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The Role of Uncertainty, Regulatory and Economic Environment and Quantitative Tightening in Banks' Performance

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ABSTRACT

This study analyses the implications of uncertainty, the regulatory and economic environment, and the monetary policy regime for bank performance. Employing multiple indicators of bank performance and underlying explanatory factors, we used a novel set of empirical approaches including Fixed Effects, Random Effects, Panel Fully Modified Least Squares (FMOLS), Panel Dynamic Least Squares (DOLS), and the Generalised Method of Moments (GMM). Considering the data of both developed (G7) and emerging (E7) economies from 2001 to 2020, our results reveal that uncertainty, leverage, capital adequacy, monetary policy, economic growth, inflation and the exchange rate have significant implications for various aspects of bank performance. We also find significant differences between the developed and developing economies' banking sector performance. In the context of uncertainty, the findings have vital implications for the banking sector in emerging and advanced economies, monetary and prudential policymakers, and stakeholders of financial stability.

1 | Introduction

The banking sector is crucial for the economy (Mekonnen, Kedir, and Shibru 2015). Financial institutions play a critical part in an economy's progress through effective financial intermediation and capital allocation. Banks in particular support the efficient utilisation of resources by mobilising funds for a variety of economic endeavours. In effect, they shift capital from those who have excess funds to those who require them for productive activities, stimulating investments and enhancing growth in the economy. If financial institutions underperform their role as intermediaries, we can expect a slower development of the economy, and possibly even a credit crunch and economic meltdown, like those seen during the Global Financial Crisis 2007–2008 (Marshall 2009). Due to the unique importance of the banking sector, the banking industry has undergone considerable changes around the world over the previous couple of decades. Despite the growing popularity of alternative sources of finance, banks continue to play a critical role in funding business growth. According to Saunders (1994), the role of banks in an economy is so important that the failure of a large bank is worse than the failure of any other institution in the economy. This is the reason why financial institutions, particularly banks, are one of the most heavily regulated sectors in the economy. It remains to be seen whether these reforms have managed to ensure the banking system can rid itself of its historical tendency towards instability.

There is ongoing interest in the stability of the banking sector because it is crucial to the economy (Ijaz et al. 2020). Several studies have looked at the stability of the banking sector and the underlying factors that determine banks' performance, however, their findings are contradictory (e.g., Akins et al. 2016; Kasman and Carvallo 2014; Li 2019). The literature finds numerous factors that can affect banks' performance, including both internal and external factors. While the majority of studies examining this topic have analysed the influence of a limited number of factors, relatively few have assessed bank performance in a

broader context. In particular, capital requirements, leverage ratios as well as the economic conditions defined by the state of economic growth, unemployment, inflation, and exchange rate can all affect bank performance. The level of uncertainty in the economy can also have implications for the financial sector. More recently, there has been a sharp surge in inflation followed by various central banks taking a contractionary stance, however, it is yet to be analysed. The implications of monetary or quantitative tightening (QT) for the performance of the banking sector need to be better understood, in both developing and developed economies.

The regulatory environment can have a particularly large impact on bank performance. In the Basel III reforms, the Basel Committee on Banking Supervision (BCBS) explicitly integrated the idea of "macroprudential" regulations into banking supervision (BCBS 2010). Besides the pre-existing Basel II basic capital charge, the Basel III reforms require financial institutions to establish a countercyclical capital buffer system that increases capital charges in response to current economic conditions. These regulations were brought in following the 2008 Global Financial Crisis when it was recognised that existing reforms were not adequate. In particular, they did not take a macro view of the banking system. It became clear that existing capital requirements and risk management approaches were insufficient in the face of such large systematic forces. Yet there remains considerable resistance to the Basel III reforms, with many developing countries in particular continuing to delay their full adoption. Furthermore, Basel III has significant ramifications. According to Chiuri, Feeri, and Majnoni (2002), implementing the Basel III capital regulations resulted in a decrease in bank loan supply, which is a significant source of banks' investment earnings. Therefore, it is vital to conduct a robust and comprehensive empirical analysis to determine the role of the regulatory environment in influencing the banks' performance.

In addition to the regulatory environment, there are several other factors such as the macroeconomic environment, labour market conditions, monetary policy, credit conditions and level of uncertainty which may influence the bank's performance. However, the evidence on the impact of these factors on bank performance is limited and contrasting (e.g., see Gikombo and Mbugua 2018; Saiz-Sepúlveda et al. 2024; Yang and Shao 2016; Nguyen 2021). Therefore, the primary objective of this study is to assess the impact of these factors in conjunction with the role of regulations on bank performance. In this study, we used both return on assets (ROA) and return on equity (ROE) to measure the banking sector's performance. These are the most popular ratios for determining performance in any business, including financial firms. The ROA determines how the bank employed investment resources to create profit and shows the profit made per pound of assets (Sheeba 2011). It demonstrates how a bank efficiently uses administrative effectiveness to convert assets into profits. A greater ROA ratio denotes better performance, whilst a weaker ROA figure denotes insufficient managerial effectiveness on the part of the banks. The ROE shows how well a bank leverages its investment capital to boost profitability.' Dechow (1994) stated that ROE has been and continues to be a key performance metric for banks. Performance measures play a dual role, providing both valuation information and supporting contractual agreements. Furthermore, the use of four different categories of factors including the macroeconomic environment, economic policy uncertainty, regulations, and monetary and credit conditions, makes this study stand apart from earlier investigations. Moreover, we conducted a comparative study with a focus on both developed and developing economies.

This study makes several contributions to the debate on the influence of regulatory and macroeconomic environment, monetary policy decisions such as Q.T, and uncertainty on banking sector performance. First, we have employed various measures of banking performance in both emerging and developed countries, Second, this study analyses the impact of the regulatory framework on the banking sector at the global level as well as in the context of emerging and developed economies which provides important insight on the heterogeneity between developed and emerging economies and the notion that one size does not fit all. Third, we account for the impact of policy tightening or Quantitative Tightening (Q.T) on the bank performance, which is important in the context of the recent policy tightening by the central banks around the world, including the Federal Reserve, European Central Bank, Bank of Japan and the Bank of England among others. Fourth, this study analyses the effects of uncertainty on the various measures of bank performance in emerging and developed economies. Lastly, this study also controls for the implications of the domestic macroeconomic environment for the performance of the banking sector in emerging and developed economies, particularly the issues around growth, exchange rate, labour market and inflation, which as caught a lot of attention recently. Employing multiple indicators of bank performance and underlying explanatory factors, we used a novel set of empirical approaches including Fixed Effects, Random Effects, Panel Fully Modified Least Squares (FMOLS), Panel Dynamic Least Squares (DOLS), and the Generalised Method of Moments (GMM). Considering the data of both developed (G7) and emerging (E7) economies from 2001 to 2020, our results reveal that leverage, capital adequacy, monetary policy, economic growth, inflation, exchange rate and uncertainty have significant implications for various aspects of bank performance. There are significant differences between the developed and developing economies' banking sector performance under the influence of the regulatory and economic environment, the monetary policy regime, and uncertainty. The empirical findings have vital implications for the banking sector in emerging and advanced economies, as well as policymakers and stakeholders of financial stability.

The following is the order in which this paper proceeds: a critical review of the literature is conducted in Section 2 and methodology is discussed in Section 3. Analysis and findings are presented in Section 4, while Section 5 contains the conclusion and policy ramifications.

2 | Literature Review

2.1 | Regulatory Environment and Bank Performance

Capital adequacy is widely recognised as one of the key factors impacting bank financial performance (Batten and Vo 2019; Lee and Hsieh 2013; Vo and Nguyen 2018: Francis and Osborne 2010) as well as efficiency (Nasim, Nasir, and Downing 2024).

According to Vo (2020), the banking capital structure decision is a significant corporate activity that piques the interest of a variety of stakeholders. Because of their distinct legal, cultural, and institutional aspects, it is increasingly significant in emerging markets.

In general, better capitalised financial institutions are in a stronger position to take advantage of market possibilities and collect additional deposits, thereby increasing interest revenue and diversifying earnings. They can also raise cheaper capital (Athanasoglou, Brissimis, and Delis 2008), and will have more capabilities to adjust to unfavourable disruptions, as per Aebi et al. (2012, 3218). Conversely, Ahokpossi (2013, 8) observed that well-capitalised banks, due to reduced interest rates and lower risk of insolvency, may charge lower margins, potentially leading to decreased revenue. However, raising capital requirements can be perceived as expensive for banks, potentially reducing profitability. The "trade-off" hypothesis suggests that it might lower a bank's risk, and therefore the premium sought to pay shareholders for the cost of financial distress.

In conventional corporate finance theory, a bank in equilibrium strives to maintain a capital requirement that optimally balances costs and benefits, essentially achieving a zero-margin connection. However, regulatory capital requirements, when binding, necessitate that banks hold capital in excess of their privately determined optimal level. This forces banks to maintain higher capital ratios than they would choose internally, thereby imposing additional costs in the form of regulatory fees (Miller 1995; Buser, Chen, and Kane 1981). Furthermore, since banks' optimal capital ratios tend to vary over time, typically increasing during periods of heightened economic stress, the relationship with return on assets becomes highly dynamic. This relationship tends to improve during periods of distress, as banks that strengthen their capital requirements provide reassurance to shareholders while also enhancing their profitability. The Global Financial Crisis of 2007–2008 and the credit crunch reignited the debate on regulatory amendments that can be most effective in promoting bank growth, efficiency, and sustainability. In their study, Sufian and Chong (2008) argued that capital positively affects the bank's performance in terms of profitability. Berger and Humphrey (1991) held a similar viewpoint and argued that banks with low capital structures put themselves in a risky position, which has an impact on their profitability. Molyneux and Thornton (1992) have suggested that a certain level of equity allows banks to reduce their cost of capital, which may have a favourable impact on bank profitability. Banks could go bankrupt because of credit losses, which is why banks must maintain a greater level of capital to sustain losses amid a challenging period. Banks with more capital are more protected from insolvency, as per Bourke (1989). This means that banks with more capital will be able to achieve higher profits. According to Huizinga (2000) and Kosmidou (2008), banks with high profitability have a high level of equity relative to their assets. Dale (2012) argued that capital requirements, at least if they are binding, are likely to have a significant impact on the bank's capital decision. If capital requirements are mandatory, a bank may be forced to hold capital above the value-maximising level, implying a negative long- and short-run relationship between bank capital and profitability. If the bank is not bound by them, the relationship may be positive, flat, or negative, as it would be if capital requirements were not in place. The level at which capital requirements are set and the capital ratios that the bank would choose in the absence of capital requirements determine whether capital requirements are obligatory, implying heterogeneity among countries, banks, and durations. Banks determine their ideal capital ratios, fixed capital requirements would have a periodic influence if bankers' leveraged buyout proportions were periodic (Blum and Hellwig 1995). Jimenez et al. (2010) find that tighter monetary policies and unfavourable economic conditions significantly reduce loan approvals, particularly by banks with lower capital or liquidity ratios. When reviewing identical loan applications, weaker banks are less likely to approve the loan.

