee, bank size to total assets, the 10-year bond rate, short-term interest rates, the consumer price index (CPI), and loan growth have a statistically significant impact on ROAA in the United Kingdom.

The ratio of deposits to assets and CPI variables has a negative influence on banks' profitability. However, the other variables have a positive impact on banks' profitability. Karadžić and Đalović (2021) investigated the determinants of profitability of 47 large European banks employing both static and dynamic models for the time period 2013-2018. Specifically, the study implemented the Fixed Effects, Random Effects, pooled OLS, and the dynamic GMM estimator.

After conducting diagnostic tests, the authors determined that Pooled OLS was the most appropriate model for the study. The authors found evidence that the concentration of the 5 largest banks (measured by the Herfindahl-Hirchman Index, HHI), inflation, and GDP growth have positive and significant implications for bank profitability proxied by Return on Equity (ROE). They further concluded that non-resident banks tend to be more profitable than domestic banks.

In another study, Horobet, *et al.* (2021) used the Generalized Method of Methods (GMM) estimator to examine the determinants of banks' profitability in the CEE (Central and Eastern Europe) banking sectors for the period between 2009 and 2018. They found that unemployment rate, inflation, budget balance, non-governmental credit, non-performing loan rates, concentration rate, and capitalization rate have significantly negative influence on bank profitability in the CEE banking sectors.

Liu (2022) used a panel regression model to examine the macro and micro variables that affect the profitability of nine U. S. commercial banks for the period 2017 through 2021. The study proxied bank profitability by return on average assets (ROAA) and return on average equity (ROAE). The authors found evidence that liquidity risk stands out as the most significant determinant of commercial bank profitability measured by both ROAA and ROAE.

On the other hand, the leverage ratio and capital adequacy were found to negatively affect commercial bank profitability only when ROAE is used as a proxy of profitability. The study further found that the bank size and the macro determinants including the pace of growth of the economy, the rate of inflation, and the rate of lending interest are all inconsequential to commercial bank profitability in the United States.

In their study, Athanasoglou *et al.* (2008) using the GMM of panel examined the impact of bank-specific, macroeconomic, and industry-specific determinants of bank profitability for a group of Greek banks for the period running from 1985 to 2001. They found that capital ratio, among the bank-specific determinants exhibited the most significant impact on the profitability of Greek banks.

Radovanov *et al.* (2023) used panel data analysis to ascertain whether the same bank-specific and macroeconomic variables can be used to predict both banks' profitability and liquidity for West Balkan countries for the period spanning 2007 through 2022. The authors used Return on Assets (ROA) and Return on Equity (ROE) as proxies for banks' profitability.

However, the authors proxied banks' liquidity by the ratio of liquid reserves to banks' total assets. The study found that both the bank-specific and macroeconomic determinants are consequential to banks' profitability, as well as liquidity. Following these results, the authors highlighted the importance of achieving a better balance between bank profitability and liquidity for West Balkan countries.

In another study, Almaqtari *et al.* (2018) examined the profitability of 69 commercial Indian banks for the period 2008 to 2017 using the pooled, fixed, random effect models in conjunction with the panel correction standard error estimator. They found that bank size, the number of branches, assets management ratio, operational efficiency, and leverage ratio have a significant impact on the profitability of Indian commercial banks proxied by ROA.

They further found that macroeconomic variables including inflation rate, exchange rate, interest rate, and demonization exert a significant effect on ROA. In a more recent study, Mijoč *et al.* (2025) using both statistic and dynamic panel data models compared the determinants of bank profitability for the US and EU banking sectors for the period 2008 to 2022. They applied the weighted least squares, fixed effects, random effects, and GMM models.

The authors found that operational efficiency, diversification, and risk have significant effects on the profitability (measured by ROE) for both the United States and the European Union banks. The authors further found that for the European Union and the United States banks, past profitability, the share of deposits and loans in assets, and inflation had a significant impact on profitability. The effects of these variables on banks profitability were however more pronounced in the United States than in the European Union.

