

Explaining Return on Assets of Government-Owned Universal Banks in the Philippines Using Murtini-Purnama-Lumbantobing Hypotheses

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Abstract:

This study analyzed the financial performance of three government-owned universal banks in the Philippines, namely Land Bank of the Philippines (LBP), Development Bank of the Philippines (DBP) and Al-Amanah Islamic Investment Bank of the Philippines (AAIIBP), from 2012 to 2022. Anchored in the Murtini-Purnama-Lumbantobing hypotheses, the study described the Return on Assets (ROA), Capital Adequacy Ratio (CAR), and Operating Expense and Operating Income (BOPO) Ratio, Non-Performance Loans (NPL), and Interest Rate of the three banks over the study period. Furthermore, it examined the impact of CAR and BOPO Ratio on ROA, as well as the mediating role of NPL and the moderating role of Interest Rates on this relationship. Based on the results, policy recommendations were proposed.

The study employed an ex-post facto research design, analyzing secondary data from financial statements, Banks' annual reports, and BSP reports. While the researcher computed ROA and BOPO Ratio, the CAR and NPL Ratios were directly sourced from the financial statements and annual reports. Data on Interest rates were derived from BSP's report on Domestic Interest Rates. Data gathered were analyzed through line graphs to visually present the trend, Generalized Linear Model (GLM) Mediation Analysis to determine whether the relationship between independent variables (CAR and BOP) on a dependent variable (ROA) is mediated by an intermediate variable (NPL), and Moderation Analysis to examine how the relationship between an independent variable (CAR) and a dependent variable (ROA) changes depending on the level of third variable, known as the moderator variable (Interest Rate).

Findings revealed that AIB consistently exhibited negative ROA, highlighting profitability challenges, while LBP and DBP showed positive, though generally below-industry-average, returns. LBP and DBP maintained CAR above the 10% BSP requirement despite fluctuations, while AIB's CAR sharply declined from 203.89% in 2012 to 3.43% in 2020. All three banks had higher BOPO ratios than the industry average. NPL trends varied, with LBP and DBP fluctuating due to market conditions, and AIB's NPL surging to 18.89% in 2022 after a period of near-zero NPLs. Interest rates, stable from 2012-2017, rose in 2018 due to inflation. CAR had a statistically significant negative impact on ROA (Estimate: -0.013, SE: 0.005, β : -0.124, z: -2.560, $p = 0.010$), as did BOPO (Estimate: -0.035, SE: 0.002, β : -0.928, z: -19.170, $p < 0.001$). NPL's mediating effect on both relationships was insignificant ($p > 0.35$). However, interest rates significantly moderated the CAR-ROA relationship (CAR*IR interaction: Estimate: 19.1631, SE: 8.5281, z: 2.247, $p = 0.025$). Based on these findings, the researcher proposed policy recommendations intended to reduce NPLs, including integration of enhanced NPL data analytics and AI-based risk management and promotion of financial education programs for borrowers.

Keywords — Ratio on Return on Assets (ROA), Capital Adequacy Ratio (CAR), Operating Expense to Operating Income (BOPO) Ratio, Non-Performing Loans (NPL), Interest Rate

I. INTRODUCTION

The banking sector plays a crucial role in economic and social development, serving as the backbone of financial systems worldwide. Beyond facilitating financial transactions and credit provision, banks drive economic growth, create employment opportunities, and support businesses across industries. The financial performance of banks is a cornerstone of economic stability and growth, influencing investor confidence, policy decisions, and overall economic development.

In the Philippines, government-owned universal banks hold a unique and critical position within the financial system. They are mandated to support economic development through a range of financial services and programs that align with national priorities. This makes the assessment of their financial performance vital to ensuring they fulfill their roles effectively and efficiently.

Over the last decade, the global banking sector has faced a multitude of challenges, including financial crises, regulatory overhauls, and economic fluctuations. These challenges have underscored the need for robust financial performance metrics to evaluate the health and stability of banks. Locally, government-owned universal banks in the Philippines face their own set of challenges and opportunities. Understanding their financial performance provides insights into their areas of strength and vulnerability, enabling the development of strategies that ensure these institutions can continue to support economic development effectively.

While prior research has explored bank financial performance, it often overlooks the unique context of government-owned universal banks. For example, Safitri and Octavia (2022) examined the impact of Capital Adequacy Ratio (CAR) and Non-Performing Loans (NPL) on Return on Assets (ROA), moderated by interest rates, in Indonesian conventional commercial banks. While insightful, their focus on private institutions neglects the distinct social and developmental responsibilities inherent in the mandates of government-owned universal banks. Similarly, Cuaca et al. (2020) investigated the effect of CAR, NPL, and the Operating Cost to Operating Income (BOPO) ratio

on the profitability (ROA) of Indonesian private banks, but their analysis, limited to the 2016-2018 period, did not consider the potential moderating influence of interest rates.

