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Examining the Impact of Financial and Structural Variables on Return on Equity in Consumer Industries: A Panel Vector Autoregression Approach

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ABSTRACT

This study aims to examine the dynamic impact of key financial and structural variables on the return on equity (ROE) of companies operating in Iraq's consumer goods industry during the period 2015 to 2024. Using panel data and employing Vector Autoregressive (VAR) models, the study analyzes the effects of shocks stemming from the variables of Economic Value Added (EVA), Operational Efficiency (OF), Price Momentum (MO), Firm Size (SIZE), Ownership Concentration (OC), and Research and Development expenditures (R&D) on ROE across three time horizons: short-term, medium-term, and long-term. Impulse response test results reveal that EVA is the only variable with a consistently positive and statistically significant impact on ROE across all time horizons—highlighting the fundamental role of economic value creation in enhancing shareholder returns in Iraq's emerging market. Operational efficiency (OF) also shows a positive effect in the short and medium term; however, this influence diminishes in the long run, potentially due to structural changes or volatility in the consumer market. Similarly, price momentum (MO) has a significant positive effect only in the short term, reflecting the short-lived impact of market sentiment and informational inefficiencies in the Iraqi stock exchange. Firm size (SIZE) exhibits a positive effect solely in the short term, which becomes insignificant over longer periods—possibly due to managerial complexity or declining scale efficiency in larger firms. Conversely, ownership concentration (OC) demonstrates no statistically significant impact on ROE in any time frame, possibly reflecting weak regulatory structures or conflicts of interest in concentrated ownership models within Iraqi companies. The findings suggest that the persistence and depth of the variables' impact on ROE depend on time and firm-specific characteristics. These insights offer practical implications for economic policymakers, corporate managers, and investors in the Iraqi market and underscore the need to reconsider strategic priorities—particularly in areas of value creation, operational productivity, and innovation management.

Keywords: Return on Equity, Consumer Goods Industry, Economic Value Added, Impulse Response, Financial Dynamic Analysis, Operational Efficiency, Ownership Structure.

Introduction

Return on equity (ROE) is widely recognized as one of the most comprehensive and informative indicators of corporate financial performance, as it reflects a firm's ability to generate returns for shareholders by efficiently deploying equity capital. In both developed and emerging markets, ROE serves not only as a benchmark for

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managerial effectiveness but also as a critical signal for investors, creditors, and policymakers regarding value creation and financial sustainability. In emerging economies, where capital markets are often characterized by higher volatility, institutional fragility, and informational inefficiencies, understanding the determinants of ROE becomes even more crucial. Prior research has consistently emphasized that profitability measures such as ROE are shaped by a complex interaction of financial, structural, operational, and behavioral factors rather than by accounting outcomes alone (1, 2). Consequently, contemporary financial research has shifted toward multidimensional frameworks that integrate value-based performance measures, governance structures, operational efficiency, innovation activities, and market dynamics to explain variations in shareholder returns.

One of the most influential developments in performance measurement literature is the growing emphasis on value-based indicators, particularly Economic Value Added (EVA). EVA is grounded in the notion that true economic profit is realized only when returns exceed the full cost of capital, including the opportunity cost of equity. Unlike traditional accounting measures, EVA explicitly incorporates capital charges, thereby aligning managerial decision-making with shareholder value maximization. Empirical studies across emerging markets have demonstrated that EVA provides superior explanatory power for firm performance and market valuation compared to conventional profitability ratios (3, 4). The relevance of EVA is especially pronounced in contexts where capital constraints, financing costs, and inefficient resource allocation are prevalent. In such environments, firms that consistently generate positive EVA signal sustainable value creation, which is ultimately reflected in higher ROE (5). As a result, EVA has become a central variable in contemporary analyses of corporate financial performance.

Beyond value-based measures, operational efficiency represents another core determinant of ROE. Operational efficiency captures a firm's ability to transform inputs into outputs at minimal cost and with optimal productivity, reflecting managerial competence, process optimization, and effective resource utilization. Theoretical perspectives rooted in production efficiency and cost-structure analysis suggest that firms with higher operational efficiency can sustain superior profitability even in highly competitive markets. Empirical evidence from emerging economies confirms that improvements in operational efficiency are positively associated with profitability and equity returns, although the magnitude and persistence of this relationship may vary over time (6, 7). In markets characterized by structural instability and demand fluctuations, operational efficiency may play a particularly important role in stabilizing earnings and protecting shareholder returns, thereby strengthening ROE.

Another stream of literature highlights the importance of firm size in explaining profitability and equity returns. Firm size is commonly associated with economies of scale, greater bargaining power, enhanced access to financial resources, and diversification benefits, all of which can contribute positively to ROE. However, size can also generate countervailing effects, such as bureaucratic rigidity, managerial inefficiencies, and reduced strategic flexibility. As a result, empirical findings on the size–profitability relationship are mixed, especially in emerging markets. While some studies report a positive association between firm size and ROE, others find diminishing or even negative effects as firms grow beyond an optimal scale (8-10). These mixed results suggest that the impact of firm size on ROE is context-dependent and may evolve dynamically over time.

