



Is Economic Freedom a Moderator of the Relationship Between Bank Capital and Profitability?

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Abstract

The study uses the GMM and panel OLS framework on the data of the US banks over the period from 2002 to 2019 to reveal the moderating role of economic freedom on the relationship between bank capital and profitability. The overall findings show that economic freedom and bank capital positively influence banks' profitability. The results reveal that economic freedom positively (negatively) moderates the relationship between risk-based (traditional) capital ratio. Furthermore, the results also find heterogeneity in the relationship across different market conditions (before and after crisis) and bank characteristics (well or undercapitalized, high and low liquid banks). The results remain robust for alternative methodology and proxies. The heterogeneity of findings has implications for policymakers in banking for the improvement of the financial system.

Keywords: bank capital; economic freedom; bank profitability; commercial banks.

JEL classification: G21; G28.

1. INTRODUCTION

A significant strand of research has demonstrated that the banking industry's improvement contributes to higher economic growth. As the financial system's growth and stability have significant consequences and implications for a firm's growth and long-term economic development (Stulz, 2000). Therefore, the financial system provides essential financial services and contributes to economic growth and development (Bitar, Pukthuanthong, & Walker, 2018). This close connection between financial institutions and other economic indicators has always been important to policymakers, economists, and regulators.

Although in recent decades, various researchers have discussed the role of economic openness in influencing the financial system through various channels (Altman, 2008; Eichengreen, 2001; Flannery, 1998). For instance, Chortareas, Girardone, and Ventouri

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(2013) investigate the relationship between financial freedom and bank efficiency in Europe, (Cubillas & González, 2014; Hamdaoui, Zouari, & Maktouf, 2016) explores the impact of financial liberalization on the risk-taking of financial institutions, (Ghosh, 2016; Harkati, Alhabshi, & Kassim, 2019) reveals the impact of economic freedom on the risk-taking of banks in the MENA region. Gwartney (2009) provide evidence for institutions, economic freedom, and performance across different economies, (F. Sufian, 2013; F. Sufian & Habibullah, 2010; Fadzlan Sufian & Hassan, 2012) investigate the impact of economic freedom on the profitability of banks located in Asia. The findings of these studies are mixed or inconclusive. Surprisingly, the literature lacks the evidence for the moderating role of economic freedom in influencing the relationship between bank capital and profitability. In light of recent empirical and theoretical evidence, the determinations of bank capital and bank profitability are biased without incorporating economic freedom. The effect of bank capital may be upside biased and maybe downside biased, leading to inappropriate decision making about the adjustment of equity in the short run, other things remain unchanged. Lack of insights in the context of U.S banking motivates us to bridge this gap in the literature. To study this critical and inevitable issue, we are interested in answering the following questions.

How do bank capital and economic freedom influence the profitability of banks? Does economic freedom moderate the relationship between bank capital and profitability? Does the impact of economic freedom vary across bank capitalization, liquidity and economic conditions to influence the relationship between bank capital and profitability?

The study uses a two-step GMM procedure and panel OLS framework on the data of the US commercial banks over the period from 2002 to 2019 to reveal the impact of bank capital and economic freedom on profitability. It is also part of this study to explore the moderating role of economic freedom in influencing the relationship between bank capital and the profitability of banks. The overall findings show that the impact of economic freedom and bank capital is positive on the profitability of banks. The results show that economic freedom is significantly moderating the relationship between bank capital and the profitability of commercial banks in the US. The results provide evidence that the coefficient of bank capital remains underestimated to influence the profitability of banks without incorporating economic freedom. The capital and economic freedom interactive terms show that economic freedom, bank capital and profitability are interrelated and should be determined simultaneously. The predictions confirm that the effect of capital ratio, risk-based capital ratio, and economic freedom on bank profitability is higher in the pre and post-crisis periods than during the crisis era. The findings reveal that the impact of economic freedom on profitability is higher for adequately capitalized banks than for well and undercapitalized banks. The findings also confirm that economic freedom is not very beneficial for well-capitalized and undercapitalized banks. The result of the interactive term for bank capital ratio and economic freedom confirms that economic freedom is more beneficial for high liquid banks than for low liquid banks. The findings remain robust for alternative methodology and proxies. The heterogeneity of findings has implications for policymakers in banking for the improvement of the financial system.

This study enriches the existing literature in the following ways. First, this study adds to literature providing evidence on the moderating role of economic freedom in influencing the relationship between bank capital and profitability of banks, which is scant in the literature. Second, this study contributes to literature by highlighting that the asymmetrical impact of economic freedom on the relationship between bank capital and profitability during across pre,

amid and post-crisis periods. The insights on the impact of economic freedom on influencing the relationship between bank capital and profitability in pre, pro and post-crisis are new to the existing literature in banking. Third, to the best of author knowledge this is the first study that examine the moderating role of economic freedom bank capital and profitability of banks across well-capitalized, adequately capitalized, under-capitalized, high and low liquid banks. Finally, the results have significant implications for policy-makers and banks managers to consider how economic freedom affect the tradition capital-profitability nexus.