This study addresses these limitations by focusing specifically on government-owned universal banks in the Philippines. It aims to analyze their financial performance from 2012 to 2022, a longer timeframe designed to capture a wider range of economic cycles. Grounded in the Murtini-Purnama-Lumbantobing hypotheses, this study focuses on examining the effects of the CAR and BOPO Ratio on financial performance, measured by ROA. Additionally, it investigates the mediating role of NPL in the relationship between CAR, BOPO, and ROA, as well as the moderating role of Interest Rates in the relationship between CAR and ROA. By incorporating these elements, this study offers a more comprehensive and nuanced understanding of the factors influencing the financial performance of government-owned universal banks in the Philippines.

II. OBJECTIVES

This study seeks to explain the financial performance of government-owned universal banks using Murtini-Purnama-Lumbantobing hypotheses. Specifically, this seeks answers for the following questions:

1. How may the return on assets of government-owned universal banks in the Philippines be described from year 2012-2022?
2. What is the status of government-owned universal banks in the Philippines from year 2012-2022 in terms of the following variables:
 - 2.1. capital adequacy;
 - 2.2. BOPO ratio;
 - 2.3. non-performance loan; and
 - 2.4. interest rate?
3. Does return on assets of government-owned universal banks significantly validates the Murtini-Purnama-Lumbantobing hypotheses?
4. Based on findings, what recommendations to policy may be proposed?

III. RESULTS AND DISCUSSION

1. Description of the Return on Assets of Government-Owned Universal Banks in the Philippines from 2012-2022

To describe the return on assets (ROA) trends of government-owned universal banks in the Philippines from 2012 to 2022, Figure 1 provides a clear illustration of the changes over time. The figure highlights variations in performance, reflecting both external economic factors and internal bank management strategies during this period.

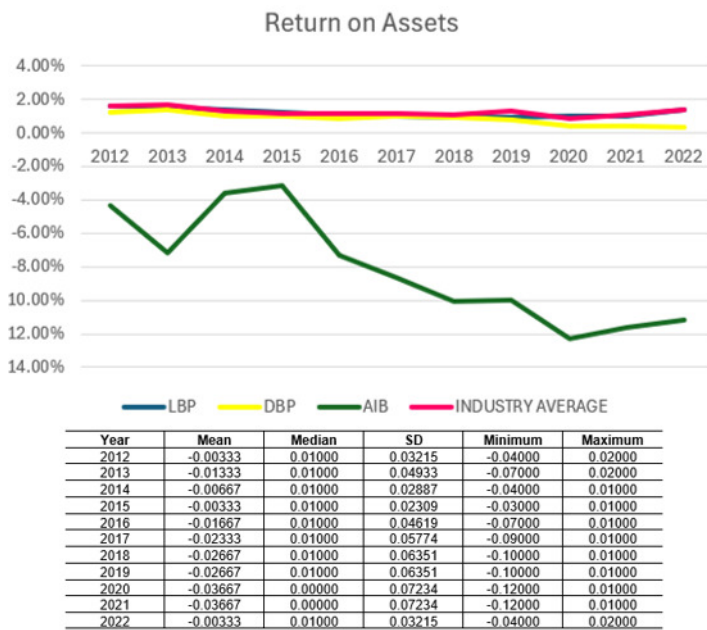


Figure 1. Return on assets of three government-owned universal banks in the Philippines for the years 2012 – 2022

As illustrated in Figure 1, LBP and DBP demonstrated positive ROA, although their

performance occasionally fell short of the industry average. AIB, however, consistently reported the lowest ROA, remaining negative throughout the observed period. Primarily influenced by AIB’s performance, the mean is consistently negative across the years, reaching its lowest values in 2020 and 2021 (-0.03667). The median ROA remained stable at 0.01000 from 2012 to 2019. However, in 2020 and 2021, the median plummeted to 0.00000. The standard deviation (SD) increases over time, becoming particularly noticeable from 2017 onward. In 2018 and 2019, the SD reaches its highest level (0.06351).

Throughout the entire period, AIB's ROA remains consistently negative, highlighting its ongoing struggle to achieve profitability. In contrast, both LBP and DBP demonstrate positive returns, albeit below the industry average in most years. However, LBP stands out, surpassing the industry average in 2014, 2015, and 2020, further emphasizing its relatively stronger financial performance. Despite their ratios being below the industry benchmark for most of the period, LBP and DBP have managed to generate positive returns over the years, unlike AIB, whose negative performance significantly drags down the overall results.

2. Status of the Government-Owned Universal Banks in the Philippines From Year 2012-2022

2.1. Capital Adequacy Ratio (CAR)

Figure 2 illustrates the trend in the CAR of the three government-owned universal banks in the Philippines from 2012 to 2022.