Corporate ownership structure, particularly ownership concentration, constitutes another critical factor influencing firm performance and ROE. Agency theory posits that concentrated ownership can mitigate agency conflicts by enhancing monitoring and aligning managerial incentives with shareholder interests. Conversely, excessive concentration may facilitate the expropriation of minority shareholders and weaken overall performance. Empirical evidence from emerging markets reveals that the effect of ownership concentration on ROE is far from

uniform and depends heavily on institutional quality, governance mechanisms, and legal protections (11, 12). Studies focusing on Middle Eastern and Asian markets indicate that ownership concentration may exert either positive, negative, or insignificant effects on performance, underscoring the need for context-specific analysis (13, 14). These ambiguities highlight the importance of examining ownership structure within broader financial and structural frameworks.

Innovation and investment in research and development (R&D) have also attracted growing attention as drivers of long-term profitability and shareholder value. According to innovation theory and the knowledge-based view of the firm, R&D expenditures enhance a firm's capacity to develop new products, improve processes, and sustain competitive advantage. While R&D investments often impose short-term costs, their long-term benefits can translate into higher productivity, market share, and ultimately improved ROE. Empirical studies from emerging markets provide robust evidence that R&D intensity positively affects firm performance over longer horizons, although short-term effects may be weak or insignificant (15-17). These findings suggest that R&D should be evaluated within dynamic frameworks that capture delayed and cumulative impacts on ROE.

In addition to structural and operational factors, behavioral and market-based variables such as price momentum have been increasingly incorporated into profitability analyses. Price momentum, rooted in behavioral finance theory, reflects the tendency of stock prices to continue trending due to investor underreaction or delayed information diffusion. In less efficient markets, momentum effects may be particularly pronounced, influencing short-term stock performance and, indirectly, perceived firm profitability. Empirical evidence from emerging markets indicates that price momentum can have a positive short-term association with firm returns, although these effects tend to dissipate over longer horizons (18, 19). Understanding the interaction between market sentiment and fundamental performance measures such as ROE is therefore essential, especially in volatile and information-constrained environments.

Collectively, the existing literature demonstrates that ROE is shaped by a multifaceted set of determinants encompassing value creation, efficiency, size, ownership structure, innovation, and market dynamics. However, much of the empirical evidence relies on static models that fail to capture the dynamic interactions and temporal persistence of these relationships. Recent advances in econometric modeling, particularly panel vector autoregression (PVAR), offer powerful tools for analyzing the dynamic and endogenous relationships among financial variables. By allowing all variables to be treated as jointly endogenous, PVAR models enable researchers to trace the short-, medium-, and long-term responses of ROE to structural and financial shocks (20, 21). Such dynamic approaches are especially valuable in emerging markets, where adjustment processes and feedback effects are likely to be more complex and nonlinear.

Despite the growing body of international evidence, there remains a notable gap in the literature concerning the dynamic determinants of ROE in Middle Eastern and post-conflict emerging economies, particularly within consumer-oriented industries. These sectors often face unique challenges related to demand volatility, institutional constraints, financing limitations, and competitive pressures. Recent studies emphasize the need for localized and context-sensitive frameworks that integrate global financial theories with region-specific economic and institutional characteristics (22-24). Addressing this gap requires comprehensive empirical analyses that simultaneously consider financial, structural, operational, and behavioral variables within a unified dynamic framework.

Accordingly, this study seeks to contribute to the literature by developing a dynamic, multidimensional analysis of the determinants of return on equity, integrating economic value added, operational efficiency, firm size,

ownership concentration, research and development expenditures, and price momentum within a panel vector autoregression framework, in order to examine their short-, medium-, and long-term effects on ROE.

Methods and Materials

If in regression analysis in relation to time series, dependent (endogenous) variables appear with a delay on the right side of the linear regression model, then the model under analysis includes one or more elements or lags of the dependent variable as an explanatory variable and is called an autoregressive model. Such models are dynamic models because they can show the relationship between the dependent variable and its past values over time. One type of autoregressive model is the vector autoregressive (VAR) model. This model was first proposed by Sims in 1980 in an article entitled "Macroeconomics and the Realities" to predict various macroeconomic time series data over a given period of time. In fact, in this model, each variable is a function of its lags and other variables in the model.

The vector autoregressive (VAR) model is one of the most prominent multivariate non-structural models and, as previously stated, was introduced by Sims (1980) after the criticism of Lucas (1976) based on the change in decisions of economic agents based on changes in their expectations, which causes incorrect estimation of the model parameters. In the simultaneous equation system, the mutual relationship between the series variables in the model is considered. In these systems, some variables are endogenous and some are predetermined (exogenous or endogenous with a lag). In the simultaneous equation system, before estimating the coefficients, the state of the system equations is examined in terms of identification. To fulfill the identification condition, it is assumed that a number of predetermined variables appear only in some of the model equations, therefore, in the estimation of the simultaneous equation system, the model variables are classified into two categories: endogenous and exogenous. Separating endogenous from exogenous variables is usually done by the researcher.

Sims also criticized the classification of variables into exogenous and endogenous. He stated that in a simultaneous equation system, all variables are determined simultaneously and it is not correct to judge whether they are exogenous or endogenous. To resolve this contradiction of the simultaneous equation system, Sims introduced the vector autoregressive model, as mentioned above. In the vector autoregressive model, all variables except the origin, trend, and seasonal variables are endogenous. Therefore, the problem of distinguishing endogenous and exogenous variables in these models is solved. Such models can be estimated by the ordinary least squares (OLS) method because all the variables on the right side are predetermined.