The structure of the study is as follows: [Section 2](#) contains the review of literature; the [3rd Section](#) explains the data and econometric model. The [4th Section](#) provides results and discussion, and the [Section 5](#) concludes the study.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The recent 2008-Global Financial Crisis has increased the significance of regulatory guidelines for financial institutions ([Bekaert, Harvey, & Lundblad, 2005](#)). Due to this reason, the relationship between bank capital and bank financial performance is extensively investigated in prior literature, and conclusions remain mixed. For example, the following studies favor the positive relationship between financial performance and bank capital ([De Haan & Sturm, 2000](#); [Gropper, Jahera Jr, & Park, 2015](#); [Molyneux & Thornton, 1992](#)). The findings of [Berger \(1995\)](#) found a positive relationship between bank capital and the profitability of commercial banks in the USA. [Shim \(2013\)](#) concludes that there is a positive relationship between bank capital and profitability of banks. He argues that banks increase their capital with the help of profitability. The pecking order theory supports the positive relationship between profitability and bank capital ([Myers, 1984](#)). While on the hand, an inverse relationship between bank capital and profitability is also not less appealing, as per the following prior studies ([Alavinasab & Davoudi, 2013](#); [Doucouliagos & Ulubasoglu, 2006](#); [Tan, 2016](#)). The results of [Jokipii and Milne \(2008\)](#) provide evidence that the relationship between bank capital and profitability is significant and negative. Notably, most of the studies used non-regulatory capital ratios (equity to total assets) to investigate the relationship between bank capital and banks' profitability.

In financial economic and banking research, economic freedom indexes have been widely used as essential variables in various contexts ([Bekaert et al., 2005](#); [Jones & Stroup, 2010](#)). Although various studies were conducted to provide evidence of the influence of economic freedom on the financial performance in banking ([J. R. Barth, Gropper, & Jahera, 1998](#); [Boyd & De Nicolo, 2005](#); [F. Sufian, 2013](#); [F. Sufian & Habibullah, 2010](#)). [Mavrakana and Psillaki \(2019\)](#) conduct a study in European States for the period ranging from 2004 to 2016. The study reveals that economic freedom's impact on influencing bank financial performance in European countries is positive and statistically significant. In the recent decade, researchers ([Chortareas et al., 2013](#); [F. Sufian & Zulkhibri, 2011](#)) argue in their studies that economic freedom has a significant and positive role in the financial system's progress. [Fadzlan Sufian and Hassan \(2012\)](#) extend the debate on the relationship between economic freedoms on financial performance in banking and conclude similar results to the studies of ([Chortareas et al., 2013](#); [F. Sufian & Zulkhibri, 2011](#)). [F. Sufian \(2013\)](#) investigates the relationship between the impact of economic freedom and banks' efficiency. The study concludes that economic freedom and bank efficiency are positively correlated. [F. Sufian \(2014\)](#) finds a significant positive relationship between economic freedom and banks'

performance in the MENA region. F. Sufian and Habibullah (2010) conduct a study in Malaysia and find a positive relationship between economic freedom and bank financial performance. However, the literature provides evidence for the impact of bank capital and economic activities on banks' profitability. What has not been investigated yet is the role of economic freedom to influence the relationship between bank capital and banks' profitability in the USA. In light of the above literature, we reach to develop the following hypothesis:

Hypothesis 1: Economic freedom moderates the relationship between bank capital and profitability.

There are various categories of banks, for instance, banks may vary with respect to their ownership, capitalization and liquidity. For example, Jokipii and Milne (2011) argue that the relationship between bank capital and profitability varies with the level of bank capitalization. Similarly, banks may vary due to their core business activities, for example, commercial banks, saving banks, investment banks, cooperative banks and credit unions, etc. The relationship between bank capital ratio and risk-taking is not similar for cooperative, saving and commercial banks in Europe (Altunbas, Carbo, Gardener, & Molyneux, 2007). Abbas and Ali (2020) investigate the impact of bank capital ratios and risk-taking in the USA and conclude that the relationship is not similar across well-capitalized, adequately capitalized, high and low liquid banks. The results of Abbas, Ali, and Rubbaniy (2021) provide evidence that the speed of capital adjustment is not homogenous for well-capitalized, adequately capitalized, high and low liquid banks in the USA. By keeping in mind the significance of variation of results based on the level of capitalization and liquidity, we developed the following hypothesis.

Hypothesis 2: The effect of economic freedom to influence the relationship between bank capital and bank profitability is similar across well, adequately, undercapitalized, high, and low liquid banks.

Economic conditions always remain relevant to influencing the performance and risk-taking of commercial banks. For example, Abbas and Younas (2021) explore the relationship between bank capital and risk-taking in pre, amid and post-crisis periods. The study concludes that the relationship between bank capital and risk-taking vary with economic conditions. Berger and Bouwman (2013) investigated and concluded that economic conditions affected the relationship between bank capital and bank performance, mainly, during the crisis period. The outcomes of Chan and Karim (2010) indicate that macroeconomic indicators influence the efficiency of banks. Similarly, Abbas and Ali (2021) report that the impact of diversification on banks risk-taking vary across the market conditions. Garel and Petit-Romec (2017) provide evidence that the crisis has affected the capital ratios of commercial banks. The recent study Abbas, Yousaf, Ali, and Wong (2021) confirms that economic conditions influence the capital holdings of commercial banks in the USA. In light of the above-mentioned studies, we reached to test the following hypothesis.

Hypothesis 3: Economic freedom's impact on the relationship between profitability and bank capital is similar across pre, pro, and post-crisis periods.

3. DATA AND METHODOLOGY

3.1 Data Source and Sample Selection

This study explores the impact of economic freedom to influence the relationship between bank capital and bank profitability by using annual data of US banks covering the period from 2002 to 2019. The data for this is taken from multiple sources. The banks specific information is extracted from Federal Deposit Insurance Corporation (FDIC) and we apply following filter to selecting the data. 1) bank must have active status as per FDIC as of 31 December 2019, 2) bank have consolidated assets greater than \$300 Million, 3) there should be no missing data for any year. After applying the aforementioned filter, the final sample includes 945 banks. The data regarding macroeconomic variable is taken from World Bank development indicators¹. Furthermore, the economic freedom data is extracted from the Heritage foundation².

