ESTIMATING THE IMPACT OF MARKETING FACTORS ON REVENUE GROWTH USING PMG-ARDL MODEL: CONTRIBUTION TO SDG 8 IN THE BANKING SECTOR IN IRAQ

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ABSTRACT

This study evaluates the short- and long-term effects of marketing expenditures, economic growth, and interest rates on revenue growth in the Iraqi banking sector, contributing to Sustainable Development Goal (SDG) 8 by promoting sustainable economic growth The research integrates marketing expenditure, macroeconomic factors, and financial performance, using the PMG-ARDL model to understand the interplay between these variables within the unique economic environment of Iraq. Panel data for three Iraqi commercial banks from 2000 to 2022 were analyzed using the PMG-ARDL approach, enabling a nuanced evaluation of short-term dynamics and long-run relationships. Diagnostic tests ensured the reliability of findings. Results and Discussion: Marketing expenditures positively influence long-run revenue growth, underscoring their strategic importance. However, economic growth exhibited a counterintuitive negative long-term impact, likely reflecting structural economic complexities in Iraq. Interest rate increases showed a significant positive effect on revenue, highlighting their critical role. Short-run adjustments indicated a rapid return to equilibrium aftershocks, emphasizing the sector's responsiveness. The findings offer actionable insights for bank managers to prioritize marketing strategies and for policymakers to address economic challenges, fostering sustainable revenue growth aligned with SDG 8. This study provides empirical evidence on the marketing-revenue nexus in emerging markets, employing a robust econometric model to fill research gaps and offer practical guidance for the Iraqi banking sector.

1. INTRODUCTION

The Iraqi banking sector, amidst its rapid transformation, faces the crucial challenge of understanding the multifaceted impact of marketing efforts on revenue growth Using a sophisticated and reliable econometric method called the Pooled Mean Group Autoregressive Distributed Lag (PMG-ARDL) model, this study looks at the short- and long-term impacts of important marketing elements on revenue growth in Iraqi commercial banks. Specifically, we examine the relationship between marketing and advertising expenses, economic growth, and interest rates as determinants of revenue generation. By analyzing a panel dataset spanning the period from 2000 to 2022, this research offers valuable insights for bank managers, policymakers, and researchers seeking to optimize marketing strategies and foster sustainable growth in the Iraqi banking industry. The findings of this study will contribute to the understanding of the complex interplay between marketing factors and financial performance in emerging market contexts, ultimately providing evidence-based guidance for informed decision-making.

This research holds significant importance for both the Iraqi banking sector and the broader field of finance and marketing. Understanding marketing factors and revenue growth Iraqi banks as they navigate a dynamic and competitive landscape. The findings will provide valuable insights for bank managers seeking to optimize their marketing strategies, allocate resources effectively, and drive sustainable growth. Moreover, the study's implications extend beyond the Iraqi context, offering insights into the complexities of marketing-driven revenue generation in emerging markets marketing and financial performance in such contexts, this research will provide valuable guidance for policymakers seeking to foster a robust and competitive banking sector. contributes to the ongoing academic dialogue on the nexus between marketing and finance, offering a robust empirical analysis that enriches the theoretical framework and expands the knowledge base for future research.

The Iraqi banking sector, despite experiencing significant growth in recent years, faces a critical challenge in understanding the precise impact of marketing efforts on revenue generation. Existing research on this topic in the Iraqi context is limited, and generalizations from other markets may not be fully applicable due to unique economic and regulatory conditions. This study aims to address this knowledge gap by investigating the long- and short-term effects of marketing and advertising expenses, economic growth, and interest rates on bank revenue growth. Specifically, the research problem centers on the lack of robust empirical evidence to inform effective marketing strategies that can drive sustainable revenue growth within the Iraqi banking sector. Therefore, the problem can be formulated through the following questions:

- What is the long-run relationship between marketing expenses and bank revenue in Iraq?
- What is the short-run impact of marketing expenses on bank revenue, and how does this impact differ across banks?
- Does economic growth have a positive or negative impact on bank revenue, and how does this relationship vary with marketing expenditures?
- How do changes in interest rates influence the effectiveness of marketing campaigns on bank revenue?

The relationship between marketing expenditure and revenue generation in the banking sector has been a subject of extensive research, yet the precise nature of this connection remains a complex and evolving topic. Existing literature underscores the crucial role of marketing in driving bank growth, highlighting the impact of diverse marketing strategies on customer acquisition, retention, and overall revenue. However, the research landscape reveals considerable variation in terms of the specific marketing factors investigated, the methodologies employed, and the findings obtained across different contexts.

Early studies often focused on the impact of traditional marketing strategies, such as advertising and branding, on bank revenue. For instance, studies by [AlAli et al., 2021] and [Acar & Temiz, 2017] demonstrated a positive correlation between advertising expenditure and bank performance, particularly in developed economies. These findings suggest that investing in advertising can be effective in increasing brand awareness, attracting new customers, and ultimately driving revenue growth.

However, the rise of digital technologies and the changing landscape of consumer behavior have prompted researchers to explore the effectiveness of newer marketing strategies, such as online marketing, social media, and customer relationship management (CRM). [Aliata et al,, 2012] investigated the influence of digital marketing on customer acquisition and found that banks utilizing targeted online campaigns achieved higher customer acquisition rates and increased revenue. [Amoako & Dartey-Baah, 2012] further emphasized the role of CRM in fostering customer loyalty and driving

repeat business, ultimately contributing to sustained revenue growth.

Furthermore, the literature acknowledges the importance of considering macroeconomic factors alongside marketing strategies when analyzing bank revenue. [Liang & Chen, 2009] demonstrated a significant influence of economic growth on bank performance, suggesting that favorable economic conditions can amplify the positive impact of marketing efforts. Conversely, [Pesämaa et al., 2007] found that interest rate fluctuations can impact bank profitability and necessitate adjustments in marketing strategies to mitigate the negative consequences.