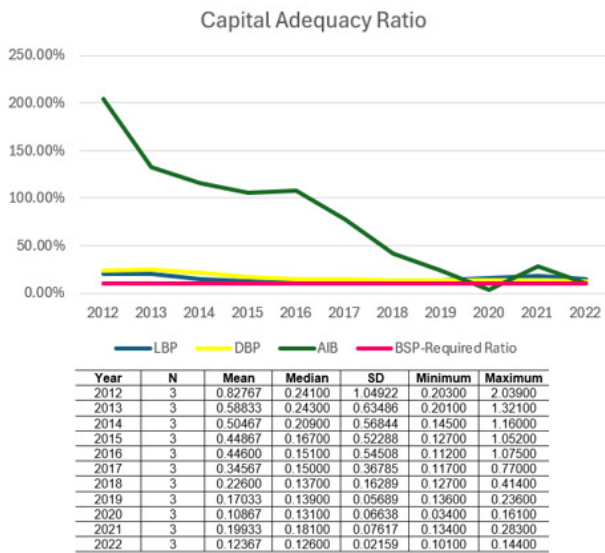


Figure 2. Capital adequacy ratio of three government-owned universal banks in the Philippines for the years 2012 – 2022

The CAR of three government-owned Philippine banks—LBP, DBP, and AIB—highlight their differing financial trajectories from 2012 to 2022. LBP and DBP maintained a robust CAR above regulatory requirements, while AIB started with an exceptionally high CAR of 203.89% in 2012 but suffered a sharp decline with CAR plummeting to 3.43% in 2020. The mean CAR starts at a high of 0.82767 (2012) but steadily decreases to 0.10867 (2020). A slight rebound is observed in 2021 (0.19933) before it drops again slightly in 2022 (0.12367). The median CAR shows a similar declining trend, starting at 0.24100 (2012) and dropping to 0.13100 (2020). From 2012 to 2016, the standard deviation (SD) is notably high, peaking at 1.04922 (2012). Over time, SD decreases dramatically, reaching 0.06638 (2020).

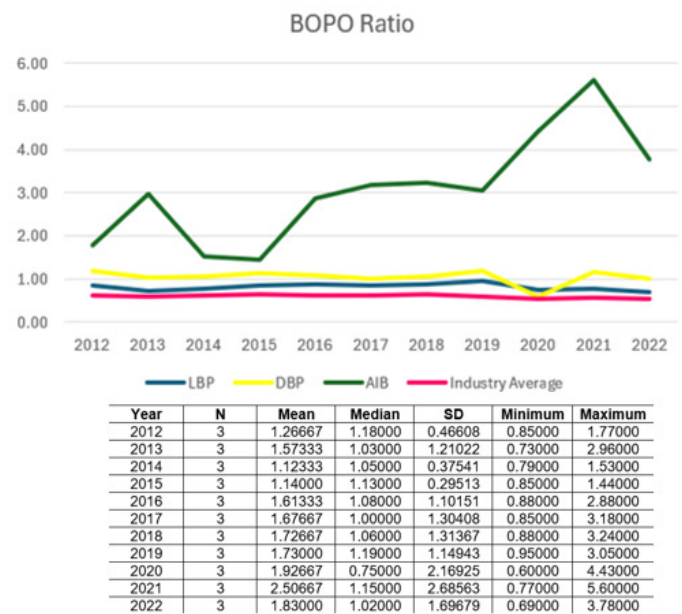
LBP experienced fluctuations in CAR, driven by regulatory adjustments under Basel III and changes in risk-weighted assets, but consistently remained above the 10% regulatory threshold. Despite challenges, LBP's CAR peaked at 18.13% in 2021 before declining to 14.44% in 2022 due to loan portfolio expansion. DBP maintained a robust CAR above regulatory requirements, with its CAR decreasing from 24.33% in 2013 to 20.91% in 2014 following Basel III implementation, though it remained compliant in subsequent years. AIB started with an exceptionally high CAR of 203.89% in 2012 but suffered a sharp decline due to

operating challenges, net losses, and the COVID-19 pandemic, with CAR plummeting to 3.43% in 2020. Although capital infusions temporarily improved AIB's CAR, it remained the weakest among the three banks, hovering near regulatory minimums by 2022.

2.2. Operating Expenses and Operating Income (BOPO) Ratio

Figure 3 visually illustrates the trend in the BOPO ratio of the three government-owned banks in the Philippines from 2012 to 2022.

Figure 3. Operating expenses and operating income (BOPO) ratio of three government-owned universal banks in the Philippines for the years 2012 – 2022



The three government-owned universal banks in the Philippines exhibit a higher Business Operating Profitability (BOPO) Ratio compared to the industry average. This indicates that their operating costs, relative to their operating income, are higher than the industry benchmark.