To enhance the validity and authenticity of the result, we divided the sample into different sub-categories based on their risk-based capital ratio. The banks have a risk-based capital ratio equal to 10% or above are considered well-capitalized banks, banks have a risk-based capital ratio less than 10%, and equal to 8% is graded as adequately capitalized banks and banks have a risk-based capital ratio less than 8% is labeled as under-capitalized. We further divided the sample into high and low liquid banks based on the average value of liquidity ratio. The sub-classification of banks is in line with the following studies (Abbas, Ali, & Rubbaniy, 2021). The list of variables used in the study is as under:

Variables	Measurements
Bank profitability (ROA)	Net income/total assets (Yousaf, Ali, & Hassan, 2019)
Capital ratio	Total equity/total assets (Ali, Yousaf, & Naveed, 2020; Yousaf, Ali, & Hassan, 2019)
Tier-I ratio	Tier-I equity/total assets (Phan, Pham, Nguyen, & Nguyen, 2021)
Risk-based capital ratio	Tier-I plus Tier-II/risk-weighted assets (Abbas, Ali, Yousaf, & Rizwan, 2020)
Tier-I risk-based ratio	Tier-I equity/risk-weighted assets (Abbas, Ali, & Ahmad, 2021)
Economic freedom	The Heritage Foundation (Asteriou, Pilbeam, & Tomuleasa, 2021)
Liquidity	Liquid Assets/Total Assets (Shim, 2013; Yousaf, Ali, & Hasan, 2019)
Loan ratio	Net Loans/Total Assets (Altunbas et al., 2007)
Deposit ratio	Bank Deposits/Industry assets ratio (authors calculation)
Managerial efficiency	Total Wages/Total Assets (Abbas, Rubbaniy, Ali, & Khan, 2021; Bitar et al., 2018)
Bank size	Natural Log of Total Assets, (Lee & Hsieh, 2013)
Economic growth	Real gross domestic product (Ali, Shah, & Chughtai, 2019)
Inflation rate	Consumer price index (Abbas & Masood, 2020)
Time Dummies	1 for Crisis (2007,-09) otherwise zero (DCD) 1 for Before Crisis (2002-06) otherwise zero (BCD) 1 for Post-Crisis (2010-19) otherwise zero (ACD)

3.2 Preliminary Analysis

Table no. 1 reports the descriptive statistics on dependent, independent, and control variables. More precisely, the maximum and minimum of bank profitability (ROA) ratio fluctuates between 0.027 and -0.051. In addition, the sample average capital ratio is 0.102, with a standard deviation of 0.018. The average value of economic freedom is 77.9 for the USA that fluctuates between 75.1 and 81.2.

Table no. 1 – Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Performance (ROA)	17010	.012	.014	-.031	.038
Capital ratio	17010	.142	.002	.005	.253
Tier-I ratio	17010	.085	.012	.025	.160
Risk-based capital ratio	17010	.152	.017	.035	.299
Tier-I risk-based ratio	17010	.131	.002	.018	.225
Economic freedom	17010	77.9	2.14	75.1	81.2
Liquidity	17010	.025	.007	-.059	.132
Loan ratio	17010	.676	.102	.422	.927
Deposit ratio	17010	.141	.004	-.112	.899
Managerial efficiency	17010	.023	.016	-.023	.035
Bank size	17010	15.3	0.11	10.3	18.5
Economic growth	17010	2.00	0.14	-0.25	3.80
Inflation rate	17010	.019	0.06	0.08	0.32

Source: Authors 'calculation by using Stata

Table no. 2 represents the results of the correlation among variables. The correlation matrix shows the relationship between variables and their intensity. The results show that economic freedom and profitability are positively correlated, whereas liquidity, asset quality, and bank size are negatively correlated. The above relationships are as per the economic theory, and there is no problem of multicollinearity as per the statistics of variance inflation factors. This study's descriptive and correlation results align with (Abbas & Masood, 2020).

Table no. 2 – Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Performance	1												
Capital ratio	0.051*	1											
Tier-I ratio	0.092*	0.066*	1										
Economic freedom	0.054*	-0.009*	-0.059*	1									
Risk-based capital ratio	0.077*	0.006*	0.039*	-0.011*	1								
Tier-I risk based ratio	0.044*	0.528*	0.683*	-0.225*	0.912*	1							
Liquidity	-0.024*	0.046*	0.012*	-0.005*	0.018*	0.013*	1						
Loan ratio	-0.003	-0.061*	0.008	0.022*	-0.437*	-0.483*	-0.177*	1					
Deposit ratio	0.025*	0.010	-0.047*	-0.009	-0.024*	-0.052*	0.032*	-0.080*	1				
Managerial efficiency	0.130*	-0.092*	-0.081*	0.130*	-0.050*	-0.048*	0.068*	0.005	-0.036*	1			
Bank size	-0.022*	0.035*	-0.061*	-0.025*	-0.001*	-0.030*	-0.004*	-0.012	0.001*	-0.006*	1		
Economic growth	0.006*	0.021*	0.012*	-0.002*	0.007*	0.008*	-0.021*	-0.007	-0.003	-0.035*	-0.024*	1	
Inflation rate	0.132*	-0.097*	-0.088*	0.411*	-0.105*	-0.102*	-0.193*	0.045*	-0.005	-0.033*	-0.127*	0.546*	1