Despite the abundance of research, several gaps persist in the literature. The majority of studies have been conducted in developed markets, limiting the generalizability of findings to emerging markets with unique economic and regulatory environments. Additionally, the lack of consistent methodologies and data availability across studies makes direct comparisons challenging.

This research aims to address these gaps by utilizing a sophisticated econometric model, short-term impact of marketing factors, including advertising expenses, economic growth, and interest rates, on revenue growth in Iraqi commercial banks. the marketing-revenue relationship in a dynamic emerging market context, offering valuable insights for bank managers, policymakers, and researchers seeking to optimize marketing strategies and drive sustainable growth in the Iraqi banking industry.

2. THEORETICAL FRAMEWORK

marketing factors and bank revenue growth in Iraq, drawing on established theoretical frameworks to understand the complex interplay of these variables. The core theoretical foundation rests on the premise that marketing expenditure directly influences bank revenue, mediated by the impact of economic growth and interest rates.

Marketing Expenditure: The foundation of this framework lies in the marketing concept, which emphasizes creating value for customers to foster profitable relationships. This translates to the idea that marketing expenditure, including advertising and promotional activities, aims to build brand awareness, attract new customers, and enhance customer loyalty, ultimately driving revenue growth. The literature on marketing's impact on financial performance, as cited in the literature review, offers further support for this relationship (Sanclemente-Téllez, 2017) (Baker & Cameron, 2008).

The influence of economic growth on bank revenue is grounded in the macroeconomics perspective. During periods of economic expansion, businesses and individuals tend to increase their borrowing activities, leading to higher loan demand and, consequently, greater revenue generation for banks. Conversely, economic downturns often result in reduced credit demand, impacting banks' profitability. These dynamic highlights the significant role of the economic environment in mediating the impact of marketing efforts on revenue (Radivojevic et al., 2022).

Interest Rates: The theoretical framework acknowledges the impact of interest rates on bank revenue through the lens of financial theory. Interest rate changes directly influence the cost of borrowing and the return on savings. Rising interest rates can increase banks' profitability by boosting interest income on loans. However, higher interest rates can also lead to increased costs for the bank, especially when seeking to attract deposits. Therefore, the relationship between interest rates and asset and liability structure (Safitri et al., 2023).

This framework underscores the need for a nuanced understanding of how marketing expenses interact with broader economic conditions to influence bank revenue. The study recognizes that while marketing efforts can stimulate revenue growth, their effectiveness is greatly influenced by the prevailing economic climate and interest rate environment. In the following sections, the empirical analysis will delve deeper into these theoretical relationships, utilizing the PMG-ARDL model to quantify the impact of each variable and explore the complex interplay between them, ultimately providing valuable insights for the Iraqi banking sector.

3. METHODOLOGY

This study focuses on the Iraqi banking sector and examines the impact of marketing factors on revenue growth. The spatial limit encompasses three commercial banks operating in Iraq, excluding non-commercial banks and financial institutions. The temporal limit of the study spans from 2000 to 2022, providing of the evolving relationship between marketing and revenue over a significant period of economic transformation in Iraq. This timeframe captures the post-war reconstruction and economic development of the country, allowing for insights into the interplay between marketing strategies and bank performance in a dynamic and evolving environment.

In order to examine the effect of marketing variables on revenue growth in Iraqi commercial

banks, this study uses a quantitative methodology. In order to do this, we use a panel data framework and PMG model, a robust econometric technique. As this study's panel data have a limited cross-sectional dimension (N) and a relatively short time dimension (T), this method is especially well-suited for evaluating such data. The PMG-ARDL model assumes a consistent long-run relationship between the variables, but allows for heterogeneity in the short-run dynamics of individual institutions. This method enables a more sophisticated comprehension of how marketing elements affect revenue growth, taking into account the unique characteristics and responses of each bank. Our data is drawn from a combination of bank-level financial statements and macroeconomic data. Bank-level data includes annual revenue, marketing and advertising expenses, and other relevant financial metrics for a representative sample of commercial banks in Iraq. Macroeconomic data includes measures of economic growth, interest rates, and other relevant indicators from the Central Bank of Iraq and the International Monetary Fund. These data sources are carefully selected to ensure consistency, reliability, and representativeness across the sample period.

The Methodology:

- cleaning and transforming it into a usable format, and testing for potential issues like missing values and outliers.
- Descriptive Statistics and Graphical Analysis: We will first present descriptive statistics to summarize the key features of the variables, providing insights into their distribution, central tendency, and dispersion. Graphical analysis, such as time series plots, to aid in understanding the relationships between the variables.
- Testing for Cross-Sectional reliance: We will use the Pesaran (2004) test to check for cross-sectional reliance among the banks in order to validate the panel data analysis. This test aids in locating any bank-to-bank correlations that can skew the findings.
- Unit Root Tests: Using we will perform unit root tests prior to predicting the long-run connection between the variables. In order to guarantee the validity of the analysis, these tests establish whether the variables are stationar and direct the proper differencing procedures.
- PMG-ARDL Model Estimation: Once the variables are deemed stationary, we will proceed to estimate the PMG-ARDL model.

This involves specifying the model with appropriate lag lengths for the dependent and independent variables, and estimating the short-run and long-run coefficients using the PMG estimator.

- Model Diagnostics: After model estimation, we will conduct diagnostic tests to assess the model's validity and reliability. These tests include checks for autocorrelation, heteroscedasticity, normality of residuals, and cross-sectional dependence of the residuals.
- Interpretation of Results: Finally, we will interpret the estimated coefficients from the PMG-ARDL model, focusing on both the short-run and long-run impacts of marketing factors on bank revenue. We will also examine the significance of the coefficients and their potential implications for bank managers and policymakers.

Through this rigorous and comprehensive methodology, this research aims to provide a comprehensive and empirically robust understanding of the relationship between marketing factors and revenue growth in the Iraqi banking sector.