Observations have shown that forecasts based on the vector autoregressive model are also more accurate than those derived from more complex systems of simultaneous equations. Providing more accurate forecasts of macroeconomic variables has made the vector autoregressive model popular with many economists and has been used in forecasting various sectors of the economy, including the monetary and financial sectors. Unlike simultaneous equation models, this model is not based on theory.

In the vector autoregression model, the left-hand variable is a vector of time series variables, each of which is defined in terms of its own lags and the lags of the other variables in the model. Lutkeppel (2005) introduces the vector autoregression model in general as follows:

$$Y_t = A_1 Y_{t-1} + \cdots + A_P Y_{t-P} + B_0 X_{t-1} + \cdots + B_q X_{t-q} + C D_t + u_t \qquad (1)$$

In this regard, Y_t is the vector of endogenous variables, X_t is the vector of exogenous variables, D_t is the vector of predetermined variables such as fixed component, linear trend, and seasonal dummy variables, and u_t is the residuals that have a normal distribution with a mean of zero.

VAR estimation from two methods of shock response analysis and variance analysis of forecast error examines the effects of each of the above-mentioned variables. The features that distinguish the VAR model from other methods are: 1) This method is actually a simultaneous trading system in which all variables are considered endogenous. 2) In this method, the value of a variable is expressed as a linear function of past values and all variables in the season. 3) In general, one of the limitations in most economic analyses is the lack of observations. In the VAR model, interruptions are used due to the lack of observations, but it has the disadvantage that the degrees of freedom are reduced.

In addition to forecasting, the VAR model is also used to test causality. In the vector autoregression model, all endogenous variables must be stationary. Therefore, if a variable is stationary, it must be made stationary by differentiation. However, differentiation causes the loss of information related to the level of variables.

Regression models based on panel vector autoregression (P-VAR)

The general form of the PVAR equation in the bivariate case is as follows:

$$\begin{bmatrix} w_{it}^1 \\ w_{it}^2 \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \end{bmatrix} \begin{bmatrix} w_{i,t-1}^1 \\ w_{i,t-1}^2 \end{bmatrix} + \begin{bmatrix} e_{it}^1 \\ e_{it}^2 \end{bmatrix} \quad (2)$$

$$\begin{pmatrix} e_{it}^1 \\ e_{it}^2 \end{pmatrix} \sim N(0, I) \quad \text{و} \quad I = \begin{bmatrix} \delta_1^2 & \delta_{12} \\ \delta_{21} & \delta_2^2 \end{bmatrix}$$

$$\Rightarrow W_{it} = A_0 + A_1 W_{i,t-1} + e_{it}$$

$$e_{it} \sim N(0, I) \quad \text{و} \quad A_0 = B^{-1}\Gamma_0 \quad \text{و} \quad A_1 = B^{-1}\Gamma_1 \quad \text{و} \quad e_{\mathrm{it}} = B^{-1}\varepsilon_{it}$$

w_{it} As an m × 1 vector of random variables for the ith cross-sectional data at time t, it is equal to:

$$w_{\mathrm{it}} = (\mathrm{I_m} - \phi)\,\mu_i + \phi w_{\mathrm{i,t-1}} + \varepsilon_{\mathrm{it}} \qquad (3)$$

For i= 1 ,...., N and t = 1, ..., T

Φ represents an M × M matrix of coefficient slopes.

$\mu_{\mathrm{i}}$is an M × 1 vector of special effects vectors.

$\varepsilon_{\mathrm{it}}$ is an M × 1 vector of disturbances.

$\mathrm{I_m}$ It represents a matrix with dimensions M × M.

Basically, the use of common econometric methods in estimating the coefficients of time series models is based on the assumption of stationary variables of the model. If the time series variables are stationary, even despite the lack of relationship with the economic concept between the variables of the model, the coefficient of determination may be high and erroneous results may be inferred from the degree of correlation of the variables.

There is a strong correlation between trend variables, even in cases where there is no significant economic relationship between them. This issue is actually the starting point of the concept that is now known as cointegration

among economists. Many years have passed since these issues were proposed by Yule and Frisch until in the 1990s, the concept of cointegration was once again widely raised in scientific circles and a new way of modeling economic activities was established. Initially, to solve the problem of co-directional movement of variables and avoid spurious regression between time series variables, a time trend variable T was considered as an independent variable in the model. Later, it was found that this solution is only possible in cases where the trend variables are stationary.

If the model variables are stationary after difference, adding a time trend T among the variables or subtracting a definite trend from the variables will not make these variables invariant. In this situation, using conventional econometric methods will make the t and F tests unreliable and will lead to incorrect conclusions about the strength of the relationship between the variables. In time series where the variables are not stationary, the difference of variables is used to avoid spurious regression. However, using the first or higher order difference of variables in regressions will cause the loss of useful information about the long-term relationships between the variables. Using the cointegration method allows the regression to be estimated based on the level of the variables without fear of being spurious.

The PVAR model is a combination of the vector autocorrelation model approach and mixed data. So that VAR models are suitable tools for analyzing economic dynamics such as countries, financial markets, trade relations and monetary unions.