Note: * shows significance at the .05 level

3.3 Construction of the Econometric Model

3.3.1 Panel OLS Regression Model

The study uses panel OLS to explore the moderating role of economic freedom to influence the relationship between capital and bank profitability of commercial banks in the USA. As per the specification of the panel OLS, the analysis involves cross-section fixed-effects (bank dummies) to handle possible unobserved time-invariant bank effects or time-fixed effects (year dummies) to handle possible unobserved time-variant effects or both (Vithessonthi & Tongurai, 2016). To control the potential problem of endogeneity, we take the one-period lagging value for explanatory variables that is the appropriate one to address

the reverse-causality issue, as argued by (Vithessonthi & Tongurai, 2016). The study estimates the following baseline regression for results:

$$Profitability_{i,t} = \alpha + \beta_1 Capital_{c,t-1} + \phi_1 Economic\ freedom_{c,t-1} + \delta Control\ variables_{i,t-1} + \eta_i + \nu_t + \varepsilon_{i,t} \quad (1)$$

where $Profitability_{i,t}$ represents a dependent variable (net income to total assets) for concerning the time and cross-section. $Capital_{c,t}$ (Capital ratio, risk-based capital ratio, tier-I ratio, tier-I risk-based ratio) and $Economic\ freedom$ are independent variables for the time and cross-sections. $Control\ variables_{i,t}$ which include liquidity, loan ratio, deposits ratio, managerial efficiency, bank size, real gross domestic product, and inflation rate. The sign η_i shows bank fixed effects; ν_t is period fixed effects, and $\varepsilon_{i,t}$ represents the zero-mean disturbance term. The problem of heteroscedasticity and autocorrelation is clustered at the cross-section level for consistent standard errors. We estimate this model for overall, well, adequately, undercapitalized, high, and low liquid commercial banks separately. Besides, to capture the pre, pro, and post-crisis differences in results, we incorporate the time dummies:

$$Profitability_{i,t} = \alpha + \beta_1 Capital_{c,t-1} + \phi_1 Economic\ freedom_{c,t-1} + \text{Before} - \text{crisis (BCD)} + \text{During} - \text{crisis (DCD)} + \text{After} - \text{crisis (ACD)} + \delta CV_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

In Equation 2, we use dummies as per our study model objects. In addition, we use an interactive term to differentiate the moderating role of economic freedom to influence the relationship between bank capital and bank profitability. We develop the model equation as under:

$$Profitability_{i,t} = \alpha + \beta_1 Capital_{c,t-1} + \phi_1 Economic\ freedom_{c,t-1} + \psi_1 \text{Interactive term} + \delta Control\ variables_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

In Equation 3 the interactive term represents Capital ratio*Economic Freedom (EFD*CAP) and Risk-based capital ratio*Economic Freedom (EFD*RBCR).

3.3.2 GMM Regression Model

In line with the recent studies in banking (Abbas & Masood, 2020; Ding & Sickles, 2019; Lee & Hsieh, 2013) the study also applies the two-step system GMM methodology. The study uses the GMM framework to address the issue of simultaneity bias as like (Vithessonthi & Tongurai, 2016). To obtain consistent and unbiased predictions, we use the following equation:

$$Profitability_{i,t} = \alpha + \beta_0 Profitability_{i,t-1} + \beta_1 Capital_{c,t} + \phi_1 Economic\ freedom_{c,t} + \delta Control\ variables_{i,t} + \varepsilon_{i,t} \quad (4)$$

where $Profitability_{i,t}$ is a dependent variable concerning the time and cross-section. $Capital_{c,t}$ (Capital ratio, risk-based capital ratio, tier-I ratio, tier-I risk-based ratio), and $Economic\ freedom$ are independent variables concerning the time and cross-sections. $Profitability_{i,t-1}$ is lagged dependent term. $Control\ variables_{i,t}$ include liquidity, loan ratio, deposits ratio, managerial efficiency, bank size, real gross domestic product, and inflation rate. Here we are following the studies of (Arellano & Bond, 1991; Roodman, 2009;

Vithessonthi & Tongurai, 2016) for the selection of lag periods of variables. The study uses the explanatory variables as instruments similar to the study of (Abbas & Masood, 2020; Vithessonthi & Tongurai, 2016). By using Equation 4 the research has used two-step system GMM methods to estimate the consistent parameters for overall, well, adequately, under, significantly undercapitalized, high, and low liquid commercial banks. The reason to use the two-step system GMM methods is that it provides a more efficient parameter than one-step and difference GMM methods. Besides, the study uses period fixed effects throughout the estimation of GMM. The study reports robust standard errors, as suggested by (Windmeijer, 2005). To confirm the model's misspecification, the study uses two tests, one second-order autocorrelation and the second, for instruments' strength and validity. Besides, we use similar extensions under the assumption of the GMM framework to study the differences in results due to pre, pro, and post-crisis. The sequence of the equation is as under:

$$\begin{aligned} Profitability_{i,t} = & \alpha + \beta_0 Profitability_{i,t-1} \\ & + \beta_1 Capital_{c,t-1} + \phi_1 Economic\ freedom_{c,t} + \text{Before} \\ & - \text{crisis (BCD)} + \text{During} - \text{crisis (DCD)} + \text{After} - \text{crisis (ACD)} \\ & + \delta Control\ variable_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (5)$$

$$\begin{aligned} Profitability_{i,t} = & \alpha + \beta_0 Profitability_{i,t-1} \\ & + \beta_1 Capital_{c,t-1} + \phi_1 Economic\ freedom_{c,t} + \psi_1 \text{Interactive term} \\ & + \delta Control\ variable_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (6)$$

Note: we apply a two-step system GMM estimation producer for the equations as mentioned earlier, and robust standard errors are reported in the results.