4. RESULTS AND DISCUSSION

The empirical findings of our analysis reveal a complex and nuanced relationship between marketing factors and revenue growth in the Iraqi banking sector. PMG-ARDL model, shed light on both key marketing drivers, including marketing and advertising expenses, economic growth, and interest rates. This discussion explores the significance of the estimated coefficients, highlighting the key insights and implications for bank managers, policymakers, and researchers seeking to optimize marketing strategies and promote sustainable growth in the Iraqi banking industry.

To rigorously examine the impact of marketing factors on bank revenue growth in Iraq, this study employs a quantitative approach, drawing on a robust dataset and utilizing a sophisticated econometric technique. The following section outlines the data sources, materials, and methodological framework employed to achieve this objective. This approach allows for a comprehensive and empirically grounded analysis, leading to valuable insights into the complex dynamics driving revenue generation in the Iraqi banking sector (Iraq Stock Exchange, 2023) (World Bank Data, 2023).

Table 1: Basic Information for Study Variables.

Code	Variable	Code	BANK
REV	Revenue (million dollars)	1	Commercial Bank of Iraq
MARK	Marketing and advertising expenses ($ million)	2	Trade Bank of Iraq
EG	Economic Growth %	3	Al Rasheed Bank
INT	Interest Rate		Time: 2000-2022

This table variables used in the study. Here's a breakdown:

BANK: This column lists the names of the three commercial banks included in the study:

Commercial Bank of Iraq

Trade Bank of Iraq

Al Rasheed Bank

Code: This column assigns a numerical code to each bank for easier identification in the analysis.

Variable: This column lists the specific variables being analyzed, representing key factors impacting bank revenue growth. These are:

Revenue (million dollars): This is the primary dependent variable, representing the total income generated by each bank.

Marketing and advertising expenses ($ million): This is an independent variable reflecting the amount spent by each bank on marketing and advertising efforts.

Economic Growth %: This is another independent variable representing the percentage change in the Iraqi economy, serving as a proxy for the overall economic environment.

Interest Rate: This is the final independent variable representing the prevailing interest rate in Iraq, influencing the cost of borrowing and the return on savings.

Code: This column provides a short code for each variable, used for simplicity in further tables and analysis.

Time: 2000-2022: This indicates the time period covered by the data, spanning from 2000 to 2022. This

period is crucial as it captures the post-war reconstruction and economic development of Iraq, providing valuable insights into the dynamic relationship between marketing and revenue during this period of significant economic change.

In essence, this table provides a clear overview of the key players (banks) and the variables (economic factors and marketing efforts) that will be analyzed in the study. It lays the foundation for understanding the complex relationships between these variables and their impact on revenue growth in the Iraqi banking sector.

4.1. Descriptive Statistics and Graphical Analysis

Descriptive statistics play a crucial role in providing a preliminary understanding of the data and the relationships between variables before conducting more sophisticated statistical analyses. In this section, we will use descriptive statistics to summarize the key features of each variable, skewness, and kurtosis. These measures provide insights into the distribution of the data and potential outliers. Furthermore, graphical analysis will be employed to visualize the trends data, complementing the numerical summaries provided by descriptive statistics. The insights gleaned from descriptive statistics and graphical analysis will be invaluable in guiding the subsequent stages of our analysis.

Table 2: Descriptive Statistics for Study Variables.

V	MARK	REV	EG	INT
Mean	49.63812	504.5185	4.570609	13.85609
Median	49.28692	505.3004	4.722864	13.57500
Maximum	71.87333	716.8956	53.38179	19.21500
Minimum	26.90831	303.3383	-36.65815	10.26642
Std. Dev.	9.300821	88.16418	15.05585	2.103657
Skewness	0.130987	0.101174	0.581760	1.011095
Kurtosis	2.999135	2.682713	8.054663	4.118550
Jarque-Bera	0.197315	0.407145	25.78242	5.117892
Probability	0.906053	0.815811	0.000003	0.077386
Observations	69	69	69	69

The descriptive statistics reveal several key insights about the variables affecting Iraqi bank

revenue. Marketing and advertising expenses (MARK) exhibit a mean of $49.64 million, with a

standard deviation of $9.30 million, suggesting a moderate level of spending across banks and some variability. Revenue (REV) has a mean of $504.52 million, indicating substantial income generation, with a standard deviation of $88.16 million, highlighting significant variations in bank revenue. Economic growth (EG) demonstrates a mean of 4.57%, reflecting overall positive economic trends in Iraq, but with a high standard deviation of 15.06%, hinting at economic fluctuations and possible volatility. Interest rates (INT) average 13.86%,