In fact, shock response functions and variance decomposition of forecast error are inferred from the estimation of the P-VAR model, which are very useful in analyzing macroeconomic disequilibrium. Methodologically, implementing the VAR method on panel data requires imposing a similar underlying structure for each unit cross-sectionally.

Fixed effects are a way to overcome the limitation on parameters. These effects are inconsistent in the panel data autoregressive model and are correlated with a lag from the dependent variable. To overcome this issue, the generalized method of moments (GMM) is used. More precisely, to eliminate fixed effects, the differenced mean method is used. In this method, all variables may be skewed one period ahead and weighted towards the standardized variance at each observation. This skewing is to maintain orthogonality between the variables and the regression regression, and allows the regression regression to be introduced as an instrument and the coefficients estimated by the GMM method.

Each time the coefficients are estimated, the shock response functions and the variance decomposition of the forecast error are calculated by Cholesky decomposition. Neither econometric methods nor empirical studies allow for a clear choice of the method to preserve the variables in Cholesky decomposition.

Impulse Response Functions (IRF) and Forecast Error Variance Decomposition (FEVD).

The study of the response of variables following a shock in each of the endogenous variables is called the response. Shock-response analysis allows the effects of disturbances in one of the endogenous variables on other variables of the system to be evaluated in VAR and P-VAR models. In other words, these path functions show the dynamics of the system of equations in response to the incoming shocks.

The study of shock-response functions is considered as an analysis of the dynamic reaction between endogenous variables in a VAR and P-VAR model. In this analysis, the exogenous and deterministic variables are considered fixed and, therefore, can be eliminated from the system of equations. In other words, a part of the mean of the endogenous variables that is attributed to the exogenous and deterministic variables is eliminated. In this

type of function, the endogenous variables are represented by Y. If Y is stationary, the moving average model for shock-response analysis is introduced as follows:

$$Y_t = \varphi_0 u_t + \varphi_1 u_{t-1} + \varphi_2 u_{t-2} + \cdots \quad (4)$$

This technique is called the prediction error impulse response. In the above equation, Y_t is the vector of endogenous variables, $\varphi_0$is the identity matrix and is equal to the following equation:

$$\varphi_t = \sum_{j=1}^{s} \varphi_{s-j} A_j \quad (5)$$

The coefficients of this model can provide an interpretation of the response to shocks to the system. The components of the $\varphi_s$matrix represent the components of Y_t for the interpretation of the VAR and P-VAR models.

Variance and forecast error analysis is a suitable tool for interpreting VAR and P-VAR models. Variance and forecast error analysis measures the effect of each variable on other variables over time. Based on the above relationship, assuming that the moving average model has orthogonal error components and zero-mean disturbance terms, we can say:

$$Y_t = \mu + \sum_{i=0}^{\infty} \Psi w_{t-1} \quad (6)$$

$$\delta_t^2(h) \sum_{n=0}^{h-1} \left(\Psi_{k1,n}^2 + \cdots + \Psi_{kn,n}^2\right) = \sum_{j=1}^{k} \left(\Psi_{kj,0}^2 + \cdots + \Psi_{kj,h-1}^2\right) \quad (7)$$

In this relation, $\Psi_{ij,n}$ is the ij factor of the orthogonal reaction-impact coefficient matrix. The expression: $\left(\Psi_{kj,0}^2 + \cdots + \Psi_{kj,h-1}^2\right)$ also gives an interpretation of the contribution of the j variable to the h step variance of the forecast error of the k variable. By dividing both sides of the relation by the expression $\delta_k^2(h)$, we can show the contribution of each j variable to the h step variance of the forecast error of the k variable:

$$\Psi_{kj}(h) = \left(\Psi_{kj,0}^2 + \cdots + \Psi_{kj,h-1}^2\right) / \delta_k^2(h) \quad (8)$$

According to the information mentioned in the previous sections, the model used to determine the impact of factors affecting return on equity is introduced as follows:

$$Y_t = [\mathrm{ROE}, \mathrm{EA}, OF, MO, SIZE, OC, RD,]$$

Findings and Results

In order to determine the correlation of residuals between sections, the Boys' Cross-Sectional Independence Test is used. The null hypothesis in this test is that there is no autocorrelation between sections. The result of this test determines the choice of the type of stability test. If there is correlation of residuals between sections, some stability tests such as the Levin-Lin-Chow test will yield false results. If the result of this test indicates the lack of autocorrelation between sections, the use of the Levin-Lin-Chow test to examine stability will be unimpeded. In this study, this test was examined, and the test result indicates that the residuals between sections are not correlated.

Table 1. Results of the boys' cross-sectional independence test

Test statistic	Probability level
0.56	0.403

To prevent spurious regression, data stationarity tests are used. In mixed data, there are different tests to check the stationarity of the variables under study. In this case, before estimating the model, the stationarity of the variables under study in the desired pattern was checked using the Levine-Lin-Chu test and the stationarity of the

panel vector autoregressive variables was checked using the Hamish-Zevallis test, and the results are given in Table (1). The null hypothesis in this test is that there is a unit root. If the calculated statistic is greater than the critical value corresponding to the 95% confidence level (the probability value of the test statistic is less than 0.05), the null hypothesis will be rejected.