The average BOPO ratio for the three banks from 2012 to 2022 exceeded 1, indicating that their operating expenses generally outpaced their operating income. However, LBP consistently maintained a BOPO ratio below 1, suggesting that its operating income exceeded its operating expenses. DBP's BOPO ratios were generally slightly above 1, except in 2020. In contrast, AIBP consistently exhibited high BOPO ratios, peaking in 2021. Even AIBP's lowest ratio in 2015 surpassed

those of both DBP and LBP. The significant disparity between the mean and median values in 2020 and 2021, primarily due to AIIBP's extreme values, suggests that these outliers skewed the mean upward. Additionally, the high standard deviation in 2021 indicates substantial variation in the BOPO ratio among the banks that year. According to AIIBP's 2021 Annual Report, surge in BOPO Ratio was primarily due to a significant decrease in gross earnings resulting restriction on loan releases due to the low Single Borrower's Limit and depleting CAR therefore the lower profit on Islamic Financing and Conventional Loans in the First Semester of 2021. Loans and Islamic Financing releases resumed only in July 2021. Recommended font sizes are shown in Table 1.

2.3. Non-Performance Loan (NPL) Ratio

Figure 4 provides visual presentation of the Non-Performing Loan (NPL) Ratio of three government-owned universal banks in the Philippines from 2012 to 2022.

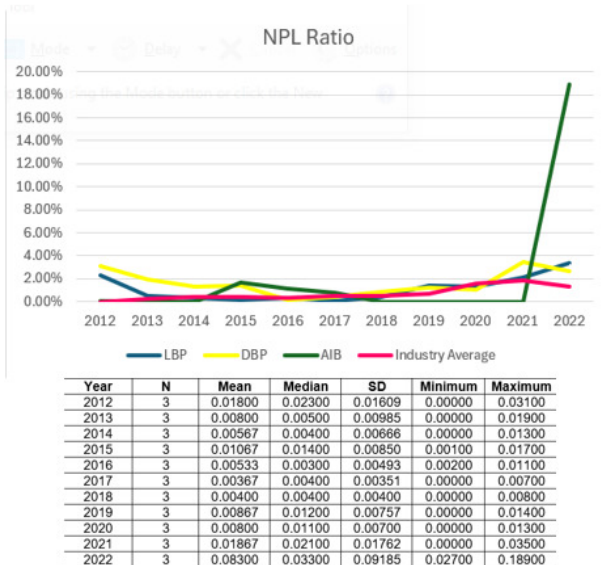


Figure 4. Non-performance loans (NPL) ratio of three government-owned universal banks in the Philippines for the years 2012 – 2022

The graph reveals fluctuating NPL ratios for LBP, DBP, and AIB from 2012 to 2022, suggesting varying levels of credit risk management effectiveness across the three banks. While all three banks experienced periods of increasing and decreasing NPL ratios, the overall mean NPL ratio fluctuated considerably, ranging from a low of 0.00567 in 2014 to a high of 0.08300 in 2022. The

median NPL ratio, while also subject to fluctuations, remained comparatively lower, varying between 0.00300 and 0.03300. The substantial standard deviation observed in 2022 (SD = 0.09185) underscores the significant variability in NPL ratios during that year.

LBP reduced its NPL ratio significantly from 2.31% in 2012 to a low of 0.02% in 2017, outperforming the industry. However, challenges like a default from big-ticket accounts, the pandemic, and its merger with UCPB pushed its NPL ratio to 3.32% in 2022, exceeding the industry average. Similarly, DBP improved its NPL ratio from 3.05% in 2012 to align with industry levels by 2017, but pandemic-related relief loans caused it to peak at 3.45% in 2021 before improving to 2.67% in 2022. AIB maintained near-zero NPL ratios from 2012 to 2014 and from 2018 to 2021, demonstrating strong credit management. However, its NPL ratio surged to 18.89% in 2022 due to pandemic aftereffects and operational challenges, marking a steep decline in asset quality.

2.4. Interest Rate

Figure 5 depicts the trend in interest rates from 2012 to 2022.