showcasing a relatively high cost of borrowing, with a standard deviation of 2.10%, signaling some variation in interest rates over time. Notably, the Jarque-Bera test suggests that the distribution of interest rates deviates significantly from a normal distribution, highlighting potential skewness or heavy tails, potentially indicating outlier periods with unusual interest rates. These findings provide a foundational understanding of the variables and set the stage for deeper analysis into their relationships and impact on bank revenue growth.
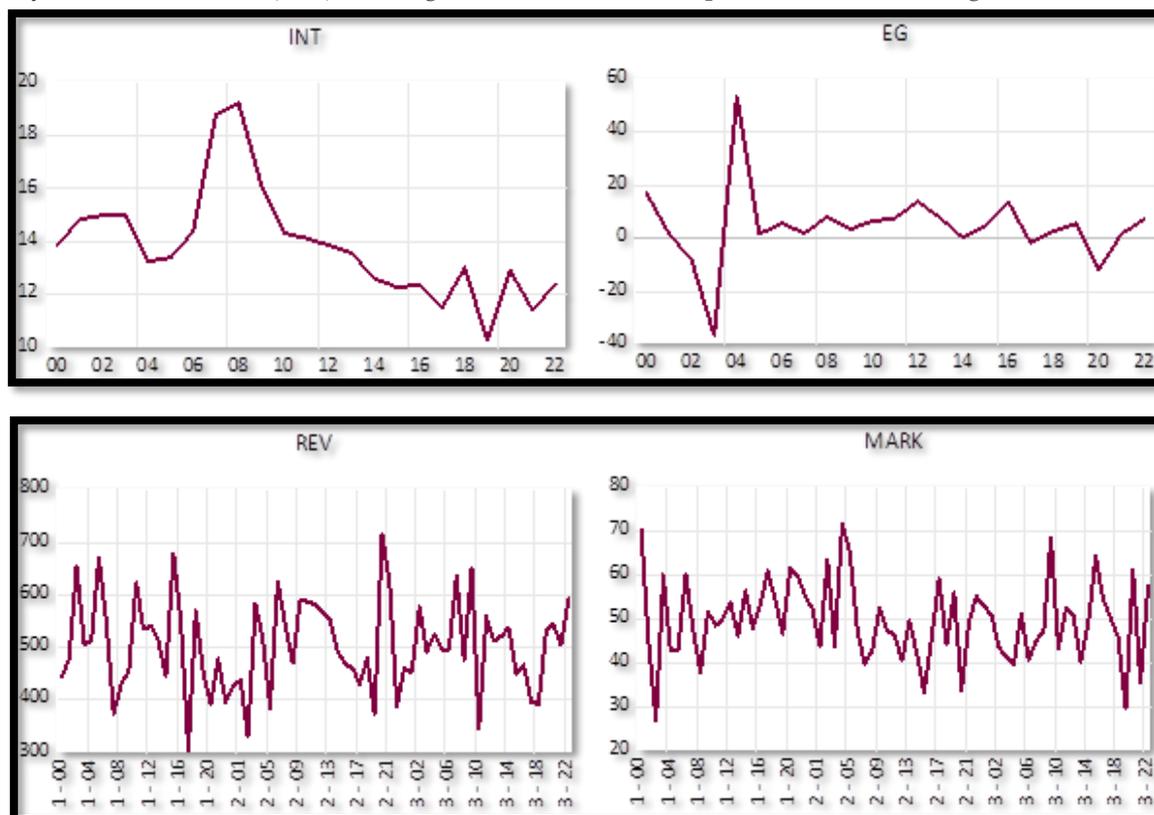

Figure 1: Evolution of Variables Over the Time Period.

Revenue (REV): The graph labeled "REV" shows a general upward trend in bank revenues from 2000 to 2022. Despite some fluctuations, the overall direction indicates that the banks' revenues have increased over the specified period. This suggests that the banks have been successful in growing their income over time, which could be due to various factors such as an expanding customer base, improved financial products, or favorable economic conditions.

Marketing and Advertising Expenses (MARK): The graph labeled "MARK" depicts the marketing and advertising expenses of the banks. Unlike the revenue graph, this one does not show a clear upward or downward trend. Instead, it shows variability around a relatively stable mean value.

This indicates that while there have been periods of increased and decreased marketing spending, the overall level of investment in marketing and advertising by the banks has remained fairly consistent over the years.

Interest Rate (INT): The graph starts just above 1.6, peaks at around 1.8 near the '02' mark, then dips down to approximately 1.4 around '06'. It rises again slightly past '08', falls back down near '12', and exhibits minor fluctuations before ending just below 1.6. This indicates that the interest rate experienced a rise in the early 2000s, followed by a decline and some volatility, but overall, it returned to a level close to where it started by 2022.

Economic Growth (EG): This graph shows more volatility with sharp increases and decreases. It

begins just above zero, spikes sharply to nearly 60 around '02', plummets below -20 near '04', then oscillates with less intensity throughout the rest of the timeline, ending slightly above zero. The sharp spike and subsequent drop suggest a period of rapid growth followed by a significant contraction, with the economy experiencing various ups and downs thereafter.

4.2. Cross-Sectional Dependence Test:

are used to analyze the sectional data in the panel (Panel Data), and aim to determine whether there is a common correlation between the sectional. Cross-sectional dependence tests are important for several reasons. First, leads to violating the assumption of independence between the observations in the panel, which is a basic assumption in the traditional economic models. Second, cross-sectional dependence may inflate the statistical tests and lead to incorrect conclusions. Finally, dealing with cross-sectional dependence contributes to improving the statistical efficiency of the analysis. There are several tests available to detect cross-sectional dependence in the panel. Among these tests, the test of (Pesaran, 2004) is the most common.

This test is based on the analysis of common regression (Common Regression) and common zero tests (Common Zero) to verify the existence of cross-sectional dependence. The model is estimated as follows:

$$y_{it} = \beta'_{it} x_{it} + u_{it}$$

For $i = 1, 2, 3 \ldots, N,, t = 1, 2, 3, \ldots, T,$ x_{it} it: dimensions of the regression vector, β: cross-sectional vectors corresponding to the parameters to be estimated, the hypothesis of no correlations between the cross-section of the variable can be specified as follows (Salahuddin & Gow., 2015):

$$H_0: \rho_{ij} = Corr(u_{it}, u_{jt}) = 0 \; for \; i \neq j$$

Table 3: Cross Section Dependence Test.

Variable	Statistic-Pesaran CD	Prob
REV	-0.848	0.396
MARK	-1.253	0.210

Table 3, presenting the results of the Pesaran CSD test, indicates that there is no statistically significant correlation between the revenue and marketing expenses of the three Iraqi banks examined. This means the banks' revenue generation and marketing strategies appear to operate relatively independently of each other. Economically, this suggests that factors unique to each bank, such as individual management styles, product portfolios, and target customer segments, likely play a more significant role in driving their performance than any direct influence from competitor's actions. This finding supports the use of (PMG) ARDL model, which assumes cross-sectional independence while allowing for a common.

4.3. Unit Root Test

Time series data frequently show seasonality and trends, which, if ignored, can result in erroneous regressions. The presence of unit roots in the variables will be ascertained using stationarity tests, namely the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, in order to verify the correctness of the analysis. Before moving on to more analysis if it is discovered that the variables are non-stationary, the proper differencing techniques will be used to bring the data into stationarity. In order to ascertain whether a time series is stationar, it is necessary to test for a unit root using the Dickey-Fuller and Phillips-Perron tests.