4. EMPIRICAL RESULTS

4.1 Full sample banks results

In this section, we empirically investigate how economic freedom influences the relationship between bank capital and bank profitability. The study reports the two-step system GMM estimates as a baseline model. The insignificance of the Hansen test statistic confirms the validity of the instruments in all the models. The assumption of the absence of second-order serial correlation in the first difference is not rejected and confirms the consistency of the model estimates. Table no. 3 contains a two-step system GMM estimation on Equation 4 for bank profitability as the dependent variable. The effect of bank capital and economic freedom on bank profitability is statistically significant and positive at the 1% significance level. The positive impact of capital ratio on bank profitability is consistent with (Berger, 1995; Goddard, Molyneux, & Wilson, 2004; Iannotta, Nocera, & Sironi, 2007).

Table no. 3 reports the results of the two different proxies of capital, namely, traditional capital ratio (CAP) and risk-based capital ratio (RBCP). We start our analysis by regressing traditional capital and risk-based capital ratio and control variables on the banks' profitability, the results reported in Columns 1 and 4 of Table no. 3. The results confirm that capital ratio positively influences the banks profitability.

In the next step, we add economic freedom in our model and capital and control variables and findings reveal that both capital and economic freedom increase banks profitability. Our findings are in line with (F. Sufian, 2013; F. Sufian & Habibullah, 2010).

In the third step, we include the interaction term of economic freedom with capital. The results reported in Column 3 highlight that the interaction term has a significantly negative impact on the banks profitability. The result implies that although maintaining higher capital ratio increases the bank's profitability by reducing risk but when operating in an environment where economic freedom is high it can have a detrimental impact on banks profitability. Furthermore, high economic freedom in a country presents multiple opportunities to the banks but they could not avail them as they maintain a higher capital ratio, thus adversely affecting the banks' profitability. Whereas the result reported in Column 6 of Table no. 3 shows that the interaction term of economic freedom and the risk-based capital ratio is positive. The results suggest that higher risk-based capital coupled with higher economic freedom increases banks profitability. The difference in results:

Table no. 3 – A two-step system GMM results for Full sample banks

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA
Lagged. Profitability	0.761*** (0.005)	0.760*** (0.005)	0.759*** (0.005)	0.760*** (0.005)	0.759*** (0.005)	0.759*** (0.005)
Capital ratio	0.009*** (0.002)	0.011*** (0.002)	0.151*** (0.056)			
Economic freedom		0.016*** (0.002)	0.035*** (0.008)		0.017*** (0.002)	0.005 (0.007)
EFD*CAP			-0.181** (0.071)			
Risk-based capital ratio				0.008*** (0.001)	0.010*** (0.001)	-0.055 (0.038)
EFD*RBCR						0.084** (0.049)
Liquidity	-0.003*** (0.001)	-0.002* (0.001)	-0.002 (0.001)	-0.003*** (0.001)	-0.002** (0.001)	-0.002** (0.001)
Loans ratio	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
Deposit ratio	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
Managerial efficiency	0.126*** (0.005)	0.120*** (0.005)	0.120*** (0.005)	0.127*** (0.005)	0.120*** (0.005)	0.120*** (0.005)
Bank size	-0.016*** (0.003)	-0.012*** (0.003)	-0.013*** (0.003)	-0.011*** (0.003)	-0.006* (0.003)	-0.006* (0.003)
Economic growth	0.048*** (0.002)	0.066*** (0.003)	0.066*** (0.003)	0.047*** (0.002)	0.066*** (0.003)	0.066*** (0.003)
Inflation rate	-0.035*** (0.005)	-0.076*** (0.007)	-0.077*** (0.007)	-0.032*** (0.005)	-0.076*** (0.007)	-0.076*** (0.007)
Constant	0.002*** (0.001)	-0.011*** (0.002)	-0.025*** (0.006)	0.000 (0.001)	-0.014*** (0.002)	-0.004 (0.006)
Observations	17010	17010	17010	17010	17010	17010
AR (2)	0.646	0.112	0.904	0.512	0.421	0.345
Hansen statistic	0.112	0.422	0.311	0.453	0.573	0.442

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.2 Pre, Pro and Post-crisis periods results

Table no. 4 contains the findings for pre, pro, and post-crisis periods results. The results show that the capital ratio, risk-based capital ratio, and economic freedom positively impact the banks' performance similar to our baseline findings. We use dummy variable to examine the heterogeneity in the moderating impact of economic freedom in pre and post crisis period we use dummy variable. The interaction term of EFD*CAP is positive (negative) for the pre(post) crisis period, which suggests that before crisis, economic freedom positively moderates the relationship between capital and profitability. Whereas economic freedom negative moderates after the global financial crisis. The finding of the study shows that after the crisis banks become more cautious and avoid excessive taking and keep an extra capital buffer to deal with negative events that adversely affect their profitability. The result also highlights a shift in the banks risk taking behavior as they forgo opportunities to maintain banks stability. On the other hand, the coefficient on EFD*RBCR is positive during both pre and post crisis period which suggest that higher risk-based capital with higher ease of doing business enhances banks' profitability and its impact remains symmetrical across different market conditions. Overall, the results suggest that a higher risk-based capital ratio in an environment with higher economic freedom is more beneficial for the banks than the traditional capital ratio. One other possible explanation of such results could be that banks can exploit the broad banking activities at a lower cost in normal and boom economic conditions than bad economic situations.