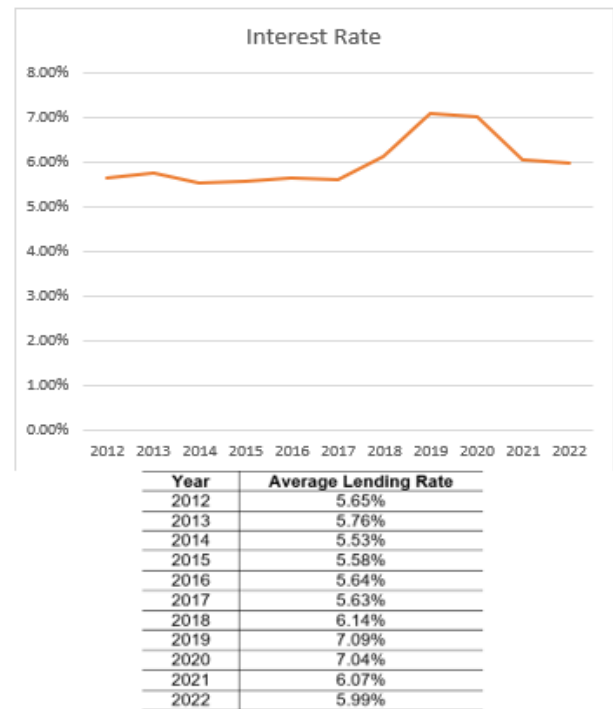


Figure 5. Bank average lending rate for the years 2012 – 2022

The average lending rate remained relatively stable between 2012 and 2017, fluctuating between 5.5% and 5.76%. However, in 2018, the average lending rate increased significantly to 6.14%. This rise was a direct response to the increasing inflation rate, which reached 5.31% that year. To curb inflation, the Bangko Sentral ng Pilipinas (BSP) implemented a tighter monetary policy stance by raising interest rates. This made borrowing more expensive, reducing demand for loans and consequently slowing down economic activity (Rivas, 2018; World Bank, 2019). In 2020, due to low inflation and the economic impact of the COVID-19 pandemic, the BSP adopted an accommodative monetary policy stance. This involved lowering interest rates and reducing reserve requirements to stimulate economic growth (World Bank, 2020).

3. Significant Validation of Return on Assets of Government-Owned Universal Banks Using Murtini-Purnama-Lumbantobing Hypotheses

Table 1 presents the descriptive statistics of the relationship between CAR, BOPO, NPL and ROA for three government-owned universal banks in the Philippines from 2012 to 2022.

Table 1 presents the descriptive statistics of these key financial indicators for the three government-owned universal banks in the Philippines over the period from 2012 to 2022. These statistics provide an overview of the central tendencies, variability, and overall patterns in the data, helping to illustrate how these factors interact over time. The data can offer insights into trends in capital adequacy, cost efficiency, asset quality, and profitability, as well as how they may have been affected by regulatory changes, economic fluctuations, and banking sector policies.

TABLE I
RELATIONSHIP OF CAR, BOPO, NPL AND ROA OF THREE GOVERNMENT-OWNED UNIVERSAL BANKS IN THE PHILIPPINES FOR THE YEARS 2012 – 2022

Effect	Estimate	SE	β	z	p	Decision to H_0	Interpretation
Total							
CAR to ROA	-0.013	0.005	-0.124	-2.560	0.010	Reject	Significant
BOPO to ROA	-0.035	0.002	-0.928	-19.170	<.001	Reject	Significant
Direct Effect							
CAR to ROA	-0.014	0.005	-0.138	-2.893	0.004	Reject	Significant
BOPO to ROA	-0.035	0.002	-0.915	-19.218	<.001	Reject	Significant
Component							

CAR to NPL	-0.016	0.012	-0.226	-1.313	0.189	Failed to reject	Not Significant
NPL to ROA	-0.089	0.068	-0.062	-1.315	0.188	Failed to reject	Not Significant
BOPO to NPL	0.006	0.005	0.218	1.268	0.205	Failed to reject	Not Significant

The total effects analysis shows that CAR has a statistically significant negative impact on ROA (Estimate: -0.013, SE: 0.005, β : -0.124, z: -2.560, p = 0.010), indicating that CAR primarily influences ROA through its direct effect, with minimal contribution from indirect effects via NPL. This result leads to the rejection of the null hypothesis for CAR. Similarly, BOPO exhibits a strongly negative and statistically significant total effect on ROA (Estimate: -0.035, SE: 0.002, β : -0.928, z: -19.170, p < 0.001), confirming that the relationship between BOPO and ROA is predominantly direct, with negligible mediation by NPL. The null hypothesis for BOPO is also rejected based on these findings.

In the direct effect analysis, findings reveal that CAR has an estimate of -0.014 with a standard error of 0.005 and a standardized beta coefficient (β) of -0.138. The z-score of -2.893 and a p-value of 0.004 indicate a statistically significant negative relationship between CAR and ROA, leading to the rejection of the null hypothesis. Similarly, BOPO exhibits an estimate of -0.035 with a standard error of 0.002 and a standardized beta coefficient (β) of -0.915. Its z-score of -19.218 and a p-value of <0.001 indicate a highly significant negative relationship with ROA, also resulting in the rejection of the null hypothesis.