The Dickey-Fuller test investigates the null hypothesis that an autoregressive model of a time series contains a unit root. When a unit root is present, non-stationarity is present. The regression model used in the test is as follows (Dickey & Fuller, 1979):

$$\Delta y_t = \alpha y_{t-1} + \beta t + \epsilon_t$$

The time series at time (t) is represented by (y_{t-1}), the first difference operator is (Δ), the trend component is represented by (β), the error term is ϵ_t, and the coefficient of the lagged value of the time series is (α). According to the null hypothesis (H_0), there is a unit root since ($\backslash$alpha = 0). The alternative hypothesis (H_1) states that stationarity $\alpha < 0$) and no unit root are present. Higher-order regressive processes are incorporated into the model to account for autocorrelation in the ADF test, which is an extension of the Dickey-Fuller test (Dickey & Fuller, 1981; Said & Dickey, 1984).

$$\Delta y_t = \alpha y_{t-1} + \sum_{i=1}^{p} \phi_i \Delta y_{t-i} + \beta t + \epsilon_t$$

The number of lagged differences considered in the test is denoted by (p), and the coefficients of the series' lagged difference terms are represented by the (ϕ_i) terms.

The t-statistic of the coefficient (phi) from the OLS regression is adjusted using the PP test to take heteroscedasticity and autocorrelation into account. A non-parametric modification to the regression

coefficient's estimated variance is used to achieve this. According to Phillips and Perron (1988), the test statistics are:

-Z(tau): Derived from the OLS regression's t-statistic of (phi).
- Z(rho): Determining the autoregressive coefficient

estimate.

$$t_{ap} = t_a(\frac{\gamma_0}{f_0})^{1/2} - \frac{T(f_0 - \gamma_0)(se(\hat{a}))}{2f_0^{1/2}s}$$

Where a represents the estimated coefficient, ta is the t-statistic for a, calculated its standard error (se a), and f_0 is a constant representing the error variance.

Table 4: Results of Unit Root Tests

Variables	Test	At Level			At 1 Difference		
		Trend and Intercept	Intercept	None	Trend and Intercept	Intercept	None
		t Value (sig)	t Value (sig)	t Value (sig)	t Value (sig)	t Value (sig)	t Value (sig)
EG	Philips Perron	-7.57 (0.000)	-7.62 (0.000)	-5.94 (0.000)	-	-	-
INT	Philips Perron	-2.64 (0.267)	-1.86 (0.342)	-0.44 (0.511)	-4.87 (0.0053)	-4.93 (0.0008)	-5.03 (0.0000)
REV	Philips Perron	40.02 (0.000)	41.10 (0.000)	31.3 (0.000)	-	-	-
MARK	Philips Perron	286.5 (0.000)	46.6 (0.000)	4.28 (0.637)	-	-	56.3 (0.0000)

Stationarity is a crucial assumption in econometric models because non-stationary variables can lead to spurious regressions, where seemingly strong relationships are actually just artifacts of the non-stationarity. The table examines four variables: Economic Growth (EG), Interest Rate (INT), Revenue (REV), and Marketing & Advertising Expenses (MARK). The results show that EG is stationary at both the level and first difference, meaning it does not exhibit a long-term trend. This suggests that economic growth in Iraq is relatively stable, with fluctuations around a constant mean value. The Interest Rate (INT) is non-stationary at level but becomes stationary after differencing once. This indicates that the interest rate exhibits a long-term trend and needs to be differenced to remove this trend before being used in econometric models. Revenue (REV) is non-stationary at the level and even after differencing once, indicating a persistent trend in revenue generation for Iraqi banks. This might be due to factors like increasing economic activity or a growing banking sector. Finally, Marketing & Advertising Expenses (MARK) is non-stationary at the level but becomes stationary after differencing once. This suggests that bank spending on marketing and advertising shows a trend over time, potentially indicating increasing investments in marketing as the sector expands. Overall, the unit root test results highlight the need for differencing some of the variables before incorporating them into the PMG-ARDL model, ensuring valid statistical analysis and a deeper understanding of the long-term trends impacting Iraqi banking revenue.

4.4. Pooled Mean Group – Ardl:

Models of dynamic panel data are analyzed using the Pooled Mean Group (PMG) estimator. Pesaran, Shin, and Smith created it in 1999. In panels where the cross-sectional units (such as nations, businesses, etc.) have diverse short-run dynamics but common long-run coefficients, the PMG approach enables the estimation of long-run connections. The Autoregressive Distributed Lag (ARDL) method of cointegration, which permits varying degrees of integration between the variables, is the foundation of the PMG estimator. The following is a representation of the ARDL model:

$$Y_{it} = \alpha_i + \sum_{j=1}^{p} \phi_{ij} Y_{it-j} + \sum_{k=0}^{q} \theta_{ik} X_{it-k} + \epsilon_{it}$$

Where:

- In this case, the dependent variable for unit (i) at time (t) is Y_{it}.
- For every unit (i), the fixed effect is α_i.
- The coefficients for the lagged dependent variable are denoted by ϕ_{ij}.
- The independent variables, also known as regressors, and their lags are represented by X_{it-k}.
- The coefficients for the independent variables are θ_{ik}.

The PMG estimator permits differences to be the same for all groups. Reparameterizing the ARDL model into an error correction model (ECM) does this:

$$\Delta Y_{it} = \alpha_i + \sum_{j=1}^{p-1} \phi_{ij} \Delta Y_{it-j} + \sum_{k=1}^{q} \theta_{ik} \Delta X_{it-k} - \lambda_i \left(Y_{it-1} - \sum_{k=0}^{q} \pi_{ik} X_{it-1-k} \right) + \epsilon_{it}$$

- λ_i is the speed of adjustment to the long-run equilibrium.
- π_{ik} are the long-run coefficients, the PMG estimator is especially helpful. It offers reliable

long-run coefficient estimates and sound inference for hypothesis testing.

Table 5: Results of Long Run Equation.