Liquidity is also a key issue for banks. A bank's liquidity position indicates its aptitude to fulfil deposit requirements and transmits information to clients about its stability, especially during times of uncertainty (Berger 1995). The effectiveness of regulations and their impact on bank performance remains debatable and the evidence is contrasting. For instance, Sastrosuwito and Suzuki (2012) found a negative link between bank profitability and loan loss provisions. They argued that a high loan-to-total-assets ratio tends to lower a bank's profitability. Furthermore, increased competition in the financial markets makes it more difficult for banks to lend at higher interest rates. Parallel studies on the determinants of profitability (e.g., Hassan and Bashir 2003) also support their findings. Examining the implications of regulatory environments, Cyree (2016) has reported that the indicators of regulatory burden (i.e., decreased ROA, lower loans per employee, lower digital and fixed-asset discretionary spending, higher percent change in the workforce, relatively high wages ratios, and increased pay rate) show mixed results. Further studies, for instance by Dietrich and Wanzenried (2011) showed a negative relationship between profitability and bank size. They argued that the main cause of the negative association is that huge banks have suffered significant losses because of multiple irrecoverable loans. Such findings provide the rationale for the prudential regulatory frameworks to increase banks' performance.

Since the global financial crisis and the great recession of 2008, banks have expanded their excess liquidity. Since the cost of keeping cash is substantially lower than it was before the crisis, banks are now confronted with a climate in which cash holdings may be far more appealing. Cash flow in short-term financial markets was depleted during the economic meltdown, leaving banks with serious funding issues. Central banks have launched new initiatives to deal with the crisis that changed the parameters of the trade-off banks undertake when determining their quantity of surplus holdings. There is also an emphasis on maintaining higher capital requirements so that the banks can have Higher Loss Absorbency (HLA). However, what implications it could have for the performance of the bank is also vital to consider and requires further investigation. It is also vital to consider that the banking sector in developing countries may vary from the developed economies, hence, the umbrella regulations may have a heterogenous impact on the two groups.

The following hypotheses are formulated and tested against the empirical finding.[1]

H0. *Regulatory environment has no statistically significant effect on banks' performance.*

H1. *Regulatory environment has a statistically significant effect on banks' performance.*

2.2 | Macroeconomic Environment and Bank Performance

The macroeconomic environment significantly influences the performance of the banking sector, a relationship explored in numerous studies (Tanna, Kosmidou and Pasiouras 2005). Gikombo and Mbugua (2018) report that both GDP and interest rates significantly impact the profitability of commercial banks. Kosmidou, Tanna, and Pasiouras (2005b) identify a strong positive relationship between bank performance and macroeconomic variables, particularly linking bank profitability to GDP growth. Similarly, Sufian and Chong (2008) reach comparable conclusions in their investigation. Similarly, Hassan and Bashir (2003) and Kosmidou et al. (2006) are some of the noteworthy studies which have reported a robust and positive association between GDP and profitability. Most of these studies are based on profitability drivers and produce consistent results in terms of economic growth and its impact on banking profitability. Khrawish's (2011) study on the Jordanian banking sector, contradicted the findings of prior studies. It was reported that the ROA and GDP had a negative relationship. Likewise, Sastrosuwito and Suzuki (2012) and Sufian and Habibullah (2009) found no significant association between bank profitability and economic growth rate in their analysis of the banking system.

Athanasoglou, Brissimis, and Delis (2008) and Kosmidou and Zopounidis (2008) investigated the impact of macroeconomic volatility on banking revenues in Greece. Their findings reveal that inflation has a large positive impact on bank performance. In the context of macroeconomic management, Clair (2004) showed that two-thirds of a bank's success is closely tied to the performance of macroeconomic factors in his study on Singapore. However, the influence of inflation on financial institutions' profitability is unclear. Inflation was revealed to be a key factor of bank performance in research by Revell (1979); Haron on the other hand, discovered negative relationships between ROA and inflation rate. If inflation is expected, the interest rate could be modified to account for it, resulting in increased earnings. In that instance, the impact of inflation on bank profitability would be positive as banks will be able to factor these costs into their operational expenses to boost profits. However, if inflation is unanticipated, the bank's capabilities may be harmed by inflation or the consequences of inflation. According to Perry (1992), depending on whether inflation is anticipated or unanticipated, it can have a favourable or negative influence on profitability. According to Bashir (2003), banks create profits by charging high rates on loans during periods of high inflation, but if inflation is unanticipated, banks will not adjust rates promptly, and overhead expenses will grow faster than inflation, resulting in bad profitability. For underdeveloped countries, Demirguc-Kunt and Huizinga (1999) reached a similar conclusion. In light of these studies, it is important to consider inflation in the analysis of determinants of bank performance.

The unemployment rate is another macroeconomic indicator that can potentially affect banks' profitability. Higher unemployment may upset budgetary imbalances and slow countries' economic success, so a rise in the unemployment rate reduces total demand and raises the nonperforming loans rate, putting the company's business profit at risk (Heffernan and Fu 2008). A study by Bordeleau and Graham (2010) reported that unemployment has a negative impact on bank performance.

H0. *Macroeconomic environment has no statistically significant effect on banks' performance.*

H1. *Macroeconomic environment has a statistically significant effect on banks' performance.*

2.3 | Monetary Policy and Bank Performance

Since the Global Financial Crisis 2007–2008, the connection between monetary policy and bank profitability has gained more attention. The vigorous response of central banks during the initial phases of the recession was widely credited with preventing a financial and economic disaster. Yet, there has been rising concern that the net benefits of protracted monetary accommodation may be diminishing because of its detrimental effects. More recently, after a prolonged period of accommodative monetary stance, a number of central banks across the world have started to increase the policy rates in the face of high inflation. It is therefore, it is vital to understand, how such a policy may affect the banks' performance in developed as well as developing countries.

There have been a number of studies on the implications of monetary policy for the banking sector. Most of these studies only use policy rates or short-term interest-based indicators to determine the stance of monetary policy (Altunbas, Gambacorta, and Marques-Ibanez 2010; Chen et al. 2017; Khan, Ahmad, and Gee 2016; Sanfilippo-Azofra et al. 2018; Yang and Shao 2016), while a few solely concentrate on unconventional monetary policy (Brana, Campmas, and Lapteacru 2019, Mamatzakis and Bermpei 2016). Interest rate changes are widely recognised as a major source of instability and a substantial risk element for businesses since they impact the maturity fit among income and expenses (Graham and Harvey 2001). Furthermore, in another study, Haron (1996) reported that interest rates had a beneficial and considerable influence on the functioning of the Banking sector. It should be highlighted that one monetary policy indicator would not be able to capture all the potential effects of monetary policy on bank activity.

H0. *Monetary policy has no statistically significant effect on banks' performance.*

H1. *Monetary policy has a statistically significant effect on banks' performance.*

2.4 | Economic Policy Uncertainty and Bank Performance

Economic policy uncertainty is potentially more detrimental than any other sort of uncertainty (Chi and Li 2017). According to a recent PwC poll of 1378 chief executives from more than 90

countries, CEOs ranked economic policy uncertainty as the most dangerous to their company's growth prospects, surpassing protectionism, trade wars, and political uncertainty (Global 2019).

Economic uncertainty surged during the 2008 financial crisis, and people began to pay more attention to its implications for the economy. Much attention has been paid to demonstrating the critical influence of uncertainty on various economic activities, such as production, investment, consumption, and savings (Al-Thaqeb and Algharabali 2019). Uncertainty also has important implications for financial markets, however, the impact on the banking sector has been less explored (see, Nasir and Morgan 2018; Nasir 2020; Huynh, Nasir, and Nguyen 2023; Tiwari, Nasir, and Shahbaz 2021). A recent study on European banks by Nguyen (2021) has shown that economic uncertainty can have implications for the banking sector's stability. Uncertainty could influence bank risk-taking due to the negative consequences of economic uncertainty on a variety of economic activities, including output losses, government deficits, unemployment, financial instability, and the variability of equity prices, money flows, and currency rates (Bloom 2009). Indeed, increasing economic uncertainty has been proposed as a reliable predictor of depression (Karnizova and Li 2014). Therefore, in a deteriorating economic situation, circumstances may raise the risk of a sector failure, as seen by greater credit crisis spreads amid periods of severe macroeconomic uncertainty. This could lead to a rise in non-performing loans. Since economic uncertainty can negatively impact bank performance (Gissler, Oldfather, and Ruffino 2016), regulators need to identify when and how bank governance can alleviate these effects. Additionally, regulations that constrain financial institution activities may help mitigate the adverse impact of economic uncertainty on bank stability.