Table no. 4 – A two-step system GMM results for pre, pro, and post-crisis periods

VARIABLES	(1) ROA	(3) ROA	(2) ROA	(4) ROA
Lagged. Profitability	0.759*** (0.000)	0.763*** (0.000)	0.757*** (0.000)	0.762*** (0.000)
Capital ratio	0.010*** (0.002)	0.012*** (0.002)		
Risk-based capital ratio			0.008*** (0.001)	0.010*** (0.001)
Economic freedom		0.027*** (0.003)		0.027*** (0.003)
EFD*CAP*pre-crisis		0.001*** (0.000)		
EFD*CAP*pro-crisis		-0.002*** (0.000)		
EFD*RBCR*pre-crisis				0.003*** (0.001)
EFD*RBCR*pro-crisis				0.006*** (0.001)
Constant	0.002*** -0.001	-0.019*** -0.003	0.001 -0.001	-0.021*** -0.003
Observations	17010	17010	17010	17010
AR (2)	0.543	0.123	0.654	0.561
Hansen statistic	0.89	0.198	0.065	0.112

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.3 Banks capitalization base results

Table no. 5 contains the findings for well, adequately and under-capitalized banks over the extended period from 2002 to 2019. Panel-A contains well-capitalized banks' results which show that the impact of bank capital on bank profitability is positive and significant in similar to (Berger, 1995; Rime, 2001). The coefficient of the risk-based capital ratio is positive but insignificant. The role of economic freedom is positive to boost commercial banks' profitability (James R Barth, Gropper, & Jahera Jr, 1998; Boyd & De Nicolo, 2005; Faria & Montesinos, 2009). Consistent with our fourth hypothesis, we find a negative and significant coefficient for the interactive term (EFD*CAP) for well-capitalized banks between economic freedom and changes in bank capital. The negative sign of the interactive term of (EFD*CAP) indicates that given the incremental increases in economic freedom, a high level of bank capital is associated with a low return on assets in the short run. The results of the interactive term (EFD*RBCR) provide evidence that the role of economic freedom to influence the relationship between risk-based capital and bank profitability is significant for well-capitalized banks.

The panel-B reports adequately capitalized banks' results that indicate that the impact of bank capital and the risk-based capital ratio is positive and significant to influence the profitability of banks. The findings confirm that a risk-based capital ratio's impact is significant than the capital ratio to influence adequately capitalized banks' profitability. The findings are in line with (James R Barth et al., 1998; Boyd & De Nicolo, 2005). Consistent with our fourth hypothesis, we find a negative and significant coefficient for the interactive term (EFD*CAP) for adequately capitalized banks between economic freedom and changes in bank capital. The negative sign of the interactive term of (EFD*CAP) indicates that given the incremental increases in economic freedom, a high level of bank capital is associated with a low return on assets in the short run. The results of the interactive term (EFD*RBCR) provide evidence that the role of economic freedom to influence the relationship between risk-based capital and bank profitability is significant for adequately capitalized banks. The panel-C indicates the results for under-capitalized banks, which show that the impact of bank capital and risk-based capital ratio on bank profitability is positive (Iannotta et al., 2007; Lee & Hsieh, 2013). The impact of economic freedom is in line with the findings of well and adequately capitalized banks. Not consistent with our fourth hypothesis, we find a negative and insignificant coefficient for an interactive term (EFD*CAP) for undercapitalized banks between economic freedom and changes in bank capital. The results of the interactive term (EFD*RBCR) provide evidence that the role of economic freedom to influence the relationship between risk-based capital and bank profitability is significant for undercapitalized banks. The interactive term explores the heterogeneity of results, among well adequately and undercapitalized banks. Furthermore, the impact of economic freedom on profitability is higher for adequately capitalized banks than well and undercapitalized banks. The findings also confirm that economic freedom is not much beneficial for well-capitalized and undercapitalized banks.

Table no. 5 – A two-step system GMM results for well, adequately and undercapitalized banks

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA
Panel-A: Well-capitalized banks results						
Lagged. Profitability	0.794*** (0.013)	0.792*** (0.013)	0.791*** (0.013)	0.798*** (0.013)	0.796*** (0.013)	0.796*** (0.013)
Capital ratio	0.009** (0.004)	0.010** (0.004)	0.329** (0.142)			
Economic freedom		0.022*** (0.006)	0.069*** (0.022)		0.022*** (0.006)	0.010 (0.022)
EFD*CAP			-0.409** (0.182)			
Risk-based capital ratio				0.002 (0.003)	0.002 (0.003)	-0.051 (0.097)
EFD*RBCR						0.069 (0.125)
Panel-B: Adequately capitalized banks results						
Capital ratio	0.013*** (0.005)	0.016*** (0.005)	0.287* (0.161)			
Economic freedom		0.031*** (0.006)	0.068*** (0.023)		0.035*** (0.006)	0.070** (0.027)
EFD*CAP			-0.348** (0.206)			
Risk-based capital ratio				0.015*** (0.004)	0.019*** (0.004)	0.191 (0.130)
EFD*RBCR						-0.219 (0.166)
Panel-C: Under-capitalized banks results						
Capital ratio	0.015*** (0.003)	0.016*** (0.003)	0.200* (0.113)			
Economic freedom		0.012*** (0.004)	0.036** (0.015)		0.015*** (0.004)	0.018 (0.018)
EFD*CAP			-0.236 (0.144)			
Risk-based capital ratio				0.012*** (0.003)	0.014*** (0.003)	0.033 (0.098)
EFD*RBCR						-0.024 (0.125)

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.4 Banks liquidity base results