In contrast to the preceding studies that incorporate both bank-specific and macroeconomic variables in modeling the determinants of bank profitability, Hoffmann (2011) Bourke (1989), Rhoades (1985), Molyneux and Thornton's (1992), Islam and Rana (2017) and Al-Matar (2023) focus exclusively on bank-specific factors.

Accordingly, Hoffmann (2011) used the GMM estimator to investigate the determinants of the profitability of the US banks for the period spanning 1995 through 2007. The author found that capital ratio negatively impacted the profitability of the US banks during the period of the study. This finding was interpreted as evidence that the US banks were operating guardedly while ignoring

possible profitable opportunities. Rhoades (1985) explored the relationship between risk and profitability US banks for the period 1969 to 1978.

The study found that risk and profit are positively significantly related. Similarly, Bourke (1989) using international data for the period 1972 to 1981, found that both capital and liquidity ratios have significantly positive effects on banks' profitability. Molyneux and Thornton (1992) examined the relationship between banks' profitability for European countries for the period 1986 to 1989. They found that banks' profitability was negatively linked to liquidity.

In their study, Islam and Rana (2017) explored the determinants of profitability of fifteen selected private commercial banks in Bangladesh for the period 2005 to 2015 using the panel data approach. Specifically, they examined the effect of non-performing loans, cost to income ratio, loan to deposit ratio, commission fees, cost of funds, and operating expenses on ROA for the sample banks.

They found that non-performing loans and operating expenses exhibit a statistically significant effect on the profitability of the fifteen sample banks. However, the loan-to-deposit ratio and cost of funds were found to have an insignificant effect on the profitability of the sample banks. Al-Matar (2023) examined the determinants of bank profitability among (Gulf Cooperation Council) GCC countries for the period 2000 to 2018. The author used the ordinary least squares (OLS) regression model.

The author found that the size of the bank and the management of assets are consequential to the GCC banks' profitability. The author further found that bank liquidity exhibited a moderating role in explaining the relationship between capital adequacy and assets quality, and GCC banks' profitability.

In sum, there seems to be an absence of literature on studies that have focused on the traditional linkages of ROA, macroeconomic variables, and bank specific fundamental contributors to profit such as interest margin, non-interest margin, provision for loan losses and expenses using a panel data approach for the new regulatory regime commencing at the end of 2014 requiring the maintenance of minimum capital ratios for U.S. banks.

Additionally, the study by Chukwuogor *et al.* (2021) uses data spanning the period 1996 to 2019. There is therefore the risk that irrelevant data from 1996 to 2014 might lead to incorrect conclusions regarding the new banking regime commencing since the end of 2014. Consequently, this study contributes to literature because it attempts to bridge these observed research gaps with respect to the models and data.

Implementing a panel data approach using annual data for the years 2015 to 2019 as well as incorporating both macroeconomic and bank-specific variables, this research paper investigates the relationship between financial performance in terms of profitability and the determinants for listed banks in the United States since the end

of 2014 when banks are generally required to maintain minimum capital ratios comprising a common equity tier 1 ratio of 4 percent, a tier 1 ratio of 5.5 percent, a total ratio of 8 percent, and a leverage ratio of 4 percent.

3. Data and Methodology

This study employs annual data on the return on assets, net interest margin, the common tier capital ratio, the tier 1 capital ratio, total capital ratio, leverage capital ratio, non-performing loans to gross loans ratio, log of assets, GDP economic growth rate, inflation rate, and unemployment rate variables.

Data are sourced from Bloomberg, the U.S. Call Report Data and Uniform Bank Performance Reports, Reports of Condition and Income for All Insured U.S. Commercial Banks, Federal Reserve Bank of St. Louis, Bank of England, World Bank, and several banks and financial institutions' websites. The dataset used in this study comprises annual data from published financial statements of US listed banks.

The balanced panel dataset of 1,065 observations is limited to a final sample 213 US listed banks for a five-year period (2015 to 2019). The dataset is selected given the unique major role listed banks play in the U.S. economy and the global economy as the U.S. economy is by far the world's biggest economy.