Market participants tend to respond aggressively to uncertainty, which could have serious economic effects. When they can predict changes, market responses are mild, but if they are taken off guard, their responses are often more robust (Pastor and Veronesi 2012). When economic uncertainty is high, bank managers may choose to pursue a riskier investment portfolio and engage in non-traditional financial activities. This behaviour often stems from a search for higher returns, as traditional investments may offer lower yields in uncertain times. Additionally, managers might seek diversification by incorporating unconventional financial activities to spread risk and mitigate potential losses. Competitive pressures and the need to adapt to changing market conditions can also drive banks to explore new avenues to attract clients and capitalise on emerging opportunities. Furthermore, increased risk appetite in uncertain environments may lead managers to believe that the potential rewards of riskier strategies outweigh the associated risks—such as securities, insurance, and real estate as they are under pressure from shareholders (Mohsni and Otchere 2018). Nevertheless, in a period of peak volatility, such operations may be risky because their earnings are more volatile than the traditional interest-earned tasks, and because small banks lack competence and experience in new lines of business, they may undermine their profitability and stability. In this setting, tighter activity limitations could deter banks from participating in hazardous operations, reducing the negative consequences of economic uncertainty on banks. Although tighter constraints on capital and activity may help to promote bank stability, they may not be enough to prevent excessive risk-taking in the banking industry during periods of severe uncertainty. In the face of increased uncertainty, banks could render the debt burden less obvious by employing flexible loan defaults as a form of reported earnings.

H0. *The uncertainty has no statistically significant effect on banks' performance.*

H1. *The uncertainty has a statistically significant effect on banks' performance.*

3 | Methodology

We employ a set of empirical techniques to analyse the impact of various underlying factors on bank performance. The relationship between bank performance, the regulatory and economic environment, monetary policy, and uncertainty can be specified as follows:

$$\begin{aligned}\text{Performance}_{i,t}(\text{ROA}) = {} & \beta_0 + \beta_1 \text{GDP}_{i,t} + \beta_2 \text{Inflation}_{i,t} \\ & + \beta_3 \text{Unemployment}_{i,t} + \beta_4 \text{Leverage}_{i,t} \\ & + \beta_5 \text{Uncertainity}_{i,t} + \beta_6 \text{Capital adequacy}_{i,t} \\ & + \beta_7 \text{Exchage rate}_{i,t} + \beta_8 \text{Monetary policy}_{i,t} + \varepsilon_{i,t}\end{aligned} \tag{1}$$

$$\begin{aligned}\text{Performance}_{i,t}(\text{ROE}) = {} & \beta_0 + \beta_1 \text{GDP}_{i,t} + \beta_2 \text{Inflation}_{i,t} \\ & + \beta_3 \text{Unemployment}_{i,t} + \beta_4 \text{Leverage}_{i,t} \\ & + \beta_5 \text{Uncertainity}_{i,t} + \beta_6 \text{Capital adequacy}_{i,t} \\ & + \beta_7 \text{Exchange rate}_{i,t} + \beta_8 \text{Monetary policy}_{i,t} + \varepsilon_t\end{aligned} \tag{2}$$

where $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ and β_8 are the coefficients of explanatory variables, i and t are unit and time subscripts while ϵ are stochastic error terms which are i.i.d.

We employ balanced panel data on G7 and E7 commercial banks (109) from 2001 to 2020. The two models were estimated using various methodologies, including Fixed Effect, Random Effect, Fully Modified Ordinary Least Squares (FMOLS), Dynamic Ordinary Least Squares (DOLS), and the Generalised Method of Moments (GMM). Following the first differencing of all variables, these panel methodologies were applied to establish the consistency and reliability of the results. Autocorrelation and heteroscedasticity diagnostic tests were also conducted, specifically the Lagrange Multiplier (LM) test for heteroscedasticity and the Breusch-Godfrey LM test for autocorrelation. The models were then re-estimated using period weights (PCSE) in the coefficient covariance approach for the Fixed Effect and Random Effect models to address data concerns. Broadly speaking, the re-estimation results were consistent with the original estimates, both in terms of statistical significance and the signs of the coefficients.

As previously noted, FMOLS and DOLS estimations effectively correct for autocorrelation—FMOLS using Newey-West adjustments and DOLS incorporating leads and lags of the

independent variables with first differences. To address endogeneity, we applied GMM, following the framework established by Ullah, Akhtar, and Zaefarian (2018). There are two types of GMM estimators: Difference GMM and System GMM, as proposed by Arellano and Bond (1991). Difference GMM uses the first difference of the panel equation for each period to eliminate individual country effects, with instrumented regressors based on their delayed values. Alternatively, System GMM combines two steps: it first takes the first difference to remove individual-specific effects and then introduces a level equation (without differencing) using the first differences of the regressors. This approach, recommended by Blundell and Bond, enhances estimation accuracy for dynamic panel data models. Arellano and Bover (1995) and Blundell and Bond (1998) demonstrated their effectiveness in improving estimation accuracy. Consequently, we employed a two-step System GMM estimation, ensuring the validity of the instruments matrix and the assumption of no residual autocorrelation to determine the quality of the results.

3.1 | Data

The data were obtained from a variety of reliable sources, including the World Bank, Thomson Reuters, and Macrotrend. This analysis encompasses 2180 observations drawn from the 109 largest commercial banks in the G7 and E7 countries, utilising annual data from 2001 to 2020. Table 1 provides a summary of the variables and their respective data sources.

The World Bank and DataStream databases provide readily available data on key performance variables. We employed return on assets (ROA) and return on equity (ROE) as measures of bank performance. There are two key reasons to use ROA as a metric for determining bank profitability. First, it reveals the profit per unit of assets earned and reflects management's ability to profitably utilise the bank's financial and real investment resources (Hassan and Bashir 2003). Additionally, Rivard and Thomas (1997) suggest that ROA is the best indicator of banks'

TABLE 1 | Summary of variables and sources.

Variable	Measurement	Code	Source
Performance ROA, ROE	Return on Assets Return on Equity	ROA ROE	Thomson Reuters
GDP	Annual GDP growth rate	GDP	World Economic Outlook database
Inflation	Consumer price index (CPI)	Inf	World Economic Outlook database
Unemployment	Annual unemployment rate	Ump	Macrotrend
Uncertainty	Uncertainty	Uncertain	Uncertainty index
Exchange rate	Exchange rate Annual fluctuation	Exchange	World Economic Outlook database
Capital adequacy	Capital adequacy ratio Tier I &2	Cap	Thomson Reuters
Leverage	Leverage ratio	Lev	Thomson Reuters
Monetary policy	Interest rate	Bart	State bank database

TABLE 2 | Descriptive statistics summary.

Variables	Mean	Median	Maximum	Minimum	SD	Skewness	Kurtosis	Jarque-Bera
GDP	0.282	0.028	3.779	−3.486	0.916	1.325	8.851	3728.19***
Inflation	0.377	0.034	4.550	−0.356	0.886	2.574	8.6541	5283.46***
Unemploy	0.950	0.061	9.630	0.024	2.243	2.413	7.626	4038.75***
Uncertainty	155.787	123.620	791.860	21.620	110.109	2.404	11.047	7938.31***
Exchange	94.477	95.330	128.110	10.200	16.294	−0.963	7.402	2086.06***
Policy rate	0.046	0.031	0.699	−0.019	0.063	4.7334	40.524	135289.7***
Capital	0.156	0.146	11.230	−0.474	0.241	44.420	2036.329	3.74E+08***
ROA	0.011	0.009	1.100	−0.398	0.034	20.231	626.998	3532139***
ROE	0.128	0.114	21.160	−3.170	0.494	36.272	1523.820	2.09E+08***
Leverage	2.650	1.482	1023.000	−0.023	22.081	45.545	2104.805	4.00E+08***

***1% level of significance.

TABLE 3 | Unit root tests summary.

		Individual Intercept		Individual Intercept and Trend		
Variable	**Test**	**Level**	**1st Difference**	**Level**	**1st Difference**	**Conclusion**
GDP	LLC	−9.949** 0.000	−34.057 ** 0.000	−8.907 ** 0.000	−28.915** 0.000	Stationary at level
	IPS	−12.729** 0.000	−33.561** 0.000	−8.147** 0.000	−28.050** 0.000	Stationary at level
	F-ADF	610.141** 0.000	1338.65** 0.000	481.705** 0.000	1009.93** 0.000	Stationary at level
Inflation	LLC	−24.544** 0.000	−56.641** 0.000	−21.522** 0.000	−51.599** 0.000	Stationary at level
	IPS	−19.495** 0.000	−49.426** 0.000	−18.569** 0.000	−40.603** 0.000	Stationary at level
	F-ADS	777.423** 0.000	2442.93** 0.000	717.93** 0.000	1219.22** 0.000	Stationary at level
Unemployment	LLC	−2.459** 0.070	−9.471** 0.000	−0.023 0.490	−5.730** 0.000	Stationary after 1st difference.
	IPS	−7.076** 0.000	−13.571** 0.000	−4.792*** 0.000	−4.028** 0.000	Stationary at level
	F-ADS	372.119** 0.000	576.781** 0.000	306.359** 0.000	322.539*** 0.000	Stationary after 1st difference
Uncertainty	LLC	4.540 1.000	−26.278*** 0.000	−4.581*** 0.000	−17.878*** 0.000	Stationary after 1st difference
	IPS	3.919 1.000	−24.765*** 0.000	−0.693 0.244	−19.052*** 0.000	Stationary after 1st difference
	F-ADS	221.029 0.430	1008.29*** 0.000	295.872*** 0.000	756.673*** 0.000	Stationary after 1st difference
Exchange rate	LLC	−3.271*** 0.000	−37.019*** 0.000	−14.229*** 0.000	−32.045*** 0.000	Stationary after 1st difference
	IPS	−5.335*** 0.000	−37.029*** 0.000	−9.189*** 0.000	−33.155*** 0.000	Stationary at level
	F-ADS	376.755*** 0.000	1465.75*** 0.000	449.853*** 0.000	1192.66*** 0.000	Stationary at level
Policy rate	LLC	−9.577*** 0.000	−28.272*** 0.000	−12.310*** 0.000	−22.175*** 0.000	Stationary at level
	IPS	−5.723*** 0.000	−27.543*** 0.000	−10.838*** 0.000	−17.607*** 0.000	Stationary at level
	F-ADS	358.322*** 0.000	1049.69*** 0.000	495.312*** 0.000	678.599*** 0.000	Stationary at level
Capital adequacy	LLC	674.808*** 0.000	−783.987*** 0.000	−853.725*** 0.000	−621.122*** 0.000	Stationary at level
	IPS	−101.417*** 0.000	−111.106*** 0.000	−105.134*** 0.000	−97.207*** 0.000	Stationary at level
	F-ADS	614.643*** 0.000	1916.45*** 0.000	452.399*** 0.000	1108.02*** 0.000	Stationary at level