Table 2. Results of the durability test (HT)

Variable name	Variable abbreviation	The value of the test statistic	Probability value of the test statistic	Test result
Return on equity	ROE	-8.04	0.0000	The variable is stationary with respect to the trend.
Price Momentum	MO	-2.8	0.0025	The variable is stationary with respect to the trend.
Company size	ROA	-9.6	0.0000	The variable is stationary with respect to the trend.
Concentration of ownership	OC	-8.2	0.0000	The variable is stationary with respect to the trend.
Research and development costs	RD	-7.8	0.0000	The variable is stationary with respect to the trend.
Operational efficiency	OF	-9.99	0.0000	The variable is stationary with respect to the trend.
Economic added value	EA	-9.2	0.0000	The variable is stationary with respect to the trend.

The results of the stationarity test for the research model are given in Tables (2). According to the results obtained, it is observed that the variables under study are stationary. Also, the optimal interval, considering the seasonality of the variables, is considered to be interval 3. In Table (3), the expected sign of the effect of the variables is as follows:

Table 3. Research variables

Row	Variable name	Operational definition	Theoretical foundations	Effect on ROE	Resources	Abbreviation symbol
1	Economic added value	EA = NOPAT − (Capital × WACC)	Economic Value Added Theory (Stewart, 1991)	Positive – indicates value creation for shareholders	Alam & Uddin (2021), Journal of Risk and Financial Management	EA
2	Operational efficiency	EBIT / Sales	Production efficiency theory/cost structure analysis	Positive – Effective operational performance	Lin et al. (2022), Review of Accounting and Finance	OF
3	Price Momentum	Changes in stock returns over the past 3–6 months	Behavioral Finance / Underreaction Hypothesis (Jegadeesh and Titman, 1993)	Positive – if the positive trend continues	Khan et al. (2021), Finance Research Letters	MO
4	Company size	– Natural logarithm of total assets	Theory of Economic Scale/Theory of Market Competition	Sometimes negative (in very large companies)	Rsheed et al. (2021), *International Journal of Finance & Economics S*	SIZE

5	Concentration of ownership	Ratio of ownership of major shareholders to total shares	Agency theory	Sometimes negative – depending on the company structure	Al-Faryan et al. (2021), Corporate Governance: Int. J. of Business	OC
6	Research and development costs	R&D / Sales	Innovation Theory (Schumpeter) / Knowledge-Based Competitive Advantage	Positive – in the long term	Hussain et al. (2023), Technological Forecasting and Social Change	RD

In this section, we examine the analysis of shock response through the variance-covariance matrix of disturbance components. Shock response analysis allows us to evaluate the effects of shocks on an exogenous variable or a disturbance in one of the endogenous variables on other variables in the model. In this test, the response of the variables in question is examined in the short, medium and long term. In this test, twenty seasons are examined for the proposed model, where the short term is the average of seasons one to four, the medium term is the average of seasons four to eight, and the long term is the average of seasons eight and later.

The damping or persistence of the effects of shocks and the difference in the response of different variables is therefore of great importance. In this section, the shock response is first examined.

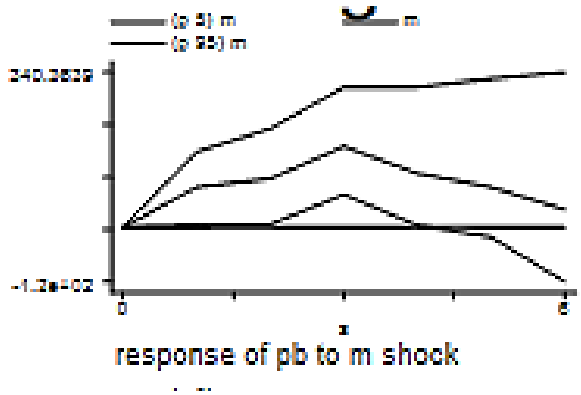

Figure 1. Analysis of the shock response on return on equity to a shock in economic value added.

The results of Figure (1) show that the positive shock response from economic value added has a positive effect on return on equity in the short, medium and long term. The results indicate that any increase in economic value added in the short, medium and long term will lead to an increase in return on equity.

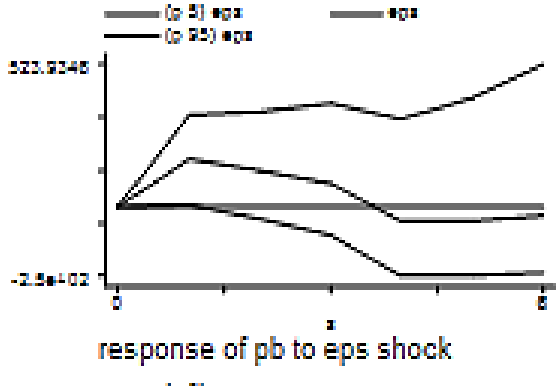

Figure 2. Analysis of the shock response of return on equity to a shock in operating efficiency

The results of Figure (2) show that the positive shock response from operating efficiency has a positive effect on return on equity in the short and medium term, while in the long term and over time it is meaningless and the shock effect is ineffective in the long term. It seems that any increase in operating efficiency in the short and medium term will be a suitable measure for return on equity. But it is ineffective in explaining the long-term effect.