The time horizon stops at 2019 to avoid the complexities and limitations of controlling for the Covid-19 pandemic that might introduce model bias. Data relating to Supplemental Leverage Ratio (SLR) and enhanced SLR applicable to U.S. GSIBs were not available and thus excluded from the panel data regression estimation.

The methodology utilizes the variables used in literature that model the return of assets as the dependent variable and proxy for bank profitability together with explanatory variables that include the net interest margin, non-performing loans, economic growth, inflation rate, and unemployment rate (Chukwuogor *et al.,* 2021; Almaqtari *et al.,* 2018; Islam and Rana, 2017; Radovanov *et al.,* 2023).

In this study, the methodology therefore involves an empirical analysis that combines the return on assets dependent variable with bank specific variables such as the common tier capital ratio, the tier 1 capital ratio, total capital ratio, leverage capital ratio, ratio of non-performing loans to gross loans, , and log of assets, and macroeconomic variables such as the net interest margin, GDP economic growth, inflation rate, and unemployment rate using the panel data regression estimator of the parsimonious model illustrated in equation 1:

$$ROA_{it}=\beta_1 NET_{it}+\beta_2 COM_{it}+\beta_3 TIERCAP_{it}+\beta_4 TOTALCAP_{it}+\beta_5 LEVCAP_{it}+\beta_6 NPL_{it}+ \beta_7 LNASSET_{it}+\beta_8 INF_{it}+\beta_9 GDP_{it}+\beta_{10} UMP_{it}+ \varepsilon_{it} \quad (1)$$

Where:

- ***ROA*** represents return on assets (the proxy for bank profitability).
- ***NET*** is the net interest margin representing the difference between the income generated by a bank's credit products and the interest paid to its deposit holders and also the proxy for the average interest rate control variable,
- ***COM*** is the common tier capital ratio bank control variable. As of the end of 2014, banks need to maintain a minimum common equity tier 1 capital ratio of 4 percent,
- ***TIERCAP*** is the tier 1 risk-based capital ratio bank control variable. The first tier is composed of capital is used to withstand loss without requiring a bank to cease operations. Tier 1 capital includes items such as common stock, disclosed reserves, retained earnings and certain types of preferred stock. As at the end of 2014, the required minimum tier 1 capital ratio is 5.5 percent,
- ***TOTALCAP*** is the total risk-based capital ratio bank control variable. It adds both the first and second tiers, and the figure is divided by the bank's risk-weighted assets. As of the end of 2014, the required minimum total capital ratio is 8 percent. Tier 2 represents the second layer of a bank's capital and consists of items such as revaluation reserves, hybrid instruments, and subordinated term debt,
- ***LEVCAP*** is the leverage capital ratio of bank control variable. It is calculated by dividing Tier 1 capital by their average total consolidated assets of a bank. The leverage ratio acts as a backstop to the other risk-weighted capital ratios and ensures that a bank has adequate core capital to offset potential losses. While risk-weighted ratios reflect the riskiness of assets, the leverage capital ratio offers a simpler, non-risk-weighted measure to restrict how much a bank's capital can be leveraged. As of the end of 2014, the required minimum leverage ratio is 4 percent,
- ***NPL*** is the ratio of non-performing loans to gross loans and control variable for loan loss provisioning of bank,
- ***LNASSET*** is the natural logarithm of total assets control variable for size of bank,
- ***GDP*** stands for Gross Domestic Product growth rate macroeconomic variable,
- ***INF*** is the inflation rate macroeconomic variable,
- ***UMP*** is the unemployment rate macroeconomic variable.

In equation (1) β1… β12 are the coefficient estimators of the independent variables and ε represents the error term. A panel data regression estimation methodology is applied to attempt to address the noted research gap in the known literature to date. Unlike other research studies to date that implement linear regression models, the panel data regression estimation methodological approach increases the accuracy

and efficiency of estimates by controlling for the individual-specific characteristics and unobserved heterogeneity that vary across units but are constant over time.