(Continues)

TABLE 3 | (Continued)

Variable	Test	Individual Intercept		Individual Intercept and Trend		Conclusion
		Level	1st Difference	Level	1st Difference	
ROA	LLC	−30.494***	−57.916***	−36.731***	−45.512***	Stationary at level
		0.000	0.000	0.000	0.000	
	IPS	−20.180***	−51.226***	−23.141***	−42.380***	Stationary at level
		0.000	0.000	0.000	0.000	
	F-ADS	1388.59***	3190.22***	659.422***	1249.71***	Stationary at level
		0.000	0.000	0.000	0.000	
ROE	LLC	−100.379***	−90.774***	−96.499***	−92.751***	Stationary at level
		0.000	0.000	0.000	0.000	
	IPS	−29.750***	−51.967***	−28.777***	−51.539***	Stationary at level
		0.000	0.000	0.000	0.000	
	F-ADS	1352.14***	2221.21***	713.162***	1321.08***	Stationary at level
		0.000	0.000	0.000	0.000	
Leverage	LLC	−4.429***	−40.296***	−10.115***	1.784	Stationary at level
		0.000	0.000	0.000	0.962	
	IPS	−7.943***	−38.137***	−7.491***	−31.829***	Stationary at leve
		0.000	0.000	0.000	0.000	
	F-ADS	474.593***	1559.68***	420.633***	1144.56***	Stationary at level
		0.000	0.000	0.000	0.000	

Note: Statistic is in brackets; *, ** and *** = 10%, 5%, and 1% significance levels, respectively, most of the variable are stationary at level.

TABLE 4 | Kao residual cointegration test.

ROA	−20.935***	ROE	5.838***
	0.000		0.000

Note: Statistic is in brackets; *** denotes a 1% significance level.

profitability since it is unaffected by greater equity multipliers. In contrast, Dechow (1994) stated that ROE has been and continues to be a key performance metric for banks. Performance measures play a dual role, providing both valuation information and supporting contractual macroeconomic variables considered including GDP, inflation rate, exchange rate, and unemployment. Regulatory environment factors include capital and leverage ratios. For monetary policy, we used real policy rates, and for uncertainty, we employed the economic policy uncertainty index.

4 | Analysis and Findings

4.1 | Descriptive Statistics

Table 2 provides a summary of the descriptive statistical analysis that reflects the attributes of the underlying dataset.

4.2 | Panel Unit Root Tests

It is crucial to assess data for stationarity and analyse the presence of unit root which can lead to a spurious estimation. In this study, we employ three-unit root tests including Levin, Lin, and Chu (2002), Im, Pesaran, and Shin (2003) and Fisher–Augmented Dickey-Fuller. Table 3 summarises the unit root tests which are abbreviated as LLC, IPS, and F-ADF, respectively. For these tests, the null hypothesis is that the panel data has a unit root, whereas the alternative hypothesis was that the panel data did not have a unit root. The tests revealed that more than half of the variables were stationary at levels; however, all the variables were stationary at first difference.

4.3 | Panel Cointegration Tests

To analyse the long-term relationship among the variables, we performed Kao's (1999) and Pedroni's tests for cointegration in the panel. The results are summarised in Tables 4, 5 and 6. The null hypothesis in both tests was that there was no cointegration. At the 1% significance level, Kao's test rejected the null hypothesis, suggesting that the parameters in Models I and II are cointegrated. At the 1% statistical significance, a little more than 50% of Pedroni's Test-Statistics likewise rejected the null hypothesis and indicated the existence of cointegration among the variables in Models I and II. As a result, the existence of cointegration indicated that the parameters had a long-term link.

We also used Pedroni's test approach to conduct a cointegration test which accounts for data heterogeneity. Pedroni (2004) suggested cointegration tests which considered variability in panel data. Extensive testing statistics are used in the test, which is separated into two categories: within-dimension tests, which include the v, rho, PP, and ADF test statistics, and between-dimension tests, which include the last three. The

TABLE 5 | Pedroni residual cointegration test for bank performance (ROA).

Variables	Test statistics	I.I	I.I and I. T	No, I or T
ROA, GDP	Panel v Statist	−6.257 1.000	−14.270 1.000	−0.956 0.830
	Panel rho Statistic	−26.562*** 0.000	−15.801*** 0.000	−32.830*** 0.000
	Panel PP Statistic	−30.880*** 0.000	−31.065*** 0.000	−27.115*** 0.000
	Panel ADF Statistic	−30.661*** 0.000	−31.755*** 0.000	−26.519*** 0.000
ROA, GDP, inflation	Panel v Statist	−4.800 (1.000)	−11.329 (1.000)	−1.221 (0.889)
	Panel rho Statistic	−15.250 0.000***	−9.303*** 0.000	−18.102*** 0.000
	Panel PP Statistic	−25.648 0.000***	−26.190*** 0.000	−24.158*** 0.000
	Panel ADF Statistic	−24.898*** 0.000	−26.164*** 0.000	−24.151*** 0.000
ROA, GDP, inflation, unemployment	Panel v Statist	−6.976 (1.000)	−12.637 (1.000)	−3.246 (1.000)
	Panel rho Statistic	−9.704*** 0.000	−4.007*** 0.000	−12.176*** 0.000
	Panel PP Statistic	−24.159*** 0.000	−27.516*** 0.000	−23.060*** 0.000
	Panel ADF Statistic	−23.396*** 0.000	−26.542*** 0.000	−22.451*** 0.000
ROA, GDP, inflation, unemployment, uncertainty	Panel v Statist	−4.708*** (0.000)	−10.092 (1.000)	−1.983 (0.976)
	Panel rho Statistic	−3.529*** 0.000	0.218 0.5864	−7.396*** 0.000
	Panel PP Statistic	−25.877*** 0.000	−23.601*** 0.000	−22.587*** 0.000
	Panel ADF Statistic	−24.667*** 0.000	−22.758*** 0.000	−22.549*** 0.000
ROA, GDP, inflation, unemployment, uncertainty, exchange rate	Panel v Statist	−2.967 0.998	−7.981 1.000	−0.296 0.616
	Panel rho Statistic	1.257 0.104	2.375 0.991	−4.189*** 0.000
	Panel PP Statistic	−27.745*** 0.000	−35.241*** 0.000	−27.838*** 0.000
	Panel ADF Statistic	−26.077*** 0.000	29.764*** 0.000	−26.749*** 0.000
ROA, GDP, inflation, unemployment, uncertainty, exchange rate, policy rate	Panel v Statist	−2.331 (0.990)	−6.341 (1.000)	−0.295 (0.616)
	Panel rho Statistic	1.476 (0.930)	4.875 (1.000)	−0.101 (0.459)
	Panel PP Statistic	−51.205*** (0.000)	−47.858 (1.000)	−52.524*** (0.000)
	Panel ADF Statistic	−38.385*** (0.000)	−36.073*** (0.000)	−36.819 (0.000)

(Continues)

TABLE 5 | (Continued)

Variables	Test statistics	I.I	I.I and I. T	No, I or T
ROA, GDP, inflation, unemployment, uncertainty, exchange rate, capital adequacy	Panel v Statist	−1.124 (0.999)	−7.786 (1.000)	−0.928 (0.823)
	Panel rho Statistic	3.387 (0.999)	6.893 (1.000)	−0.218 (0.413)
	Panel PP Statistic	−28.212*** 0.000	−40.818*** 0.000	−26.313*** 0.000
	Panel ADF Statistic	−24.351*** 0.000	−28.532*** 0.000	−24.943 0.000***
ROA, GDP, inflation, unemployment, uncertainty, policy rate, capital adequacy	Panel v Statist	−0.806 (0.790)	−3.267 (0.999)	1.442 (0.074)
	Panel rho Statistic	2.386 (0.991)	4.436 (1.000)	−0.720 (0.235)
	Panel PP Statistic	−26.577*** 0.000	−29.629*** 0.000	−27.436*** 0.000
	Panel ADF Statistic	−24.532*** 0.000	−27.581*** 0.000	−26.303*** 0.000
ROA, GDP, inflation, unemployment, uncertainty, policy rate, leverage	Panel v Statist	0.708 (0.239)	−0.696 (0.756)	1.676 (0.046)
	Panel rho Statistic	2.335 (0.990)	4.913 (1.000)	−0.335 (0.368)
	Panel PP Statistic	−36.765*** 0.000	−46.626*** 0.000	−26.012*** 0.000
	Panel ADF Statistic	−30.138*** 0.000	−35.237*** 0.000	−24.896*** 0.000
ROA, GDP, inflation, unemployment, uncertainty, exchange rate, leverage	Panel v Statist	6.825*** 0.000	3.510*** 0.000	6.714*** 0.000
	Panel rho Statistic	−0.623 0.266	4.812 1.000	−0.604 0.272
	Panel PP Statistic	−49.014*** 0.000	−47.682*** 0.000	−40.236*** 0.000
	Panel ADF Statistic	−41.867*** 0.000	−35.659*** 0.000	−33.199*** 0.000
ROA, GDP, inflation, unemployment, uncertainty. capital adequacy, leverage	Panel v Statist	−5.885 (1.000)	−8.406 (1.000)	−4.361 (1.000)
	Panel rho Statistic	1.038 (0.8505)	5.361 (1.000)	−0.788 (0.215)
	Panel PP Statistic	−34.808*** 0.000	−43.080*** 0.000	−27.901*** 0.000
	Panel ADF Statistic	−32.046*** 0.000	−33.759*** 0.000	−26.598*** 0.000
ROA, GDP, inflation, unemployment, uncertainty, capital adequacy, exchange rate	Panel v Statist	−3.124 (0.999)	−7.786 (1.000)	0.928 (0.823)
	Panel rho Statistic	3.387 (0.999)	6.893 (1.000)	−0.218 (0.413)
	Panel PP Statistic	−28.212*** 0.000	−40.818*** 0.000	−26.313*** 0.000
	Panel ADF Statistic	−24.351*** 0.000	−28.532*** 0.000	−24.944*** 0.000

(Continues)

TABLE 5 | (Continued)

Variables	Test statistics	I.I	I.I and I. T	No, I or T
ROA, GDP, inflation, unemployment, uncertainty, capital adequacy, policy rate	Panel v Statist	−0.806 (0.790)	−3.267 (0.999)	1.442 (0.074)
	Panel rho Statistic	2.386 (0.991)	4.436 (1.000)	−0.720 (0.235)
	Panel PP Statistic	−26.577*** 0.000	−29.629*** 0.000	−27.436*** 0.000
	Panel ADF Statistic	−24.532*** 0.000	−27.581*** 0.000	−26.303*** 0.000

Note: Statistic is in brackets; w = Weighted Statistic; *** = 1% significance level; I.I. = Individual Intercept; I.I. and I.T. = Individual Intercept and Individual Trend; No, I or T = No Intercept or Trend.

null hypothesis for each category was that there was no cointegration. The results of this test, presented in Tables 5 and 6 below, suggest the presence of cointegration or a long-term relationship between both measures of bank performance and its determinants.