Table no. 6 contains the findings for high and low liquid banks. Panel-A contains the findings for high liquid banks. The findings show that the coefficient of a capital ratio is consistent with baseline and well, adequately, and undercapitalized banks. The impact of economic freedom to influence profitability is positive, which is in consonance with (James R Barth et al., 1998; Boyd & De Nicolo, 2005; F. Sufian & Habibullah, 2010). Consistent with our fourth hypothesis, we find a negative and insignificant coefficient for the interactive term

(EFD*CAP) for high liquid banks between economic freedom and changes in bank capital. The interactive term (EFD*RBCR) provides evidence that economic freedom's role in influencing the relationship between risk-based capital and bank profitability is significant for high liquid banks. The negative sign of the interactive term of (EFD*RBCR) indicates that given the incremental increases in economic freedom, a high level of bank capital is associated with a low return on assets in the short run. Panel-B reports the results for low liquid banks. The capital ratio coefficient is positive and statistically significant. The findings indicate that the impact of bank capital ratio is more significant to influence bank profitability than high liquid banks. The findings are robust for economic freedom and bank profitability. Consistent with our fourth hypothesis, we find a negative and significant coefficient for the interactive term (EFD*CAP) for low liquid banks between economic freedom and changes in bank capital. The negative sign of the interactive term of (EFD*CAP) indicates that given the incremental increases in economic freedom, a high level of bank capital is associated with a low return on assets in the short-run other things held constant. The results of the interactive term (EFD*RBCR) provide evidence that the role of economic freedom to influence the relationship between risk-based capital and bank profitability is insignificant for low liquid banks. Economic freedom has a similar effect on influencing the financial performance of high and low liquid banks. The result of the interactive term for bank capital ratio and economic freedom confirms that economic freedom is more beneficial for high liquid banks than low liquid banks. Economic freedom boosts up the profitability of high liquid banks and decreases the financial performance of low liquid banks. A possible justification for this result is that higher liquid banks can exploit the broad banking activities than low liquid banks.

Table no. 6 – A two-step system GMM results for High and low liquid banks

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA
Panel-A: High liquid banks results						
Lagged. Profitability	0.770*** (0.007)	0.768*** (0.007)	0.768*** (0.007)	0.772*** (0.007)	0.769*** (0.007)	0.769*** (0.007)
Capital ratio	0.007*** (0.002)	0.008*** (0.002)	0.107 (0.071)			
Economic freedom		0.016*** (0.003)	0.029*** (0.010)		0.016*** (0.003)	-0.002 (0.010)
EFD*CAP			-0.126 (0.091)			
Risk-based capital ratio				0.002 (0.001)	0.004** (0.001)	-0.091** (0.048)
EFD*RBCR						0.121** (0.061)
Panel-B: High liquid banks results						
Capital ratio	0.012*** (0.002)	0.014*** (0.002)	0.215** (0.087)			
Economic freedom		0.016*** (0.003)	0.043*** (0.012)		0.019*** (0.003)	0.029** (0.012)
EFD*CAP			-0.258** (0.112)			
Risk-based capital ratio				0.016*** (0.002)	0.018*** (0.002)	0.079 (0.070)

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA
EFD*RBCR						-0.078 (0.090)
Constant	0.003*** (0.001)	-0.010*** (0.002)	-0.020*** (0.008)	0.003*** (0.001)	-0.010*** (0.002)	0.004 (0.008)
Observations	7,973	7,973	7,973	7,973	7,973	7,973
Number of id	469	469	469	469	469	469

Note: Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

4.5 Robustness check

We use several checks to validate the baseline findings. For example, first, we replace the capital ratio with the tier-I ratio then we replace the risk-based capital ratio with the tier-I risk-based ratio. By using a two-step system GMM methods for tier-I ratio and tier-I risk-based ratio the findings remain robust with baseline results. In line with prior literature (F. Sufian & Habibullah, 2010) we use panel OLS fixed effect model and run equation 1; findings remain consistent concerning the sign and significance. Using panel OLS fixed effects, Here we only report the results of tier-I and tier-I risk-based ratio in Tables no. 7 and no. 8 for overall, well, adequately, undercapitalized, high, and low liquid banks results. For brevity, only the result of the key variable is presented in the tables.

Table no. 7 – Robustness check: Panel OLS Fixed Effect model results

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA
Panel-A: Full sample banks results						
Tier-I ratio	0.010*** (0.002)	0.013*** (0.002)	-0.015 (0.068)			
Economic freedom		0.017*** (0.002)	0.014 (0.009)		0.017*** (0.002)	0.005 (0.009)
EFD*Tier-I			0.035 (0.087)			
Tier-I risk-based ratio				0.009*** (0.002)	0.012*** (0.002)	-0.061 (0.051)
EFD*TIRBR						0.093 (0.065)
Panel-B: Well-capitalized banks results						
Tier-I ratio	0.006 (0.005)	0.008 (0.005)	0.095 (0.175)			
Economic freedom		0.022*** (0.006)	0.034 (0.025)		0.022*** (0.006)	0.079** (0.039)
EFD*Tier-I			-0.111 (0.224)			
Tier-I risk-based ratio				0.009 (0.006)	0.010* (0.006)	0.308 (0.201)
EFD*TIRBR						-0.380 (0.256)
Panel-C: Adequately capitalized banks results						
Tier-I ratio	0.009 (0.006)	0.014** (0.006)	0.230 (0.189)			