4. Results and Analysis

The descriptive statistics relating to the full sample estimation which are calculated by the Stata software are displayed in Table 1. These statistics show quite a wide variation indicating the sample characteristics to be distributed across listed banks in the United States ranging from small to medium to large firms in terms of relative magnitude and lending volume activity.

Table 1. *Descriptive Statistics*

Variable	Description	Mean	Max.	Min.	Std. Dev
COM	Common Tier Capital ratio	0.12	0.46	0.03	0.03
GDP	GDP growth rate	0.02	0.03	0.02	0.00
INF	Inflation rate	0.02	0.02	0.00	0.01
LEVCAP	Leverage Capital Ratio	0.10	0.26	0.04	0.02
LNASSET	Log of Assets	8.75	14.80	5.91	1.68
NET	Net interest margin	0.04	1.14	0.01	0.04
NPL	Non-Performing Loans	0.02	2.12	0.00	0.13
ROA	Return on assets	0.01	0.59	-0.02	0.02
TIERCAP	Tier 1 Capital ratio	0.13	0.46	0.08	0.03
TOTALCAP	Total Capital ratio	0.15	0.47	0.10	0.03
UMP	Unemployment rate	0.04	0.05	0.04	0.01

Source: *Results are calculated by the authors using the Stata software.*

The regression results calculated by the Stata software, where the ROA variable is regressed on the explanatory and control variables using panel data estimation are shown in Table 2. The Hausman test is not statistically significant. This means that the random effects model and not the fixed effects model, is determined to be appropriate.

Table 2. *Random Effects estimates (Dependent Variable: ROA)*

Variables	Coefficient	Std. Error	t	P>|z|
NET	**-0.000**	**0.001**	**-0.220**	**0.826**
COM	**0.025**	**0.041**	**0.610**	**0.545**
TIERCAP	**-0.065**	**0.059**	**-1.110**	**0.268**
TOTALCAP	**-0.008**	**0.047**	**-0.170**	**0.862**
LEVCAP	**0.100****	**0.046**	**2.190**	**0.029**
NPL	**-0.000**	**0.000**	**-0.220**	**0.822**
LNASSET	**0.001****	**0.000**	**2.040**	**0.041**
INF	**-0.217**	**0.136**	**-1.600**	**0.109**

GDP	**-0.514**	**0.553**	**-0.930**	**0.352**
UMP	**-0.636*****	**0.214**	**-2.980**	**0.003**
CONS	**0.006**	**0.024**	**0.250**	**0.801**
Hausman Test	$Chi^2 = 8.85$			
	Prob > Chi^2 = 0.3552			

Note: ***, ** *and* * *indicate level of significance at the 1%, 5% and 10%, respectively.*
Source: *Results are estimated by the authors using Stata software with robust standard errors that are robust to serial correlation and heteroscedasticity.*

The original results in Table 2 notably reveal the Leverage Capital ratio variable (LEVCAP) with a coefficient of 0.100 in Table 2 is positively significant at the 5% level indicating that banks with higher leverage capital ratios are more profitable.

This is because a higher leverage capital ratio indicates a stronger capital cushion to absorb losses relative to the bank's assets. This result is consistent with the descriptive statistics displayed in Table 1 showing a mean for the leverage capital ratio of 10%, a standard deviation of 2%. a maximum of 25% and a minimum of 4% that is consistent with the required minimum leverage capital ratio of 4%.

The log of assets variable (LNASSET) displays a coefficient of 0.001 in Table 2, which is also positively significant at the 5% level implying that despite all banks being quoted on the stock exchanges, larger banks that are more leveraged are more profitable than relatively smaller banks that are low geared (Barth and Miller 2018; Abbas *et al.,* 2024).

The finding that log of assets has a significantly positive effect on ROA is also consistent with the results reported by Yuan *et al.* (2022), Hasanov *et al.* (2009) and Syathiri *et al.* (2020) who also found that bank size plays significantly positive role in the determination of banks' profitability for Asian countries. Again, this result is expected as bigger firms have the potential for larger profits due to economies of scale, increased lending volumes, and prestige etc.