4.4 | Estimation of Models

We employed four-panel estimation techniques to establish the consistency and validity of the findings. Table 7 summarises the panel estimations for Model I which used ROA as the dependent variable and Table 8 for Model II which used ROE as the dependent variable. The diagnostic tests for autocorrelation and heteroscedasticity are summarised in the lower section of the tables. For both the FE and RE estimations, the Durbin-Watson (D-W) test for autocorrelation was only supplied as part of the model estimation findings. As a result, the Lagrange Multiplier (LM) test for heteroscedasticity and the Breusch-Godfrey serial correlation LM test for autocorrelation had to be computed manually. The test statistics for heteroscedasticity and autocorrelation revealed the presence of these properties in most of the cases. The equations were re-estimated using the periodic weights (PCSE) in the coefficient covariance technique for the FE and RE to solve these concerns. Overall, the re-estimations were consistent with the initial estimations (statistical significance and sign of coefficients). Both FMOLS and DOLS computations were able to account for autocorrelation using Newey-West and lead and lag for predictor factors during the first differential, as aforementioned.

Regarding the economic environment, our results show a positive coefficient for GDP, indicating that macroeconomic variables significantly impact bank performance at the 5% significance level. Inflation has a negative effect on performance, aligning with findings by Guru, Staunton, and Balashanmugam (2002) for Malaysia, Jiang et al. (2003) for Hong Kong, and Abreu and Mendes (2001) for European countries. Since strong economic growth tends to enhance profitability, we expect GDP to positively influence profitability by generating new demand in the financial services sector. This contrasts with previous research by Tafri et al. (2009), which reported a negative and significant relationship between Malaysian GDP and return on assets. Additionally, the unemployment rate, which affects average incomes, is believed to influence consumers' ability to repay loans and make deposits. Our study confirms the negative impact of unemployment on ROA, consistent with Messai and Jouini (2013) and Jureviciene and Doftartaite (2013), who found that unemployment adversely affects banks. Furthermore, we observed that an appreciation of the exchange rate positively impacts bank performance, which contrasts with Taiwo and Adesola (2013), who reported that exchange rate volatility might negatively affect banks.

Capital adequacy does not show a significant effect on ROA across all models, suggesting that changes in capital adequacy do not significantly impact ROA in this analysis, where as Olalekan and Adeyinka (2013) reported a positive and significant association between capital adequacy and profitability. Diamond and Rajan (2001) argue that when banks have a robust capital buffer, their capital structure becomes less vulnerable. According to the risk absorption principle, capital positively affects bank liquidity (Berger and Bouwman 2009), enabling greater liquidity creation. However, maintaining a high level of liquid assets, which do not generate income, can make it challenging for banks to sustain profitability. Despite this, it is crucial for banks to hold sufficient liquid assets to handle emergencies.

We found preliminary evidence that economic uncertainty adversely affects bank performance. Our results demonstrate a significant negative relationship between economic uncertainty and ROA, suggesting that increased uncertainty reduces bank performance. Economic uncertainty exacerbates information asymmetry, making it more challenging for banks to accurately predict future returns on investment projects. According to Liu, Liu, and Peng (2018), economic uncertainty acts as "speckle-noise" in the decision-making processes of banks. Under these conditions, banks may adopt more uniform lending practices and exhibit "herding behaviour," which can heighten risk and potentially contribute to a banking crisis. It is worth noting that, in times of uncertainty, demand for foreign currency soars due to a lack of public trust in the native currency, allowing banks to make additional profits. Furthermore, our results affirm that policy rates have a positive relationship with ROA, with an increase in policy rates bank returns on assets increase and vice versa. Finally, our results also reveal that leverage has an insignificant relation with ROA. Our findings contradict Genay and Podjasek's (2014) hypothesis that banks were able to maintain overall profits by reducing provisioning. The value of R^2 is low which is typical in panel data analysis, as highlighted by

TABLE 6 | Pedroni residual cointegration test for bank performance (ROE).

Variables	Test statistics	I.I	I.I and I. T	No, I or T
ROE, GDP	Panel v Statist	−5.039 1.000	−13.251 1.000	1.109 0.1336
	Panel rho Statistic	−26.675*** 0.000	−16.343*** 0.000	−34.560*** 0.000
	Panel PP Statistic	−31.379*** 0.000	−31.949*** 0.000	−29.206*** 0.000
	Panel ADF Statistic	−31.380*** 0.000	−31.752*** 0.000	−29.259*** 0.000
ROE, GDP, inflation	Panel v Statist	−7.076 1.000	−13.404 1.000	−2.579 1.000
	Panel rho Statistic	−18.525*** 0.000	−10.729*** 0.000	−20.909*** 0.000
	Panel PP Statistic	−32.984*** 0.000	−33.163*** 0.000	−29.080*** 0.000
	Panel ADF Statistic	−32.961*** 0.000	−32.704*** 0.000	−29.103*** 0.000
ROE, GDP, inflation, unemployment	Panel v Statist	−8.893 1.000	−14.590 1.000	−5.1704 1.000
	Panel rho Statistic	(−11.887) *** 0.000	(−5.793) *** 0.000	(−14.753) *** 0.000
	Panel PP Statistic	(−31.285) *** 0.000	(−31.537) *** 0.000	(−30.620) *** 0.000
	Panel ADF Statistic	(−31.203) *** 0.000	(−30.694) *** 0.000	(−30.563) *** 0.000
ROE, GDP, inflation, unemployment, uncertainty	Panel v Statist	(−10.321) (1.000)	(−15.290) 1.000	(−7.287) 1.000
	Panel rho Statistic	(−1.453) *** 0.000	(2.719) 0.9967	(−5.348) *** 0.000
	Panel PP Statistic	(−81.044) *** 0.000	(−79.830) *** 0.000	(−47.400) *** 0.000
	Panel ADF Statistic	(−36.004) *** 0.000	(−35.091) *** 0.000	(−33.383) *** 0.000
ROE, GDP, inflation, unemployment, uncertainty, exchange rate	Panel v Statist	(−11.606) 1.000	(−16.200) 1.000	(−8.947) (1.000)
	Panel rho Statistic	(4.587) 1.000	(8.011) 1.000	−2.134 0.983
	Panel PP Statistic	−55.426*** 0.000	−54.957*** 0.000	−51.779*** 0.000
	Panel ADF Statistic	−25.360*** 0.000	−24.010*** 0.000	−25.966*** 0.000
ROE, GDP, inflation, unemployment, uncertainty, exchange rate, policy rate		−9.408 (1.000)	−11.576 (1.000)	−7.633 (1.000)
	Panel rho Statistic	9.371 (1.000)	15.657 (1.000)	5.062 (1.000)
	Panel PP Statistic	−18.027*** (0.000)	−25.219*** (0.000)	−56.497*** (0.000)
	Panel ADF Statistic	−15.079*** (0.000)	−33.049*** (0.000)	−26.461*** (0.000)

(Continues)

TABLE 6 | (Continued)

Variables	Test statistics	I.I	I.I and I. T	No, I or T
ROE, GDP, inflation, unemployment, uncertainty, exchange rate, leverage	Panel v Statist	−6.267 (1.000)	−5.914 (1.000)	−3.729 (0.999)
	Panel rho Statistic	6.766 (1.000)	15.861 (1.000)	3.752 (0.999)
	Panel PP Statistic	−19.069*** (0.000)	−27.241*** (0.000)	−24.098*** (0.000)
	Panel ADF Statistic	−15.059*** (0.000)	−14.661*** (0.000)	−19.928*** (0.000)
ROE, GDP, inflation, unemployment, uncertainty, policy rate, leverage	Panel v Statist	−3.257 (0.999)	−4.704 (1.000)	−0.755 (0.774)
	Panel rho Statistic	5.9221 (1.000)	12.060 (1.000)	3.492 (0.999)
	Panel PP Statistic	−48.153*** (0.000)	−52.496*** (0.000)	−53.731*** (0.000)
	Panel ADF Statistic	−19.375*** (0.000)	−18.315*** (0.000)	−23.986*** (0.000)
ROE, GDP, inflation, unemployment, uncertainty, capital adequacy, leverage	Panel v Statist	−1.728 (0.958)	−1.883 (0.970)	0.748 (0.227)
	Panel rho Statistic	4.755 (1.000)	12.334 (1.000)	2.692 (0.996)
	Panel PP Statistic	−22.340*** (0.000)	−63.277*** (0.000)	−23.976*** (0.000)
	Panel ADF Statistic	−19.267*** (0.000)	−18.758*** (0.000)	−20.872*** (0.000)
ROE, GDP, inflation, unemployment, uncertainty capital adequacy, policy rate	Panel v Statist	−12.406 (1.000)	−16.498 (1.000)	−9.892 (1.000)
	Panel rho Statistic	6.073 (1.000)	9.699 (1.000)	3.728 (0.999)
	Panel PP Statistic	−52.731*** (0.000)	−88.833*** (0.000)	−55.686*** (0.000)
	Panel ADF Statistic	−21.817*** (0.000)	−21.040*** (0.000)	−24.363*** (0.000)
ROE, GDP, Inflation, unemployment, uncertainty capital adequacy, exchange rate	Panel v Statist	−13.521 (1.000)	−17.864 (1.000)	−11.119 (1.000)
	Panel rho Statistic	9.016 (1.000)	12.354 (1.000)	6.523 (1.000)
	Panel PP Statistic	−60.456*** (0.000)	−64.608*** (0.000)	−46.014*** (0.000)
	Panel ADF Statistic	−16.472 (0.000)	−15.307 (0.000)	−20.919 (0.000)

Note: Statistic is in brackets; w = Weighted Statistic; *** = 1% significance level; I.I. = Individual Intercept; I.I. and I.T. = Individual Intercept and Individual Trend; No, I or T = No Intercept or Trend.