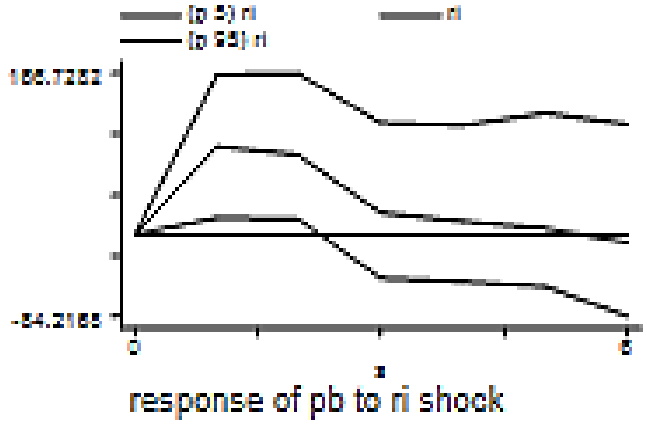

Figure 3. Analysis of the response of the return on equity to a shock in price momentum

The results of Figure (3) show that the positive shock response from price momentum has a positive effect on return on equity in the short-term. In other words, an increase in price momentum in the short-term increases return on equity. However, in the medium-term, the real effect of an increase in price momentum is the variability in return on equity and its undesirable effects.

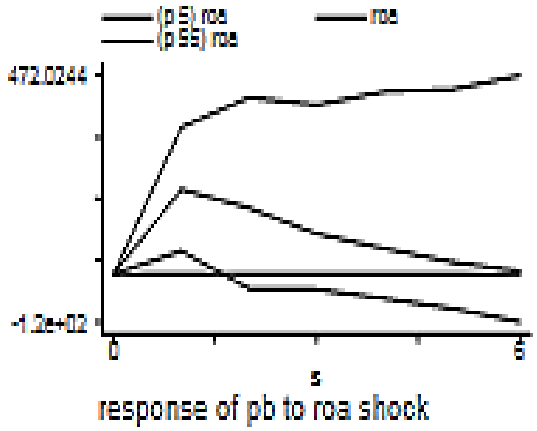

Figure 4. Analysis of the shock response on return on equity to a shock in firm size

The results of Figure (4) show that the positive shock response resulting from the company size variable has a positive effect on the return on equity in the short and medium term. But it is not significant in the long term. In other words, the results indicate that any increase in company size in the short and medium term will lead to an improvement in the situation of shareholders.

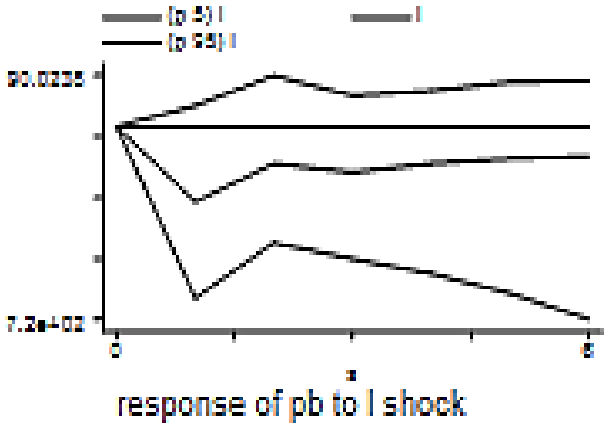

Figure 5. Analysis of the shock response of equity returns to a shock in ownership concentration

The results of Figure (5) show that the positive shock response resulting from ownership concentration is completely meaningless in the short, medium and long term. In other words, the ratio of ownership of major shareholders to total shareholders does not have much effect in the selected companies. And attention should be paid to other influential factors.

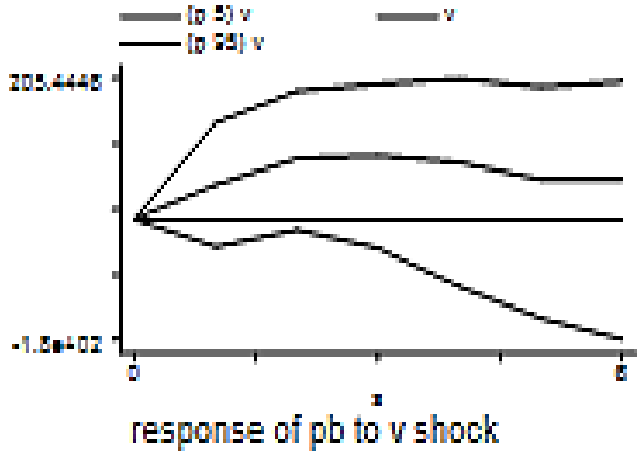

Figure 6. Analysis of the shock response of return on equity to a shock in research and development expenses

The results of Figure (6) show that the positive shock response from R&D costs in the short and medium term is positive but meaningless (due to the absence of all boundary lines on one side of the graph). In other words, R&D costs cannot be a suitable measure for increasing return on equity and its significance in the capital market, and other influential factors should be considered.

Table 4. Results of the shock response test of return on equity against other model variables

Course	ε_{VEA} (Shock) EA)	ε_{OF} (Shock OF)	ε_{MO} (Shock MO)	ε_{SIZE} (Shock SIZE)	ε_{OC} (Shock OC)
Short-term	Positive	Positive	Positive	Positive	Meaningless
Medium-term	Positive	Positive	Meaningless	Positive	Meaningless
Long-term	Positive	Meaningless	Meaningless	Meaningless	Meaningless

Based on the results of the shock response test table, the economic value added (EA) variable has a positive and significant effect on return on equity (ROE) in all three time horizons, short-term, medium-term and long-term.