Table 2 shows the unemployment variable (UMP) with a coefficient of -0.636 that is negatively highly significant at the 1% level, which provides strong evidence that higher unemployment levels result in lower bank profitability. This result is consistent with the finding of Radovanov *et al.* (2023).

The inflation variable (INF) exhibits a coefficient of -0.526 in Table 2 which is not significant. This result is supported by the finding by the International Monetary Fund (IMF) and the Office of the Comptroller of the Currency (OCC) that show, for most U.S. banks, the overall impact of inflation on profitability appears to be insignificant because banks are largely operationally hedged in that income and expenses frequently rise with inflation to similar magnitudes, resulting in an offsetting effect (Bergant *et al.,* 2025).

Consistent with Ndu *et al.* (2023), it is important to stress the other original results of this paper indicate that the common equity (COM), tier 1 (TIERCAP**)**, and total capital ratio (TOTALCAP) variables as well as the non-performing loan variable (NPL) in Table 2 are remarkably not significant. This corroborates the existence of no systematic earnings and capital management in listed U.S. banks due to the introduction of more stringent banking regulations and supervision.

Another noted result that is surprising is that the net interest margin variable (NET) in Table 2 is strikingly not significant. A plausible explanation for this anomaly is that the extraordinarily low-interest rate environment that has occurred in the period since the 2008 financial crisis has put downward pressure on the NIMs of all banks, but especially the largest ones (Board of Governors of the Federal Reserve System, 2015).

Data for the period 2015 to 2019 was used in this study and interest rates during this period as measured by the Federal Funds Rate increased from near zero following the 2008 financial crisis to a high of around 2.4% in 2019 (Board of Governors of the Federal Reserve System, 2019). Sengupta and Xue (2022) note the decline of bank net interest margins (NIMs) since 2019 amidst renewed concerns in respect of the viability of traditional banking in a low-interest-rate environment.

Additionally, the listed U.S. banks have a well-diversified income stream consisting of fees and other non-interest banking income; and implement increasingly sophisticated interest rate hedging strategies and good risk management functions. In line with Ndu et al. (2023), the gross domestic product variable (GDP) in Table 2 is particularly not significant and implies that the 5-year cycle sample period of this study does not afford the consideration of the full economic cycle.

Along with the Hausman statistical test for robustness that was performed with the results displayed in Table 2, a test for robustness implementing the bootstrapping procedure is performed using the Stata software for the balanced panel dataset via resampling methods to obtain robust standard errors, confidence intervals, and p-values. This is especially the case if the theoretical distribution of the test statistic is unknown or assumptions may be violated. The bootstrapping results are shown below in Table 3 and are consistent overall with the original results estimated in Table 2.

5. Findings

The study has several key findings and contributes in various ways regarding the -determinants of bank profitability in the new banking dispensation commencing at the end of 2014 when U.S. banks are required to maintain minimum regulatory capital ratios as set by the Basel III framework. First, the Leverage Capital ratio is positively significant with bank profitability and is evidence that the current leverage framework does not encourage banks to take part in lower-risk, lower-limit return

activities, such as U.S. Treasury bills purchases and sales, and incentivizes higher-risk, higher return activities without a resulting corresponding increase in capital requirements.

Table 3. *Random Effects estimates (Dependent Variable: ROA) – The Bootstrapping Procedure as a Test for Robustness*

Variables	Coefficient	Std. Error	T	P>|z|
NET	0.000	0.013	-0.010	0.992
COM	0.021	0.022	0.980	0.328
TIERCAP	-0.057	0.042	-1.360	0.175
TOTALCAP	-0.006	0.018	-0.330	0.742
LEVCAP	0.089**	0.045	1.970	0.048
NPL	0.000	0.075	0.000	1.000
LNASSET	0.001*	0.001	1.700	0.089
INF	-0.217	0.176	-1.230	0.217
GDP	0.081	0.118	0.690	0.490
UMP	-0.522*	0.316	-1.650	0.098
CONS	0.025	0.023	1.050	0.292