Moksony (1999) and Søder (2024). When analysing complex financial and economic variables, it is common for R^2 values to be relatively low due to the high variability and numerous influencing factors. This does not necessarily imply that the model is weak; rather, it reflects the intricate nature of the relationships being examined.

After ROA, we employed the ROE as the measure of bank performance and the results are presented in Table 8.

When comparing the results from Tables 7 and 8, we observe significant differences in how various macroeconomic variables impact the econometric models (FE, RE, FMOLS, and DOLS). For GDP, Table 7 shows no notable effects in the FE and RE models, while FMOLS and DOLS indicate a significant positive impact. In contrast, Table 8 highlights a significant positive effect of GDP in FE, FMOLS, and DOLS models, but not in RE, suggesting a stronger influence in the additional dataset.

TABLE 7 | Panel Estimation—Detriments of Bank Performance (ROA).

Variables	FE	RE	FMOLS	DOLS
GDP	0.000 (0.709)	0.001 (0.309)	0.016** (0.000)	0.019** (0.036)
Inflation	0.001 (0.247)	0.001 (0.232)	−0.272*** (0.000)	−0.263*** (0.001)
Unemployment	−0.000 (0.471)	−0.0002 (0.683)	−0.089*** (0.005)	−0.0824 (0.154)
Uncertainty	−1.85-E05** (0.0191)	−7.59E-06 (0.286)	−1.71E-06 (0.722)	−2.11E-07 (0.981)
Capital adequacy	0.00042 (0.888)	0.0005 (0.844)	−0.013 (0.506)	−0.009 (0.735)
Exchange rate	−8.04E-06 (0.882)	2.94E-05 (0.554)	0.00022*** (0.000)	0.0002*** (0.000)
Policy rate	0.033 (0.055)	0.008 (0.561)	0.107*** (0.002)	0.093 (0.142)
Leverage	−2.52E-06 (0.939)	−1.11E-05 (0.734)	−0.0006 (0.381)	−0.0004 (0.710)
R^2	0.113173	0.0037	−164.400	−146.128
Adj. R^2	0.063041	0.000079	−164.966	−146.604
F Statistic	2.257484	1.021543	—	—
p Value	0.0000	0.41721	—	
D W test	2.066918	1.953270	—	
H-test	1.3401	1.420	1.208	1.073

Note: Coefficients are in brackets; *, ** and *** = 10%, 5% and 1% significance levels, respectively; D-W statistic = Durbin Watson statistic; A. test statistic = Autocorrelation test statistic where Chi-square Distribution at 5% significance level is 16.07; H. test statistic = Heteroscedasticity test statistic where Chi-square Distribution at 5% significance is = 16.07.

TABLE 8 | Panel estimation—detriments of bank performance (ROE).

Variables	FE	RE	FMOLS	DOLS
GDP	0.0119 (0.000)	0.0106 (0.487)	0.326*** (0.000)	0.325*** (0.000)
Inflation	0.0340 (0.1095)	0.0419 (0.495)	−0.422*** (0.011)	−0.495 (0.130)
Unemployment	−0.0385** (0.0285)	−0.007 (0.331)	0.065 (0.709)	0.111* (0.073)
Uncertainty	−0.00023** (0.0484)	−8.50E-05 (0.401)	−0.0003** (0.034)	−0.0003 (0.413)
Capital adequacy	−0.0348 (0.435)	−0.0404 (0.3546)	−0.750*** (0.000)	−0.7609** (0.045)
Exchange rate	0.0002 (0.7824)	0.00028 (0.6904)	0.0018*** (0.000)	0.0018** (0.045)
Policy rate	−0.34815 (0.1694)	0.1266 (0.505)	4.850*** (0.000)	3.7056 (0.169)
Leverage	−0.522E-06 (0.991)	−0.0001 (0.824)	−0.0193* (0.071)	−0.0245 (0.359)
R^2 Adj. R^2	0.0756 (0.233)	0.0059 (0.002)	−1.1993 (−1.208)	−1.851 (−1.861)
F statistic. *p*	1.447 (0.001)	1.6039 (0.118)		
D W test	(2.0692)	(1.962)		
H-test	9.3657	8.9167	862.72	1411.72

Note: Coefficients are in brackets; *, ** and *** = 10%, 5% and 1% significance levels respectively; D-W statistic = Durbin Watson statistic; A. test statistic = Autocorrelation test statistic where Chi-square Distribution at 5% significance level is 16.07; H. test statistic = Heteroscedasticity test statistic where Chi-square Distribution at 5% significance is = 16.07.

TABLE 9 | Determinants of bank performance GMM estimation.

Variable	ROA	ROE
GDP	0.001*	0.012
	(0.224)	(0.417)
Inflation	0.001	−0.040**
	(0.260)	(0.033)
Unemployment	−3.98E−05	−0.005
	(0.933)	(0.405)
Uncertainty	−2.22E−06	−5.63E−05
	(0.744)	(0.568)
Leverage	−1.83E−05	−0.000
	(0.579)	(0.780)
Policy rate	0.026**	0.199
	(0.034)	(0.267)
Exchange rate	−5.32E−05	0.000
	(0.268)	(0.700)
Capital	0.000**	0.042
	(0.802)	(0.335)
Hansen J-Stat.	2160***	2160***
Prob (J-Stat)	0.000	0.000
Instrument rank	10	10
AR (1)	0.011	0.128
AR (2)	0.034	0.494
Observations	2169	2169

Note: **p-value < 0.05, *** < 0.01, and * < 0.10. The Arellano–Bond test of average autocovariance in residuals of order 1 equals 0 is known as AR (1) (H0: there is no autocorrelation). The Arellano–Bond test of average autocovariance in residuals of order 2 equals 0 is known as AR (2) (H0: no autocorrelation).

Regarding inflation, it does not significantly affect the dependent variables in the FE and RE models of Table 7 but shows a significant negative impact in the FMOLS and DOLS models. In Table 8, inflation continues to have a significant negative effect in the FMOLS model but not in the DOLS model, indicating a consistent negative influence in FMOLS across both datasets. Unemployment's impact is more varied: it shows a significant negative effect only in the FMOLS model in Table 7, while Table 8 reveals a significant negative effect in the FE model and a positive effect in the DOLS model, demonstrating changes in significance and direction in the new dataset. Economic uncertainty significantly affects the dependent variable only in the FE model in Table 7. However, Table 8 shows a consistent negative impact in both the FE and FMOLS models, suggesting a stronger adverse effect in the additional dataset.

Capital adequacy does not significantly affect any model in Table 7 but shows a significant negative impact in the FMOLS and DOLS models in Table 8, indicating increased relevance in the new dataset. The exchange rate's positive effect is consistently significant in both FMOLS and DOLS models across Tables 7 and 8, indicating a stable positive influence. The policy rate shows a significant positive effect only in the FMOLS model in both tables, highlighting its restricted impact on the FMOLS model. Leverage, which shows no significant effects in Table 7, exhibits a significant negative impact in the FMOLS model in Table 8, reflecting newfound significance in the additional dataset.

The analysis of ROE variables reveals notable differences compared to ROA. For GDP, while ROA models show no significant

TABLE 10 | Determinants of bank performance developed economies (ROA).

Variables	FE	RE	FMOLS	DOLS
GDP	0.0015	0.0023***	0.093***	0.197***
	(0.2263)	(0.002)	(0.000)	(0.000)
Inflation	0.0026	0.003***	0.290***	0.2426***
	(0.203)	(0.001)	(0.000)	(0.000)
Unemployment	−0.001	0.0007	0.074***	0.075***
	(0.206)	(0.118)	(0.001)	0.000
Uncertainty	−4.02E−05***	−3.04E−05**	5.22E−05***	−5-01E−05***
	(0.006)	(0.025)	0.000	0.000
Capital adequacy	−0.000	0.000	0.59***	0.065***
	(0.875)	(0.867)	0.000	0.000
Exchange rate	4.02E−05	3.04E−05	5.22E−05***	4.51E−05***
	(0.006)	(0.256)	0.000	0.000
Policy rate	0.211	0.247***	0.515***	0.409***
	(0.003)	0.000	0.000	0.000
Leverage	−4.56E−07 (0.990)	−9.39E−06	0.007*** 0.000	0.006***
		(0.811)		0.000
R^2	0.0878 (0.033)	0.016	−850.949	0.01734
Adj. R^2		(0.009)	(−856.117)	(0.117)
F statistic	1.620	2.543		
p Value	0.001	0.009		
D W test	2.133	2.020		
H test	3.639	4.34	110.872	4.431

Note: Coefficients are in brackets; *, ** and *** = 10%, 5% and 1% significance levels respectively; D-W statistic = Durbin Watson statistic; A. test statistic = Autocorrelation test statistic where Chi-square Distribution at 5% significance level is 16.07; H. test statistic = Heteroscedasticity test statistic where Chi-square Distribution at 5% significance is = 16.07.

TABLE 11 | Determinants of bank performance developed economies ROE.