The results suggest that both CAR and BOPO have significant negative impacts on ROA, indicating that higher CAR and BOPO values are associated with lower ROA among the three government-owned banks. The significant negative relationship of CAR with ROA may reflect the capital conservation tendencies of banks, where higher capital adequacy requirements may limit the proportion of resources allocated to income-generating activities. This aligns with the notion that while a strong CAR enhances stability, it might come at the cost of lower profitability. The highly negative relationship between BOPO and ROA highlights the critical impact of operational efficiency on bank profitability. A higher BOPO,

indicative of higher operating expenses relative to income, directly erodes profitability, emphasizing the need for efficient cost management to sustain a positive ROA.

The result aligns with the findings of Al-Sharkas, A. and Al-Sharkas, T. (2022), who also reported a negative correlation between capital adequacy ratio (CAR) and return on assets (ROA). However, these results differ from the studies of Murtini et al. (2023), Agustina and Pratiwi (2024), Hartanto and Syarif (2022), and Cuaca et al. (2020) and Mendoza and Rivera (2017), which found no significant relationship between CAR and ROA. Additionally, research by Matanubun and Wiyarni (2023), Safiri and Oktavia (2022) and Sunaryo (2020) highlighted a positive relationship between CAR and ROA, suggesting that higher levels of CAR could enhance profitability by boosting stakeholder confidence, improving credit ratings, and lowering the cost of capital. These mixed results highlight the complex interplay between regulatory capital requirements and bank profitability, which may vary depending on the economic environment and banking practices. The findings regarding the relationship between BOPO and ROA reveal a significant and strong negative impact of the BOPO ratio on ROA. A higher BOPO ratio, which indicates operational inefficiency, directly reduces profitability, as banks face higher costs relative to their income. This result aligns with previous research by Agustina and Pratiwi (2024), Hartanto and Syarif (2022), Cuaca et al. (2020), and Wardoyo et al. (2020), all of whom also found that inefficiencies in operations, as reflected by a higher BOPO ratio, negatively affect bank profitability.

The component effect analysis shows that CAR's effect on NPL has an Estimate of -0.016, with a standard error (SE) of 0.012, and a β coefficient of -0.226. The z-value of -1.313 and a p-value of 0.189 indicate that the relationship is not statistically significant, as the p-value exceeds the standard threshold of 0.05. Similarly, the effect of BOPO on NPL has an Estimate of 0.006, an SE of 0.005, and a β coefficient of 0.218. The z-value of 1.268 and a p-value of 0.205 similarly fail to meet the significance threshold. The null hypotheses for both relationships are not rejected, indicating no

statistically significant effects of CAR or BOPO on NPL for the observed period.

The lack of statistical significance in the CAR-to-NPL relationship suggests that fluctuations in capital adequacy ratios did not directly influence the levels of non-performing loans in the analyzed banks. This may imply that while maintaining a robust CAR is essential for overall financial stability, it might not be a direct determinant of loan performance. On the other hand, the BOPO-to-NPL relationship shows a weak positive association, but it is also statistically insignificant. This suggests that operating efficiency, as measured by BOPO, may not have been a primary factor in influencing NPL levels during the study period.

The findings regarding the relationship between CAR and NPL levels align with previous research by Murtini et al. (2023) and Irawan and Syarif (2019), which also indicated that CAR does not have a significant impact on NPL levels. This suggests that a higher CAR, while indicative of a bank's financial stability, does not necessarily translate to lower NPLs. Conversely, the analysis revealed no significant relationship between BOPO and NPL levels, contradicting the findings of Murtini et al. (2023) and Abidi and Sastradipraja (2023). This discrepancy could be attributed to various factors, including differences in sample size, geographical context, and specific economic and regulatory conditions during the study periods.

Table 2 presents the mediation effects of Non-Performing Loans (NPL) on the relationship between Capital Adequacy Ratio (CAR) and Return on Assets (ROA), as well as between Operating Income to Operating Costs (BOPO) and ROA, for three government-owned universal banks in the Philippines for the period 2012 to 2022.

TABLE 2
MEDIATION OF NON-PERFORMANCE LOAN BASED ON THE EFFECT OF CAR AND BOPO ON ROA OF THREE GOVERNMENT-OWNED UNIVERSAL BANKS IN THE PHILIPPINES FOR THE YEARS 2012 – 2022

Effect	Estimate	SE	β	z	p	Decision to H_0	Interpretation
CAR \Rightarrow NPL \Rightarrow ROA	0.001	0.002	0.014	0.929	0.353	Failed to reject	Not Significant
BOPO \Rightarrow NPL \Rightarrow ROA	-0.001	0.001	-0.014	-0.913	0.361	Failed to reject	Not Significant

In the Generalized Linear Model (GLM) Mediation Analysis, the mediation effect of NPL on

the relationship between CAR and ROA yields an estimate of 0.001, a standard error (SE) of 0.002, and a beta coefficient (β) of 0.014, with a z-value of 0.929 and a p-value of 0.353. These results suggest that the mediation effect of NPL in this relationship is not significant, as the p-value exceeds the significance threshold of 0.05. Similarly, for the relationship between BOPO and ROA mediated by NPL, the estimate is -0.001, with an SE of 0.001, a β of -0.014, a z-value of -0.913, and a p-value of 0.361, indicating no significant mediation effect.