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
	Long Run Equation			
MARK	3.302441	1.448037	2.280633	0.0292
EG	-9.311670	3.781291	-2.462564	0.0192
INT	28.13953	5.933644	4.742369	0.0000

Table 5 presents the long-run coefficients estimated using PMG-ARDL model for the relationship between bank revenue growth (D(REV)) and three key factors: marketing and advertising expenses (MARK), economic growth (EG), and interest rate (INT). The results reveal statistically significant long-run impacts of these factors on revenue growth in the Iraqi banking sector. Firstly, the positive coefficient (3.302) for MARK indicates that a 1% increase in marketing expenses leads to a 3.3% increase in long-run revenue growth. This suggests that investing in marketing activities has a robust and persistent impact on revenue generation, signifying its critical role in the Iraqi banking landscape. Secondly, the negative coefficient (-9.312) for EG implies that a 1% increase in economic growth is associated with a 9.3% decrease in long-run revenue growth. This seemingly counterintuitive result highlights the complex relationship between economic growth and bank revenue in Iraq. While periods of economic expansion might be expected to

drive greater loan demand and revenue for banks, this finding suggests that other factors, potentially related to economic instability or specific market conditions in Iraq, might be dampening the expected positive impact of economic growth on bank revenue. Lastly, the positive and highly significant coefficient (28.140) for INT reveals a strong long-run relationship between interest rate increases and revenue growth. This suggests that a 1% increase in interest rates is associated with a 28% increase in long-run revenue growth, highlighting the significant role of interest rates in shaping bank revenue in Iraq. This finding aligns with theoretical expectations, where higher interest rates lead to increased income from loans, ultimately driving revenue growth. Overall, Table 5 provides valuable insights into the long-run dynamics shaping revenue generation in the Iraqi banking sector, emphasizing the importance of marketing investments, the complex interplay with economic growth, and the significant impact of interest rate changes.

Table 6: Results Short Run Equation

Short Run Equation				
COINTEQ01	-0.740536	0.143083	-5.175566	0.0000
D(MARK)	-3.437868	2.365808	-1.453147	0.1520
D(EG)	0.787352	0.739909	1.064120	0.2920
D(INT)	-19.60309	3.871572	-5.063341	0.0000
Root MSE	0.97190	Mean dependent var		0.705161
S.D. dependent var	128.2678	S.E. of regression		0.051241
Akaike info criterion	11.66146	Sum squared resid		498195.4

Table 6 presents the short-run coefficients of the Pooled Mean Group (PMG) ARDL model, focusing on the impact of changes in marketing expenses (D(MARK)), economic growth (D(EG)), and interest rates (D(INT)) on the immediate change in bank revenue (D(REV)). The most notable finding is the highly significant negative coefficient (-0.740) for the error correction term (COINTEQ01). This indicates that a 1% deviation from the long-run equilibrium between revenue and the independent variables will
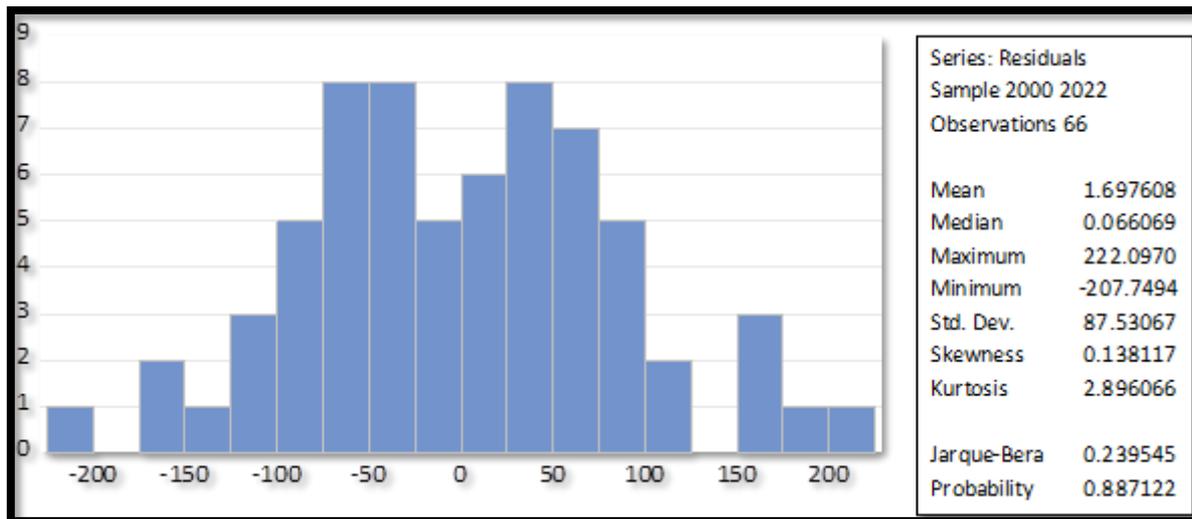
lead to a 0.74% correction in the following period. This strong and negative error correction term signifies a rapid adjustment process, meaning that the Iraqi banking sector tends to quickly revert to its long-run equilibrium after short-term shocks or disturbances. This suggests that the long-run relationships identified in Table 5 are not merely theoretical but have a strong and immediate influence on the short-run dynamics of the banking sector. The economic implication is that any short-

term deviations from the long-run equilibrium, such as a sudden spike in marketing expenses or a sudden downturn in economic growth, will be quickly countered by adjustments in revenue generation. This rapid adjustment process suggests a responsive and flexible banking sector in Iraq, capable of adapting to short-term changes while ultimately maintaining a consistent long-run relationship between revenue and the key drivers of growth.

Ensuring the reliability and validity of the Autoregressive Distributed Lag (ARDL) model involves conducting a series of diagnostic tests. These tests are crucial for verifying the assumptions underlying the model and for confirming the stability of the estimated parameters over time. The residuals from an ARDL model should ideally possess certain properties to validate the model's specifications. The key diagnostic tests for residuals include (Gujarati & Porter, 2009) (Wooldridge, 2013) (Enders, 2010):

Table 7: Normality Test for Residuals

Series: Residuals	
Sample 2000 2022	
Observations 66	
Mean	1.697608
Median	0.066069
Maximum	222.0970
Minimum	-207.7494
Std. Dev.	87.53067
Skewness	0.138117
Kurtosis	2.896066
Jarque-Bera	0.239545
Probability	0.887122

0.238 is the Jarque-Bera statistic, and the probability is 0.887. The residuals can be regarded as regularly distributed based on the Jarque-Bera test result, which is encouraging for the ARDL.