Variables	FE	RE	FMOLS	DOLS
GDP	0.016 (0.377)	0.034** (0.022)	1.451*** 0.000	0.887*** 0.000
Inflation	0.060* (0.056)	0.057*** (0.001)	3.588*** 0.000	3.144*** 0.000
Unemployment	−0.042** (0.026)	0.011* (0.097)	0.779*** 0.000	0.793*** 0.000
Uncertainty	−0.000** (0.040)	−0.000* (0.078)	0.000*** 0.000	0.000*** 0.000
Capital adequacy	−0.006 (0.913)	0.010 (0.845)	0.738*** 0.000	0.695*** 0.000
Exchange rate	0.000 (0.619)	0.000 (0.403)	0.001*** 0.000	0.001*** 0.000
Policy Rate	4.497*** 0.000	4.636*** 0.000	6.774*** 0.000	5.352*** 0.000
Leverage	1.65E−05 (0.987)	−7.40E−05* (0.090)	0.078*** 0.000	0.074*** 0.000
R^2	0.078	0.020	−53.872	−59.071
Adj. R^2	0.024	0.013	−54.205	−59.414
F statistic	1.444***	3.128***		
p Value	0.011	0.001		
D W test	2.18	2.088		
H test	8.500	8.377	926.6	1021.328

Note: Coefficients are in brackets; *, ** and *** = 10%, 5% and 1% significance levels, respectively; D-W statistic = Durbin Watson statistic; A. test statistic = Autocorrelation test statistic where Chi-square Distribution at 5% significance level is 16.07; H. test statistic = Heteroscedasticity test statistic where Chi-square Distribution at 5% significance is = 16.07.

effect except in FMOLS and DOLS where the impact is modestly positive, ROE models display a strong positive effect of GDP across all models, with high significance, indicating a substantial impact on ROE. Inflation negatively affects ROA in FMOLS and DOLS models but has a more variable impact on ROE, being significant in FMOLS but not in FE and RE models. Unemployment shows a generally negative and significant effect on ROA in FMOLS but is inconsistent for ROE: significantly negative in FE and positive in DOLS. Economic uncertainty negatively impacts ROA in the FE model but has a more consistent negative effect on ROE in the FE and FMOLS models, indicating a stronger adverse effect on ROE. Capital adequacy does not significantly affect ROA but has a significant negative impact on ROE in FMOLS and DOLS models. The exchange rate positively influences both ROA and ROE, with significant effects in FMOLS and DOLS for both metrics. The policy rate positively affects ROA only in the FE model but shows a significant positive effect on ROE in FMOLS. Finally, leverage does not significantly impact ROA but has a negative effect on ROE in FMOLS and DOLS models. These variations underscore the differing sensitivities of ROA and ROE to economic and financial variables.

The findings suggest that GDP has a positive impact on ROE, aligning with studies by Louzis, Vouldis, and Metaxas (2012), Curak, Poposki, and Pepur (2012), and Petria, Capraru, and Ihnatov (2015) which indicate that economic growth benefits bank profitability. This contrasts with Rashid and Jabeen (2016), who found a negative impact of GDP on bank performance. The exchange rate's statistically significant positive impact on ROE aligns with Ngerebo (2012) and Saona (2016). The policy rates and leverage demonstrate a negative relationship, consistent with Kosmidou, Tanna, and Pasiouras (2005a). Capital adequacy and unemployment negatively affect ROE, in line with Saona (2016). In contrast, other variables generally have a positive impact on ROE. Specifically, the inverse effect of capital adequacy on ROE observed in the second model suggests that increasing a bank's capital may reduce ROE, which contrasts with Kenny, Jumoke, and Faderera (2014) but aligns with Anbar and Alper (2011), who noted positive yet minor effects.

4.5 | Determinants of Bank Performance GMM Estimation

Next, we used the two-step system GMM estimation, and the results are presented in Table 9.

The GMM results show a positive impact of inflation, capital, and policy rates on bank performance. This is consistent with some of the existing evidence that demonstrates the importance of these determinants of the banking system's performance (e.g.,

see Cetin (2019) for G20 countries, Laubach (2011) for the US, Flamini, McDonald, and Schumacher (2009) for Sub-Saharan Africa and Goddard, Molyneux, and Wilson (2004) for European Union countries). In terms of ROE, our findings show that higher inflation rates have a negative impact which is consistent with the findings of Abreu (2002) on European banks and Moyo and Tursoy's (2020) study on South Africa. The unemployment rate is the final macroeconomic variable we consider in our estimates of bank profitability, and it is important for banks' operational expenditures, stability, and the share of non-performing loans, among other things. Whilst, existing research, has yet to find a clear link between unemployment and bank performance, our findings show a negative impact. This is also the case for uncertainty, leverage, and exchange rate.

4.5.1 | Determinants of Bank Performance Developed Economies

After the joint analysis of emerging & developed economies' banking sectors, we analysed the emerging & developed economies separately. Starting with the developed economies, as in the previous section, the unit-root, cointegration tests were performed. We did find evidence of cointegration & stationarity at first difference.[2] The Durbin-Watson statistics indicate that the model has no autocorrelation issue, making the model more dependable. This cleared the path to proceed to the estimation of models and starting with the ROA the results are presented in Table 10:

The results show that the GDP has a positive impact on bank performance. Inflation has a positive impact on performance implying inflation increases are well managed and leads to having a positive impact on a bank's profitability. The contradictory outcome of the negative relationship between inflation and profitability was found to be in the study of Khrawish (2011), while Saksonova and Solovjova (2011) found a negative association between inflation and profitability. The monetary policy and exchange rates have a positive significant relationship with bank performance, while uncertainty leverage and capital adequacy negatively impact ROA (Ho and Hsu 2010). This inverse impact of capital contradicts the study by Athanasoglou, Brissimis, and Delis (2008), which concluded that banks with more capital are better able to pursue business possibilities and have more time and flexibility to cope with challenges originating from unanticipated losses, resulting in higher profitability. Exchange rates show a direct impact on ROA. Foreign exchange rate oscillations are said to have a significant effect on financial performance in the study by Lambe (2015). Next, we analysed the determinants of bank performance in developed economies while using ROE as the measure of performance. The results are presented in Table 11.

The results show that GDP and inflation have a positive impact on ROE. A higher GDP indicates a better economic environment, which benefits banks and their profitability. When compared to Molyneux and Thornton (1992), who claim that full anticipation of inflation rate suggests the right adjustment of interest rate to increase profitability faster than operating costs, these results appear to be aligned with this study. The inflation period associated with the booming economy is more benign than the deflationary and recessionary. Exchange rates show a minor but positive impact on ROE. Capital shows a positive impact on ROE, in contradiction to the study result by Molyneux and Thornton (1992) who ascertain that capital has a favourable impact on ROE since an increase in the quantity of equity helps banks to lower their cost of capital, resulting in higher profitability. However, banks dislike holding a large amount of money since it affects their return on investment. Both policy rates and leverage have a significant positive impact on bank performance.

TABLE 12 | Determinants of bank performance developed economies GMM estimation.

Variable	ROA	ROE
GDP	0.001 (0.211)	0.019*** (0.000)
Inflation	−0.000 (0.665)	−0.017** (0.022)
Unemployment	0.000 (0.165)	0.007*** (0.002)
Uncertainty	−2.89E−06 (0.846)	0.000*** (0.003)
Leverage	−2.04E−05 (0.604)	−0.000*** (0.002)
Bankrate	0.287*** (0.000)	2.662*** (0.000)
Exchange rate	−8.95E−05 (0.219)	−4.43E−05 (0.750)
Capital	−3.66E−05 (0.991)	−0.003*** (0.005)
Hansen J-Stat.	1222.0***	1223***
Prob (J-Stat)	0.000	0.000
Instrument rank	10	10
AR (1)	0.009	0.109
AR (2)	0.406	0.619
Observations	1231	1232

Note: **p value <0.05, ***p value <0.01. Estimates based on grouped estimation, including only intercept.

4.5.2 | GMM Estimation Determinants of Bank Performance Developed Economies

In our analysis of bank performance in developed economies, we employed the GMM estimation approach. The results are presented in Table 12:

The negative relationship between capital and both performance indicators shows that a higher level of capital held by the banks in these economies may harm their performance. Economic growth and monetary policy rates still have a positive relationship while inflation have a negative impact on bank performance

TABLE 13 | Panel estimations for bank performance (return on assets).

Variables	FE	RE	FMOLS	DOLS
GDP	(0.083)***	(0.070)***	(0.269)***	(0.310)***
	0.000	0.000	0.000	0.000
Inflation	(0.000)	(0.000)	(0.180) ***	(0.203) ***
	0.742	0.734	0.000	0.000
Unemployment	(0.101)	(0.083)	(0.242)	(0.240) ***
	0.127	0.112	0.000***	0.000
Uncertainty	(−1.80E−06)	(1.26E−06)	(8.04E−05) ***	(470.E−06) ***
	0.756	0.823	0.000	0.000
Capital adequacy	(0.060) ***	(0.066) ***	(0.003)	(−0.008)
	0.000	0.000	0.884	0.755
Exchange rate	(5.55E−05)	(1.91E−05)	(0.0001) ***	(0.0001) ***
	0.325	0.720	0.000	0.000
Policy rate	(−0.035) ***	(−0.028) ***	(0.172) ***	(0.160) ***
	0.000	0.004	0.000	0.000
Leverage	(−0.001)	(−0.000) *	(0.011) ***	(0.009) ***
	0.0807	0.086	0.000	0.000
R^2	(0.250)	(0.048)	−0.284	−0.355
Adj. R^2				
F statistic	(5.454) ***	(5.927) ***		
p Value	0.000	0.000		
D W test	1.819	1.717		
H test	5.721	3.564	6.771	28.14

Note: Coefficients are in brackets; *, ** and *** = 10%, 5% and 1% significance levels respectively; D-W statistic = Durbin Watson statistic; A. test statistic = Autocorrelation test statistic where Chi-square Distribution at 5% significance level is 16.07; H. test statistic = Heteroscedasticity test statistic where Chi-square Distribution at 5% significance is = 16.07.

(Lu, Alatengsudao, and Yin 2013) and exchange rates also have a negative impact on the banks' performance. Since unemployment is positively, statistically significantly and strongly associated with profit our findings align with those of Clair (2004) in the case of Singaporean banks, Heffernan and Fu (2008) in the case of Chinese banks, Abreu and Mendes (2001) in the case of Spanish, German, and French banking systems.

4.5.3 | Determinants of Bank Performance in Emerging Economies

After the developed economies, we analysed the determinants of bank performance in emerging economies while specifically focusing on the E7 countries. We started with the standard unit root testing and cointegration. The results show that all the variables were stationarity at level or first difference and there was also evidence of cointegration.[3] Thereafter we moved the estimation of the model starting with the ROA and the results are presented in Table 13.