This finding indicates that EA, as an indicator for real economic value creation, plays a key and sustainable role in enhancing shareholder returns. Therefore, focusing on improving EA can be an effective policy for increasing the long-term profitability and market value of companies. As for operational efficiency (OF), the effect of this variable is positive and significant in the short and medium term, but it becomes meaningless in the long term. This indicates that operational efficiency can improve financial performance in the near term, but in the long term, other factors such as changes in market structure, technology or competition may moderate its effect. The price momentum (MO) variable has a positive effect only in the short term and is meaningless in the medium and long term. This result is consistent with behavioral finance assumptions and suggests that the effects of price trends are merely transient and should not be considered as a stable indicator for assessing long-term financial performance. It is also observed that firm size (SIZE) has a positive and significant effect on ROE in the short and medium term, but this effect disappears in the long term. It can be argued that economies of scale, organizational structure and better access to financial resources can only increase returns to a certain extent and in the long term may face challenges such as reduced flexibility or increased managerial complexity. Finally, ownership concentration (OC) has not shown a significant effect on ROE in any of the time periods. This lack of significance could be due to the duality of agency theory, such that ownership concentration can simultaneously lead to improved monitoring or exacerbate conflicts of interest. As a result, the final effect of this variable may depend on other institutional and structural factors. Among the variables examined, EA has the most stable and strongest impact on ROE across all periods, while variables such as operating efficiency and firm size have temporary effects. Also, variables such as price momentum and ownership concentration have no significant long-term impact. Accordingly, policymakers and financial managers should focus on variables that have a sustainable role in creating economic value.

In general, variance analysis of forecast error is used to identify the contribution of orthogonal disturbance components to the least squares error of individual variables. Hence, variance analysis is used to determine the relative importance of shocks to the variables of economic value added, operating efficiency, price momentum, firm size, ownership concentration, and research and development expenses on changes in return on equity. And the effect of each variable on the variance of the return on equity forecast error is shown in percentage terms.

Table 5. Results of the analysis of variance test for prediction error

Variables	Time	ε_{VA}	ε_{OF}	ε_{SIZE}
P_b	Medium-term	0.31	0.09	0.06

Based on the variance analysis table of forecast error, it can be concluded that the main reason for the variance of return on equity is affected by economic value added. In the medium term, this shock has a 31 percent share in the variance of return on equity. On the other hand, after economic value added, it can be said that the shock resulting from operating efficiency and company size, respectively, have the largest share in the variance of return on equity, at 9 percent and 6 percent. Since it is not possible to examine variance analysis in the short term in panel data vector autoregression models, only the results of medium-term fluctuations have been examined.

Discussion and Conclusion

The primary objective of this study was to examine the dynamic effects of key financial, structural, operational, and behavioral variables on return on equity (ROE) in consumer-oriented firms using a panel vector autoregression framework. The empirical findings provide several important insights into the time-varying nature of value creation

and profitability in emerging market contexts and allow for a nuanced interpretation when aligned with prior theoretical and empirical research.

The most robust and consistent finding of the study is the strong, positive, and statistically significant impact of Economic Value Added (EVA) on ROE across short-, medium-, and long-term horizons. This result underscores the central role of value-based performance measures in explaining shareholder returns. EVA captures economic profit after accounting for the full cost of capital and therefore reflects genuine value creation rather than accounting-based profitability. The persistence of EVA's effect over time suggests that firms capable of sustaining returns above their cost of capital are more likely to generate stable and durable equity returns. This finding is strongly aligned with prior empirical evidence from emerging markets, which demonstrates that EVA outperforms traditional profitability metrics in explaining firm performance and market valuation (3, 4). Moreover, the results are consistent with the value creation perspective emphasized in recent studies showing that EVA has a lasting influence on firm profitability due to its close linkage with strategic investment decisions and capital efficiency (5, 25). In environments characterized by capital scarcity and higher financing costs, such as emerging economies, EVA appears to function as a critical anchor for long-term ROE enhancement.

Operational efficiency also demonstrates a positive and statistically significant effect on ROE in the short and medium term, although this effect weakens and becomes insignificant in the long run. This pattern suggests that improvements in cost control, productivity, and process optimization can enhance equity returns in the near term, but their impact may not be indefinitely sustainable without complementary strategic adjustments. This finding is consistent with efficiency-based theories, which argue that operational gains can quickly translate into higher profitability but may be eroded over time by competitive pressures, technological change, or diminishing marginal returns to efficiency improvements. Prior studies provide strong support for this interpretation, showing that operational efficiency is positively associated with profitability, particularly in the short run (6, 7). However, the diminishing long-term effect observed in this study aligns with evidence suggesting that efficiency advantages alone are insufficient to sustain superior performance unless reinforced by innovation, governance reforms, or strategic repositioning (26). In volatile and competitive markets, operational efficiency may therefore act as a stabilizing but not a permanently decisive factor for ROE.