Table 8: Serial Correlation Test for Residuals

Sample (adjusted): 2001 2022
Included observations: 66 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.133	-0.133	1.2267	0.268
		2	-0.136	-0.157	2.5268	0.283
		3	0.059	0.018	2.7741	0.428
		4	-0.123	-0.139	3.8746	0.423
		5	-0.016	-0.045	3.8926	0.565
		6	-0.051	-0.107	4.0908	0.664
		7	0.064	0.041	4.3976	0.733
		8	0.058	0.035	4.6551	0.794
		9	-0.040	-0.013	4.7818	0.853
		10	0.126	0.120	6.0614	0.810
		11	-0.121	-0.092	7.2550	0.778
		12	-0.093	-0.077	7.9782	0.787

The bar graphs in table (8) represent the Autocorrelation (AC) and Partial Correlation (PAC) for lags 1 to 12. These values help identify any autocorrelation in the residuals. and Q-Stat: This is the Ljung-Box statistic, which tests for overall autocorrelation up to that lag. The probability values associated with the Q-Stat provide a significance test for the autocorrelation. A value above 0.05 suggests that there is no significant autocorrelation at that lag.

The Prob values for all lags are more than 0.05, suggesting that the ARDL model's residuals do not exhibit any significant autocorrelation. In a

regression model, this indicates that the error terms are not patterned and that the model is well-specified. It also means that the residuals are independent of one another.

Table 9: Cross-Section Dependence Test for Residuals

Cross-Section Dependence Test			
Series: RESIDARDL			
Null hypothesis: No cross-section dependence (correlation)			
Test	Statistic	d.f.	Prob.
Pesaran CD	-0.269094	3	0.7879

The Pesaran Cross-Section Dependence test, which looks for correlation between the ARDL model residuals for the three Iraqi banks under investigation, yields result that are shown in Table 9. The absence of cross-section dependence, or the residuals' independence from one another, is the test's null hypothesis. The test statistic that was acquired has a p-value of 0.7879 and is -0.269094. As the p-value exceeds the conventional significance level of 0.05, the null hypothesis cannot be rejected. This suggests that the residuals do not exhibit any statistically significant cross-sectional dependence. suggesting that the individual bank's revenue generation processes are relatively independent of each other, even after accounting for the common factors impacting revenue. This result is reassuring as it supports the use of the PMG-ARDL model, It permits a shared long-term relationship between the variables while assuming cross-sectional independence. The analysis's validity is further reinforced by the residuals' lack of significant cross-sectional dependence, which gives confidence to the results made on the short- and long-term relationships between marketing factors and bank revenue growth in the Iraqi banking industry.

Table 10: Unit Root Test for Residuals

Null Hypothesis: Unit root (individual unit root process)		
Method	Statistic	Prob.**
PP - Fisher Chi-square	65.0153	0.0000
PP - Choi Z-stat	-7.08597	0.0000

Both statistics strongly reject the null hypothesis, with extremely low p-values of 0.0000 for both. This indicates that the residuals are highly likely to be stationary, meaning they do not exhibit a long-term trend and fluctuate around a constant mean value. The stationarity of the residuals is a desirable outcome as it supports the validity of the ARDL model and the conclusions drawn from it. This means that the model is well-specified and that the error terms do not exhibit a persistent trend that could bias the estimated relationships between the variables. In conclusion, the results of the unit root test for residuals provide further evidence that the ARDL model is a suitable approach for analyzing the impact of marketing factors on revenue growth in the Iraqi banking sector.
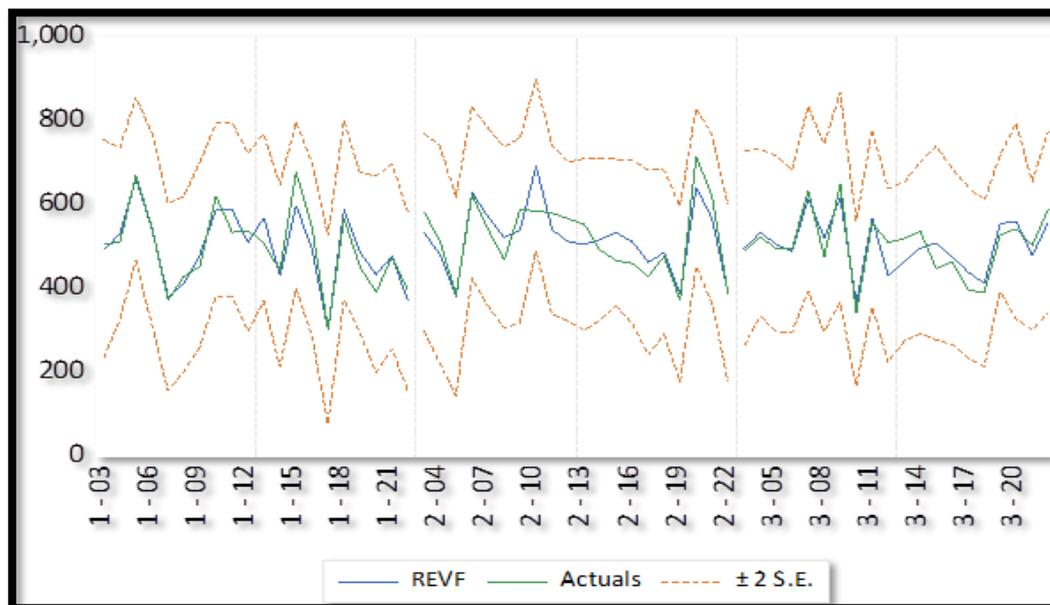
Figure 2: Actual and Forecast Data.