According to the results, GDP, inflation, exchange rate and capital adequacy have a positive impact on the return on assets, suggesting a favourable link between these macroeconomic factors, capital adequacy and ROA. This matched the findings of other studies such as Pasiouras and Kosmidou (2007) and Sufian and Chong (2008). This positive association indicates that if a bank in emerging economies prefers a higher capital ratio it may have a positive impact on its performance by avoiding liquidity and credit shocks. Nevertheless, there is evidence of a negative association between leverage and ROA. In practice, during a financial crisis, liquidity can be a huge issue. These findings can be seen in parallel to those of Rasiah (2010) and Gerakos, Lang, and Maffett (2011), who found a negative relationship between ROA and leverage. Our findings are similar to those of Vieira (2010) who discovered a short-run positive association between liquidity and ROA. We also found that policy rates and economic uncertainty have a negative influence on ROA. It demonstrates that in E7, rapid economic growth boosts profitability. Changes in the overall level of activity are projected to have a direct impact on bank profitability. This conclusion is consistent with prior findings (e.g., Demirguc-Kunt and Huizinga 1999). Inflation is another crucial factor that has a direct link with ROA. The capital ratio positive impact on ROA, implying that well-capitalised banks have positive returns. The inflation rate has the greatest effect on banks' return on assets among the external factors. After the ROA, we employed the RoE as the measure of bank performance and the results are presented in Table 14.

TABLE 14 | Panel estimations for bank performance (roe).

Variables	FE	RE	FMOLS	DOLS
GDP	0.933***	0.837***	2.764***	2.420***
	0.000	0.000	0.000	0.000
Inflation	0.004	0.000	2.221***	1.985***
	(0.774)	(0.991)	0.000	0.000
Unemployment	1.434	0.158	2.648***	2.717***
	(0.063)	(0.733)	0.000	0.000
Uncertainty	−6.55E−05	−4.09E−05	0.000***	0.000***
	(0.331)	(0.509)	0.000	0.000
Capital adequacy	−2.477	−2.134***	0.946***	0.863***
	0.000***	0.000	0.000	0.000
Exchange rate	−0.000	−0.000	0.001***	0.001***
	(0.587)	(0.660)	0.000	0.000
Policy rate	−0.478***	−0.405***	2.106***	2.062***
	0.000	0.000	0.000	0.000
Leverage	0.003	0.000	0.118***	0.113***
	(0.643)	(0.917)	0.000	0.000
R^2	0.271	0.172	−5.214	−0.934
Adj. R^2	(0.233)	(0.166)	(−5.264)	(−0.948)
F statistic	6.292***	24.249***		
p Value	0.000	0.000		
D W test	1.048	0.973		
H test	179.904	185.526	869.53	296.092

Note: Coefficients are in brackets; *, ** and *** = 10%, 5% and 1% significance levels respectively; D-W statistic = Durbin Watson statistic; A. test statistic = Autocorrelation test statistic where Chi-square Distribution at 5% significance level is 16.07; H. test statistic = Heteroscedasticity test statistic where Chi-square Distribution at 5% significance is = 16.07.

We evaluated the impact of gross domestic product (GDP), inflation unemployment, uncertainty leverage policy rate capital adequacy, and exchange rate on return on equity (ROE). The results indicate that the ROE is positively affected by the GDP, inflation, unemployment, and leverage, while other variables negatively influence ROE. Capital adequacies have an inverse impact on ROE. The finding was in line with the study by Buchory (2015) but contrary to the studies that suggest a high capital adequacy ratio boosts profitability (see e.g., Molyneux and Thornton 1992; Abreu 2002; Saeed 2014). Exchange rates negatively affect ROE, and our results are consistent with Wong et al. (2008).

4.5.4 | GMM Estimation Determinants of Bank Performance Emerging Economies

Lastly, we employed the GMM estimation to analyse the determinants of Bank performance in emerging economies and the results are presented in Table 15.

Our study result shows inflation, GDP and capital adequacy have a statistically significant positive impact on the performance (ROA and ROE) of banks in emerging markets. The findings support the findings of Bikker and Hu (2002) and Sufian (2012), who found a positive link between GDP and bank performance (ROA). However, the findings are contradictory to those of Staikouras and Wood (2003), who claim that unexpected inflation has a detrimental impact on bank profitability. A study by (Athanasoglou, Brissimis, and Delis 2008) confirms that inflation and profitability are linked if inflation is anticipated by management, they can adjust their interest rate accordingly. Our study result is consistent with Naeem, Baloch, and Khan (2017) and Le and Nguyen (2020), who find that the capital adequacy ratio has a significant association with the profitability of the bank which in our case performance is assessed by ROA and ROE. Whereas contradicts the finding of Yahya, Akhtar, and Tabash (2017) who state that capital adequacy has a negative and insignificant association with performance. The remaining variables have a negative impact on ROA and ROE. Unemployment has an inverse relationship with profitability. A lower unemployment rate means high bank profitability, as high unemployment attracts poor economic activity, higher default risk, and disproportionate initial banking crises (Bofondi and Ropele 2011). These results are intuitive. The uncertainty also seems to weigh on the performance of the banking sector in emerging economies.

TABLE 15 | GMM estimation determinants of bank performance in emerging economies.

Variable	ROA	ROE
GDP	0.035**	0.613***
	(0.051)	(0.004)
Inflation	0.001*	0.009
	(0.091)	(0.160)
Unemployment	−0.062	−0.209
	(0.191)	(0.618)
Uncertainty	−1.93E−06	5.06E−06
	(0.623)	(0.906)
Leverage	−0.000	0.002
	(0.102)	(0.536)
Policy rate	−0.031	−0.225
	(0.183)	(0.573)
Exchange rate	−0.000	−2.18E−05
	(0.138)	(0.969)
Capital	0.090***	0.408
	(0.000)	(0.615)
Hansen J-Stat.	3.156*	3.778**
Prob (J-Stat)	0.075	0.051
Instrument rank	10	10
AR (1)	0.014	0.153
AR (2)	0.022	0.243
Observations	938	937

Note: **p value < 0.05, *** < 0.01, and * < 0.10.

5 | Conclusion

The performance of the banking sector is of profound importance to a country since it is a key determinant of economic and financial stability. This study offers new insight into the performance of the banking sector in the G7 & E7 economies. Specifically, we investigated the impact of the macroeconomic environment, regulatory environment, monetary policy, and economic uncertainty on bank performance in developed and emerging economies. The consideration of the effects of the regulatory environment on bank profitability, as well as the use of an appropriate econometric methodology for the estimate of dynamic panel data models, are both novel characteristics of our research. Our findings lead us to conclude that overarchingly, economic growth, inflation and policy rates have a positive impact on bank performance, whereas unemployment and uncertainty negatively affect banks. There was also evidence that the high-level leverage can impede bank performance manifested in the negative impact on both returns on assets and equity. The positive impact of monetary policy rates is a crucial finding given central banks have started to take a contractionary stance recently following several years of low interest rates. Exchange rate dynamics seem to show some negative impact on the return on assets, however, the return on equity seems not to be negatively affected by the exchange rate. Capital adequacy seems to have a positive impact on the return on assets showing that the bank's performance may improve with the higher capital though it may have a negative impact on the return on equity. However, for the long-term stability of the banking sector, high capital ratios are vital and contribute positively to the banks' performance.

We also analysed the determinants of bank performance in emerging and developed economies in seclusion. Starting from the developed economies, our results lead us to conclude that the economic outlook is a significant contributor to bank performance. The policy rates also seem to have a positive impact which implies that the policy of ultra-low rates that prevailed in the G-7 economies since the Global Financial Crisis has not helped the banks' performance. Furthermore, the uncertainty, leverage and exchange rate dynamics have a negative impact on bank performance in developed countries. Higher capital ratios also seem to weigh on the bank performance, although the impact was more pronounced on the return on equity which is consistent with our earlier findings and implies caution in prudential policies in the developed economies. On the administrative level, regulators must watch out for new policies that could burden banks unless they would help the banks' performance. Lastly, our analysis of the emerging economies' banking sector led us to conclude that economic growth is also a major contributing factor to the performance of the banks. Inflation in emerging economies does not impede the banking sector's performance in these economies. However, unemployment, exchange rate dynamics and uncertainty are the factors that are crucial and can negatively affect the emerging economies' banking sector. Interestingly, contrary to the developed economies, the monetary policy rates can negatively affect the bank performance in the emerging markets banking sector. This is a crucial finding in terms of monetary policy formulation in these economies. Particularly the quantitative tightening that is adopted by a number of central banks including the Fed, ECB and the Bank of England. Nevertheless, our findings also lead us to conclude that capital adequacy can positively contribute to the banking sector performance in emerging economies. Putting together the findings and conclusions on both groups of economies it is evidence that one size does not fit all and the same macroeconomic factors, monetary policy stance and prudential policies can have a different impact on the emerging and developed economies. Perhaps the factors which are common in impact are economic growth and uncertainty. The study's findings have critical implications for both policymakers and the banking sector, emphasising the need for tailored approaches in policy formulation. It highlights the differing effects of monetary policy between developed (G7) and emerging (E7) economies—while higher policy rates boost bank performance in developed economies, they negatively impact banks in emerging markets. This underscores the importance of customising monetary policy to the specific economic context. Additionally, regulatory considerations, such as capital adequacy, are vital for ensuring financial stability, though they may limit profitability, particularly in developed markets. Economic growth is a consistent driver of bank performance in both sets of economies, while unemployment and economic uncertainty universally hinder the sector. These findings reinforce that a one-size-fits-all policy approach is ineffective, and a nuanced understanding of macroeconomic environments is essential for enhancing bank performance and ensuring financial stability.

In this study, we focus on the G7 and E7 economies, further research can focus on the other economies and also focus on other factors, such as bank-specific factors, geopolitical factors or major events which may affect banks' performance.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Endnotes

[1] 1%, 5%, and 10% level of significance are chosen as per empirical convention.

[2] Those results have been concealed to save space and are available upon request.

[3] The results have been concealed to save space, can be provided upon request.

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