The results further indicate that price momentum exerts a positive and significant influence on ROE only in the short term, with no meaningful effects observed over medium- or long-term horizons. This finding is consistent with behavioral finance theory, which attributes momentum effects to investor underreaction, delayed information diffusion, and short-lived market sentiment. In less efficient capital markets, price trends may temporarily influence firm valuation and perceived performance, but these effects tend to dissipate as new information is incorporated into prices. Empirical studies from emerging markets provide substantial evidence that momentum strategies generate abnormal returns primarily in the short run, with limited persistence over time (18, 19). The results of the present study reinforce this view and suggest that while price momentum may temporarily enhance ROE through valuation effects or investor sentiment, it does not constitute a reliable determinant of sustained profitability. This underscores the importance of distinguishing between market-driven and fundamentals-driven sources of equity returns.

Firm size exhibits a positive and statistically significant effect on ROE in the short and medium term, but this relationship weakens and becomes insignificant in the long term. This temporal pattern reflects the dual nature of firm size effects in emerging markets. In the early stages, larger firms may benefit from economies of scale, stronger

bargaining power, easier access to financing, and greater market visibility, all of which can contribute to higher equity returns. However, over time, these advantages may be offset by increased organizational complexity, bureaucratic inefficiencies, and reduced strategic flexibility. The mixed evidence on the size–profitability relationship in the literature is consistent with this finding. Several studies report positive size effects in emerging economies (2, 9), while others document diminishing or negative returns to scale in the long run (8, 10). The results of this study suggest that size-related advantages are context- and time-dependent and that growth strategies focused solely on expansion may not guarantee sustained improvements in ROE.

Ownership concentration does not exhibit a statistically significant effect on ROE in any of the examined time horizons. This finding highlights the ambiguous role of ownership structure in shaping firm performance, particularly in emerging market contexts. Agency theory posits that concentrated ownership can improve monitoring and reduce managerial opportunism, thereby enhancing performance. However, it also recognizes the risk of expropriation of minority shareholders and entrenchment effects when ownership becomes excessively concentrated. The absence of a significant relationship in this study suggests that these opposing mechanisms may offset each other, resulting in a neutral net effect on ROE. This result is consistent with empirical evidence from various emerging markets, where ownership concentration has been found to have positive, negative, or insignificant effects depending on institutional quality, governance frameworks, and legal enforcement (11-13). The findings imply that ownership concentration alone is insufficient to explain variations in ROE without considering the broader governance environment.

Finally, research and development (R&D) expenditures show no statistically significant effect on ROE across the analyzed time horizons. This result may initially appear inconsistent with innovation theory, which emphasizes the long-term profitability benefits of R&D investment. However, it is important to recognize that R&D effects are often delayed and contingent on complementary assets, absorptive capacity, and market conditions. Empirical studies frequently report weak or insignificant short-term effects of R&D on profitability, with positive impacts emerging only over extended horizons (15, 16). While some studies document long-term performance gains from sustained R&D investment (17, 25), the lack of significance in this study may reflect structural constraints, limited innovation ecosystems, or measurement challenges in emerging market settings. The findings suggest that R&D investment alone may not translate directly into higher ROE unless supported by effective commercialization strategies and institutional infrastructure.

Overall, the results of this study emphasize the importance of distinguishing between variables that generate temporary versus persistent effects on ROE. EVA emerges as the most stable and influential determinant of equity returns, while operational efficiency, firm size, and price momentum exhibit time-bound impacts. Ownership concentration and R&D expenditures appear to have more context-dependent or indirect effects. These findings contribute to the literature by highlighting the dynamic and heterogeneous nature of profitability drivers in emerging markets and by demonstrating the value of a PVAR framework for capturing these complex interactions.

Despite its contributions, this study is subject to several limitations that should be acknowledged. First, the analysis relies on firm-level accounting and market data, which may be affected by measurement errors, reporting inconsistencies, or data availability constraints common in emerging markets. Second, while the panel vector autoregression approach captures dynamic interrelationships, it does not explicitly incorporate structural breaks or regime shifts that may influence profitability dynamics over time. Third, the study focuses on a specific set of financial and structural variables and does not account for macroeconomic factors, regulatory changes, or industry-

specific shocks that may also affect return on equity. Finally, the generalizability of the findings may be limited to similar institutional and market environments, and caution should be exercised when extrapolating the results to fundamentally different economic contexts.

Future research could extend the present study in several directions. First, incorporating macroeconomic variables such as inflation, interest rates, or economic growth could provide a more comprehensive understanding of the external forces shaping ROE dynamics. Second, future studies may explore nonlinear or threshold effects, particularly for firm size and ownership concentration, to capture potential asymmetries in their impact on performance. Third, extending the analysis to alternative sectors or cross-country samples would allow for comparative insights and enhance the external validity of the findings. Finally, future research could examine the interaction effects between innovation, governance quality, and operational efficiency to better understand the conditions under which these factors jointly contribute to sustainable equity returns.

From a practical perspective, managers and policymakers should prioritize strategies that enhance genuine economic value creation rather than focusing solely on short-term profitability indicators. Emphasizing capital efficiency, disciplined investment decisions, and value-based performance management can contribute to more stable and sustainable returns on equity. Managers should also recognize that operational efficiency and firm growth can improve performance in the near term but require continuous adaptation and innovation to maintain their impact over time. For investors, the findings highlight the importance of distinguishing between transient market-driven effects and fundamentals-based value creation when evaluating firm performance. Finally, policymakers should consider strengthening institutional frameworks, transparency, and innovation ecosystems to enable financial and structural factors to translate more effectively into long-term shareholder value.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adheried in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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