Note: ****, ** and * indicate level of significance at the 1%, 5% and 10%, respectively.*
Source: *Results are calculated by the authors using the Stata software. Results based on bootstrap procedure as a test for robustness.*

This finding validates and is consistent with Federal Reserve's approval on June 27, 2025, to recalibrate capital requirements with the aim to encourage Global Systemically Important Banks (GSIBs) to take part in lower-risk, lower-return undertakings, such as U.S. Treasury market intermediation (FDIC, 2025). Second, the log of assets variable is positively significant with bank profitability. Third, the unemployment variable is negatively highly significant with bank profitability.

Fourth, the inflation variable is not significant. Fifth, there is no evidence of the opportunistic management of the risk-based regulatory capital ratios to manage profits. Sixth, the net interest margin is notably not significant which is likely due to the pronounced low-interest rate environment since the 2008 financial crisis that has put downward pressure on the NIMs of all banks, especially larger banks such as the listed banks. Further, listed U.S. banks have steadily increasing well-diversified income streams comprising fees and other non-interest banking income as well as implement increasingly sophisticated interest rate hedges and robust risk management functions.

6. Conclusion

This is the first study known to date that explores the relationship between financial performance in terms of profitability and the economic determinants for listed banks

in the United States since the end of 2014 when banks are required to maintain minimum required regulatory capital ratios.

As a result, the research question attempts to investigate the determinants of profitability for U.S. listed banks since the inception of these new banking regulatory capital ratios for U.S. banks. This is important due to the relative paucity of research on this topic. In sum, the results of this study will vitally assist academics, governments, central banks, standard setters, regulators, supervisors, and industry practitioners all over the world with formulating policy especially in a fast, challenging, and ever-changing banking environment.

The study concludes that the leverage capital ratio and unemployment variables are the only significant determinants of profitability for listed banks in the U.S. In contrast, the net interest margin, inflation, and non-performing loan variables are not significant. The log of assets control variable for the size of banks is significant.

However, the other control variables comprising the common tier capital ratio, tier 1 risk-based capital ratio, total risk-based capital ratio, and Gross Domestic Product (GDP) growth rare are not significant.

A possible limitation is that data relating to Supplemental Leverage Ratio (SLR) and enhanced SLR applicable to U.S. global systemically important banks (GSIBs) were not available and thus excluded from the panel data regression model. The effect of the exclusion of this data is not deemed significant because the number of US GSIBs is only 29 for 2024 as identified by the Financial Stability Board (American Bankers Association, 2024).

From a policy perspective, it is recommended the regulators continue to investigate the plan to revamp the current leverage framework to ensure that the leverage capital ratio is lower, functions as a protection support, and not a limitation. This will encourage banks to participate more actively in low-risk, low-return activities like the U.S. Treasury market intermediation to improve its smooth functioning. The policies should therefore enable banks not to be perceived as being distressed for participating in the U.S. Treasury market intermediation.

Second, the regulators should continue to encourage good risk management functions as well as effective non-interest income and fees diversification earning strategies to address the deterioration in net interest margins in banks.

Third, the regulators need to continue to monitor the relationship between size of listed banks and profitability and excessive opportunistic risk taking in banks. Fourth, regulators should continue to be cognizant of the negative effects of increasing unemployment on the profitability of listed banks and initiate prompt countermeasures as required.

Finally, a suggestion for future research is to extend the analysis to include the Covid-19 pandemic period and beyond. A second suggestion is to perform the analysis for unlisted U.S. banks.

A third avenue for research is to examine the effects of corporate governance mechanisms on profitability of U.S. banks. A final suggestion is to explore the effects of the high tariffs imposed on U.S. trading partners in 2025 and the resulting retaliatory tariffs on the profitability of U.S. banks.

Data Availability Statement: *The data presented in this study are available on request from the corresponding author. The data are not publicly available due to ongoing research.*

Conflict of Interest: *The authors declare no conflict of interest.*

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