The lack of significant mediation effects by NPL in both the CAR \Rightarrow NPL \Rightarrow ROA and BOPO \Rightarrow NPL \Rightarrow ROA pathways suggests that NPL does not play a substantial role in mediating the impact of either CAR or BOPO on ROA. Despite NPL being a common variable considered when assessing bank performance, its mediating effect in this context appears to be negligible. This finding may imply that other factors beyond NPL, such as market conditions or external economic factors, play a more significant role in influencing ROA. Given the negative relationship between BOPO and ROA, as seen in previous analyses, it is possible that BOPO has a more direct and pronounced effect on profitability, overshadowing the indirect influence through NPL. Furthermore, the weak relationship between CAR and ROA in this study suggests that regulatory capital requirements may not have a strong mediating effect through NPL, which may be more relevant in other contexts or banking environments.

The results of this analysis indicate that changes in Non-Performing Loans (NPL) do not have a statistically significant impact on the relationship between Capital Adequacy Ratio (CAR) and Return on Assets (ROA). In other words, NPL does not mediate the impact of CAR on ROA. While CAR does influence ROA, the effect remains unchanged and is not meaningfully explained by fluctuations in NPL. This finding is consistent with Matanubun and Wiyarni (2023), who also found no mediation effect of NPL in the relationship between CAR and ROA, suggesting that CAR's direct impact on profitability is not significantly influenced by the asset quality. Similarly, the analysis shows that NPL does not mediate the relationship between the Operating Costs to Operating Income (BOPO) ratio

and ROA. This finding contrasts with the results of Murtini et al. (2023) and Apriyanti et al. (2021), who observed that NPL plays a significant mediating role between BOPO and ROA. The discrepancy in results highlights the possibility that the role of NPL in influencing the relationship between operational efficiency and profitability may differ based on the specific characteristics of the banks, the economic environment, or the time periods being studied.

Table 3 presents the results of a moderation analysis exploring the role of interest rates (IR) in moderating the effect of Capital Adequacy Ratio (CAR) on Return on Assets (ROA) for three government-owned universal banks in the Philippines from 2012 to 2022.

TABLE 3
MODERATION OF INTEREST RATE TO THE EFFECT OF CAR ON ROA OF THREE GOVERNMENT-OWNED UNIVERSAL BANKS IN THE PHILIPPINES FOR THE YEARS 2012 – 2022

	Estimate	SE	z	p	Decision to Ho	Interpretation
<i>Moderation</i>						
CAR	-0.00505	0.0201	-0.251	0.802	Failed to reject Ho	Interest Rate significantly moderates the effect
IR	1.83628	1.9248	0.954	0.34	Failed to reject Ho	
CAR * IR	19.1631	8.5281	2.247	0.025	Reject Ho	
<i>Simple Slope</i>						
Average	-0.00505	0.0238	-0.212	0.832	Failed to reject Ho	Low deviation significantly moderates the effect
Low (-1SD)	-0.07896	0.0313	2.519	0.012	Reject Ho	
High (+1SD)	0.06886	0.0498	1.382	0.167	Failed to reject Ho	

Results of the Moderation Analysis show that the estimate for the moderation effect of CAR is -0.00505, with a standard error (SE) of 0.0201 and a z-value of -0.251. The p-value for this relationship is 0.802, indicating that the effect of CAR on ROA is not significantly moderated by interest rates. Similarly, the estimate for the effect of interest rates (IR) alone is 1.83628 with an SE of 1.9248, a z-value of 0.954, and a p-value of 0.34, also failing to reject the null hypothesis, indicating no significant direct effect of IR on ROA. However, the interaction term between CAR and IR (CAR * IR) has an estimate of 19.1631, an SE of 8.5281, a z-value of 2.247, and a p-value of 0.025, which is statistically significant, leading to the rejection of the null hypothesis and confirming that interest

rates do significantly moderate the relationship between CAR and ROA. The simple slope analysis also confirms that the effect of CAR on ROA at low deviations of IR remains significant, with a p-value of 0.832, indicating no moderation effect at high deviations.

The findings indicate that interest rates significantly moderate the relationship between CAR and ROA, meaning that the impact of CAR on profitability changes depending on the level of interest rates. This suggests that in periods of high interest rates, the effectiveness of CAR in improving profitability may be diminished, possibly due to the increased cost of capital for banks, which could affect their lending behavior and profitability. The moderation of CAR by interest rates highlights the importance of considering the broader macroeconomic environment, particularly the level of interest rates, in assessing the financial performance of banks.