The blue (actual) line closely follows the green (forecast) line, it indicates good convergence. In other words, the actual data aligns well with the expected trend.

5. CONCLUSION

This study set out to investigate the relationship between marketing factors and revenue growth in Iraq's banking sector. Using the Pooled Mean Group Autoregressive Distributed Lag (PMG-ARDL) model, the study looked at the short- and long-term effects of interest rates, economic growth, and marketing and advertising expenditures on bank profits. Using panel data for three Iraqi commercial banks from 2000 to 2022, the PMG-ARDL model assumed a common long-run link between the variables while allowing for heterogeneity in short-run dynamics. This made it possible to fully comprehend the complex relationship that exists between financial success and marketing elements. According to the report, marketing expenditures have a major and favorable long-term influence on revenue growth, indicating that marketing activity investments are essential for the Iraqi banking sector to continue to function profitably. The long-term link between revenue growth and economic growth, however, was shown to be negative, indicating that there may be complexity in the Iraqi economy that reduce the growth's anticipated benefits. Interest rate increases were found to have a strong positive long-run impact on revenue growth, highlighting the significant role of interest rate changes in shaping bank revenue in Iraq. The short-run results indicated a rapid adjustment process, suggesting that the Iraqi banking sector quickly reverts to its long-run equilibrium after short-term shocks. Based on these findings, we recommend that Iraqi banks continue to invest in marketing strategies to drive long-term revenue growth, particularly focusing on targeted advertising and promotional campaigns that cater to specific customer segments. Moreover, policymakers should actively address the complexities in the relationship between economic growth and bank revenue, promoting economic stability and creating an environment conducive to sustainable growth in the banking sector. Furthermore, the banking sector should proactively adapt to changing interest rate environments, optimizing asset and liability management strategies to maximize profitability and mitigate potential risks. This research provides valuable insights for bank managers, policymakers, and researchers seeking to optimize marketing strategies and foster sustainable growth in the Iraqi banking industry. Future research could explore the impact of specific marketing strategies, incorporate additional macroeconomic variables, and expand the analysis to include a larger sample of banks in Iraq and other emerging markets.

REFERENCES

Acar, M., & Temiz, H. (2017). Advertising effectiveness on financial performance of banking sector: Turkey case. International Journal of Bank Marketing, 35(4), 649-661.

AlAli, M. S., AlKulaib, H. A., Abuzarqa, R., & AlSalem, A. S. (2021). Marketing expenditure impact on bank's

financial performance: A case study on Kuwaiti banks. European Journal of Economic and Financial Research, 5(1).

Aliata, V. L., Odondo, A. J., Aila, F. O., Ojera, P. B., Abong'o, B. E., & Odera, O. (2012). Influence of promotional strategies on banks performance. International Journal of Business, Humanities and Technology, 2(5), 169-178.

Amoako, G. K., & Dartey-Baah, K. (2012). An analysis of the impact of strategic marketing on profitability of rural banks – A case study of Dangme Bank. International Journal of Marketing Studies, 4(2), 150-156.

Baker, M. J., & Cameron, E. (2008). Critical success factors in destination marketing. Tourism and hospitality research, 8(2), 79-97.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74 (366), 427-431.

Dickey, D. A., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica,* 49 (4), 1057-1072.

Enders, W. (2010). Applied econometric time series. John Wiley & Sons.

Gujarati, D. N., & Porter, D. C. (2009). Basic econometrics. McGraw-Hill.

Iraq Stock Exchange (2023). https://isx.iq/

Pesämaa, O., Hair, J. F., & Haahti, A. (2007). Relationship marketing and bank performance: An application of the Q2 index in the Swedish banking industry. International Journal of Bank Marketing, 25(4), 220-232.

Pesaran, M. (2004). General Diagnostic Tests for Cross Section Dependence in Panels. *University of Cambridge, Faculty of Economics, Cambridge Working Papers in Economics*, 0435.

Pesaran, M. H., & Shin, Y. (1999). An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. In Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium (Chapter 11). Cambridge University Press2*.*

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationships Journal of Applied Econometrics, 16(3), 289-3263.

Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled Mean Group Estimation of Dynamic Heterogeneous Panels Journal of the American Statistical Association, 94(446), 621-6341*.*

Phillips, P. C. B. (1987). Time series regression with a unit root. *Econometrica*, 55 (2), 277-301.

Radivojevic, N., Curcic, N., & Boskovic, M. Z. (2022). E-marketing as determinant of economic growth. Economic and Social Development: Book of Proceedings, 198-214.

Safitri, Z. N., Restuningdiah, N., & Makaryanawati, M. (2023). The Effect of Credit Interest Rates, Digital Marketing, and Social Influence on Millennial Generation's Interest in Adopting Online Loan Services (Peer to Peer Lending). International Journal of Social Science, Education, Communication and Economics (SINOMICS JOURNAL), 2(4), 867-878.

Said, S. E., & Dickey, D. A. (1984). Testing for unit roots in autoregressive-moving average models of unknown order. *Biometrika*, 71 (3), 599-607.

Salahuddin, M., & Gow, J. (2015). The relationship between economic growth and remittances in the presence of cross-sectional dependence. The Journal of Developing Areas, 207-221.

Sanclemente-Téllez, J. C. (2017). Marketing and Corporate Social Responsibility (CSR). Moving between broadening the concept of marketing and social factors as a marketing strategy. *Spanish journal of marketing-ESIC*, *21*, 4-25.

Sharma, N., & Patterson, P. G. (1999). The impact of communication effectiveness and service quality on relationship commitment in consumer, professional services. Journal of Services Marketing, 13(2), 151-170.

Vento, G. A., & La Ganga, P. (2009). Bank liquidity risk management and supervision: Which lessons from recent market turmoil?. Journal of Money, Investment and Banking, (10), 78-125.

Wooldridge, J. M. (2013). Introductory econometrics: A modern approach. South Western Cengage Learning.

World Bank Data (2023). https://data.albankaldawli.org/country/IQ