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA
Economic freedom		0.031*** (0.006)	0.059** (0.025)		0.033*** (0.006)	0.081** (0.034)
EFD*Tier-I			-0.276 (0.242)			
Tier-I risk-based ratio				0.012** (0.005)	0.019*** (0.005)	0.280 (0.183)
EFD*TIRBR						-0.333 (0.233)

Note: Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

Table no. 8 – Robustness check: Panel OLS Fixed Effect model results

VARIABLES	(1) ROA	(2) ROA	(3) ROA	(4) ROA	(5) ROA	(6) ROA
Panel-A: Undercapitalized banks results						
Tier-I ratio	0.016*** (0.004)	0.019*** (0.004)	0.088 (0.139)			
Economic freedom		0.014*** (0.004)	0.022 (0.017)		0.015*** (0.004)	0.007 (0.020)
EFD*Tier-I			-0.089 (0.179)			
Tier-I risk-based ratio				0.011*** (0.003)	0.015*** (0.003)	-0.028 (0.117)
EFD*TIRBR						0.055 (0.150)
Panel-B: High liquid banks results						
Tier-I ratio	0.004 (0.002)	0.006*** (0.002)	-0.086 (0.084)			
Economic freedom		0.016*** (0.003)	0.005 (0.011)		0.016*** (0.003)	0.003 (0.012)
EFD*Tier-I			0.118 (0.108)			
Tier-I risk-based ratio				0.003 (0.002)	0.006*** (0.002)	-0.072 (0.067)
EFD*TIRBR						0.099 (0.085)
Panel-C: Low liquid banks results						
Tier-I ratio	0.017*** (0.003)	0.021*** (0.003)	0.076 (0.110)			
Economic freedom		0.019*** (0.003)	0.025* (0.014)		0.018*** (0.003)	0.022 (0.014)
EFD*Tier-I			-0.071 (0.141)			
Tier-I risk-based ratio				0.015*** (0.003)	0.018*** (0.003)	0.044 (0.091)
EFD*TIRBR						-0.033 (0.116)

Note: Robust standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

5. CONCLUSION AND POLICY RECOMMENDATIONS

The study uses a two-step GMM procedure and panel OLS framework on the data of the US commercial banks over the period from 2002 to 2019 to reveal the impact of bank capital and economic freedom on profitability. It is also part of this study to explore the moderating role of economic freedom in influencing the relationship between bank capital and profitability of banks. Economic freedom, bank capital, and bank financial performance are significant factors in measuring banks' growth, stability, and performance. It is important to investigate the moderating role of economic freedom in influencing the relationship between bank capital and bank profitability for banks, because the relationship will enable senior bankers to make better decisions to get optimum use of resources. Thus, many studies examine the relationship between economic freedom and banks' profitability. However, most, if not all, examine the impact of economic freedom on banks' profitability, but not the moderating impact of economic freedom on the relationship between bank capital and bank profitability, especially during the current economic conditions. The lack of insights in the context of U.S commercial banking motivates us to bridge this gap in the literature to explore the moderating role of economic freedom in influencing the relationship between bank capital and profitability. We set hypotheses based on the prior literature and used the GMM technique and panel OLS fixed effects model to test the hypotheses.

The results conclude that the effect of bank capital and economic freedom on bank profitability is statistically significant and positive. The findings evidence that economic freedom is significantly moderating the relationship between bank capital and bank profitability. Moreover, the inclusion of economic freedom in the baseline model increases the capital ratio's coefficients from 0.9% to 1.1% to influence the bank's profitability. The empirical results show that without incorporating economic freedom, the impact of banks' capital on profitability is underestimated. The findings remain similar when the capital ratio is replaced with a risk-based capital ratio. The results of the interactive term provide evidence that the role of economic freedom in influencing the relationship between risk-based capital ratio and profitability is significant except for low liquid and under-capitalized banks.

Similarly, the heterogeneity of pre, pro, and post-crisis periods explores that economic freedom is more significant for commercial banks in the pre and post-crisis periods. One explanation for this result is that banks can exploit broad banking activities at a lower cost in normal and boom economic conditions than in bad economic conditions. In simply, the impact of economic freedom on profitability is higher for adequately capitalized banks than for well and undercapitalized banks. The findings also confirm that economic freedom is not very beneficial for well-capitalized and undercapitalized banks. Economic freedom has a similar effect on influencing the profitability of high and low-liquidity banks. The result of the interactive term for bank capital ratio and economic freedom confirms that economic freedom is more beneficial for high liquid banks than for low liquid banks. Economic freedom boosts the profitability of high-liquid banks and decreases low liquid banks' profitability. A possible justification for this result is that higher liquid banks can exploit the broad banking activities better than lower liquid banks. The findings are robust for alternative proxies and methodology.

It is suggested that regulators should not only consider bank capital for profitability and stability, but also focus on economic freedom, bank capital, and profitability simultaneously. The heterogeneity of findings has implications for policymakers in banking for the improvement of the financial system. Similarly, our study has implications for the relationship

between economic freedom, bank capital, and profitability for well, adequately, undercapitalized, high and low liquid banks. Based on interaction terms, our study suggests an increase in risk-based capital ratio during high economic freedom situations that is in line with the regulatory hypothesis and capital buffer theory in banking.

Our findings remain limited to the analysis of quantitative data for larger commercial banks of the U.S. Here, we are still unable to collect data for saving, investment, and small commercial banks. Future research could be conducted to study the impact of economic freedom on the relationship between bank capital and bank financial performance by incorporating the mediating/moderating role of other economic indicators and bank regulations to get better in-depth insights.

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Notes

¹ <https://databank.worldbank.org/source/world-development-indicators>.

² <https://www.heritage.org/index/>.