The findings regarding the moderating effect of interest rates on the relationship between CAR and ROA contradict those of Murtini et al. (2023). While this study suggests that higher interest rates may weaken the positive impact of CAR on ROA, Murtini et al. (2023) found the opposite effect. This discrepancy may arise from differences in the economic contexts of the studies or variations in sample banks.

Given the aforementioned results, this study does not provide significant validation for the Murtini-Purnama-Lumbantobing Hypotheses. These hypotheses propose that CAR, BOPO, and NPL each have a negative and significant effect on ROA; CAR does not significantly affect NPL levels; BOPO has a positive and significant influence on NPL; NPL does not significantly mediate the relationship between CAR and ROA; NPL negatively and significantly mediates the effect of BOPO on ROA; and interest rates positively moderate the relationship between CAR and ROA.

However, the findings of this study differ, particularly in the BOPO-to-NPL relationship and the mediation role of NPL. The results indicate that the BOPO-to-NPL relationship shows a weak positive association, but it is statistically insignificant. Furthermore, NPL does not

significantly mediate the relationship between CAR and BOPO on ROA.

4. Proposed Recommendations to Policy Based on the Findings

This study revealed contrasting financial performance among the analyzed banks. AIB consistently struggled with profitability, exhibiting negative ROA throughout the 12-year period, while both LBP and DBP demonstrated positive ROA, though generally below industry averages. While LBP and DBP maintained CAR above the 10% regulatory requirement despite market and regulatory fluctuations, AIB's initially high CAR (203.89% in 2012) plummeted to 3.43% by 2020 due to operational challenges, net losses, and the COVID-19 pandemic. LBP also maintained a better BOPO ratio than DBP and AIB. Across all banks, non-performing loan NPL ratios increased alongside rising interest rates driven by inflation. Regression analysis indicated no significant direct relationships between CAR, BOPO, and NPL. Both CAR and BOPO were negatively associated with ROA. Mediation analysis showed that NPL did not significantly mediate the relationship between CAR, BOPO, and ROA. Moderation analysis revealed that interest rates significantly moderated the relationship between CAR and ROA.

This research translates its findings into actionable policy recommendations, aiming to contribute to positive change within the banking sector. Grounded in the study's empirical findings, this evidence-based approach enhances the credibility and effectiveness. By connecting research outcomes directly to concrete policy actions, the study seeks to provide a strong foundation for improving bank performance and stability.

IV. CONCLUSIONS

Based on the findings of the study, the following conclusions are drawn:

1. Despite positive returns from LBP and DBP, the mean ROA for Philippine government-owned banks have consistently been negative, reaching its lowest point during the 2020-2021 pandemic period, driven by AIIBP's poor performance and exacerbated by increased variability in ROA.

2. The following outlines the conclusion on the status of government-owned universal banks in the Philippines from 2012 to 2022 in terms of:

2.1. Capital Adequacy Ratio (CAR)

Despite a declining trend from 2012 to 2022, with a brief rebound in 2021, the mean and median CAR remained above BSP's 10% requirement, ensuring regulatory compliance.

2.2. Operating Expenses and Income (BOPO) Ratio

The fluctuating mean BOPO ratio, driven by AIIBP's extreme values in 2021, exceeded 1 on average, reflecting higher operating expenses than income and varying operational efficiencies among banks.

2.3. Non-Performing Loan (NPL) Ratio

While all three banks generally maintained low NPL ratios, the mean NPL ratio fluctuated, spiking in 2022 primarily due to a surge in AIIBP's NPLs, indicating heightened loan defaults, which skewed the overall mean and increased variability despite the relatively low NPL ratios across the banks.

2.4. Interest Rate

The average lending rate remained stable from 2012 to 2017 before rising significantly in 2018 in response to inflation and the BSP's tighter monetary policy, which subsequently contributed to reduced loan demand and slower economic activity.

3. The regression analysis found no significant relationships between CAR and NPL, or BOPO and NPL, indicating that fluctuations in capital adequacy and operating efficiency did not directly impact NPL levels.

Both CAR and BOPO showed significant negative relationships with ROA, suggesting that higher CAR and BOPO values were associated with lower profitability. This highlights the trade-off between maintaining adequate capital and operational efficiency and achieving higher profitability.

The mediation analysis revealed that NPL did not significantly mediate the relationship between CAR, BOPO, and ROA, implying that other factors likely influenced ROA more strongly.

The moderation analysis indicated that interest rates significantly moderate the relationship between CAR and ROA, with high interest rates

reducing CAR's effectiveness in enhancing profitability.

4. Integrating advanced technologies like big data, AI, and predictive analytics into NPL management could enhance early borrower distress identification, automate loan classification, and enable proactive interventions; however, this requires significant investment in technology and infrastructure while addressing data privacy concerns, alongside a nationwide financial literacy campaign to promote responsible borrowing and debt management, thereby improving the overall stability and performance of government-owned banks.

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