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Examining the Relationship Between Stock Market Volatility and Bank Performance and Profitability: A Case Study of Banks Listed on the Tehran Stock Exchange (2019–2024)

Ashkan Gholami Dehkordi[a]

[a]*Master of Finance, Financial Engineering and Risk Management, Iranian Electronic Higher Education Institute, Tehran, Iran*

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Abstract

In the contemporary financial landscape, banks remain pivotal to Iran's economy as key players in the capital market. This study investigates the relationship between stock market volatility and the performance and profitability of banks listed on the Tehran Stock Exchange (TSE) from 2019 to 2024. The statistical population includes banks with a consistent presence on the TSE during this period, namely Karafarin Bank, Parsian Bank, Eghtesad Novin Bank, Sina Bank, Bank Mellat, and Bank Saderat Iran. Data were sourced from stock market indicators, TSE financial reports, "Rahavard Novin" software, the www.Rdis.ir website, and banks' financial statements and notes, collected via a documentary library method. Panel regression analysis, conducted using EViews software, was employed to assess the relationships between dependent variables (bank performance and profitability metrics) and independent variables, including stock market volatility, banking competition, market development, and macroeconomic factors. The results indicate that stock market volatility significantly impacts Economic Return on Equity (EROE) and Net Interest Margin (NIM). Banking competition significantly affects NIM, while stock market development influences NIM and Economic Value Added (EVA). Additionally, interest rates impact both NIM and EVA, whereas inflation primarily affects NIM. These findings highlight the interplay between market dynamics and bank performance, with implications for financial stability and digital transformation in the banking sector.

Keywords: (Stock market volatility, bank performance, banking competition, macroeconomic factors, financial stability, Tehran Stock Exchange)
2022 MSC: O20, O10

1 Introduction

Banks are the backbone of Iran's financial system, driving economic growth by facilitating resource allocation across real sectors such as industry, agriculture, and services [4]. The rapid evolution of financial markets, particularly the Tehran Stock Exchange (TSE), has expanded the scope of banking activities, making their performance critical to national economic stability [5]. Efficient banking operations ensure optimal mobilization of resources, provide diverse services to clients, and generate profitability, aligning with broader economic objectives [6]. However, external shocks, including stock market volatility, high inflation, and geopolitical tensions (e.g., sanctions), significantly impact banks'

Email address: ashkan.gholami9797@gmail.com (Ashkan Gholami Dehkordi)

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operational costs, cost of capital, and profitability, given their deep integration with the economy [9]. Inefficiencies in the banking sector can disrupt multiple economic sectors, underscoring the need for continuous performance evaluation to enhance financial resilience [5].

The TSE, a pivotal component of Iran's capital market, is highly sensitive to macroeconomic and industry-specific factors, particularly oil price fluctuations, which drive short-term capital flows due to investors' ability to swiftly convert cash into securities [6]. As an OPEC member, Iran's stock market experiences pronounced volatility, influenced by oil prices and sanctions, making TSE both an attractive and risky avenue for domestic and international investors seeking diversification [9]. Financial markets, including stock and capital markets, serve as critical channels for investment, with their efficiency determining the allocation of scarce resources to economic activities [11]. The rise of digital banking and global market integration has further highlighted the need to understand stock market dynamics in emerging economies like Iran [1]. Bank performance is defined by efficiency (optimal resource use) and effectiveness (achieving strategic goals), shaped by internal operational factors and external market conditions [1]. Leading indicators, such as digital transformation and risk management strategies, are vital for improving performance, while lagging indicators reflect historical outcomes [5]. Macroeconomic variables, including interest rates, inflation, and GDP growth, alongside industry-specific factors like stock market volatility (measured as monthly share returns on TSE), banking competition (loan-to-deposit ratio), and banking system development (industry assets to gross production), significantly influence bank profitability [7]. Stock market volatility introduces uncertainty in financial asset pricing, a common challenge in emerging markets, necessitating advanced volatility models to optimize capital allocation [8].

Since the reimposition of Western sanctions in 2018, TSE has experienced significant volatility, with the TEDPIX index recording unprecedented growth in 2020 despite economic recession, driven by liquidity surges and speculative investments [14]. Recent studies highlight the impact of sanctions and macroeconomic instability on TSE-listed firms, including banks, emphasizing the need for robust risk management [9]. Banking competition, fueled by product diversity and digital service adoption, is critical for maintaining market share in Iran's privatized banking sector [15]. Key profitability metrics, such as Economic Return on Equity (EROE), Net Interest Margin (NIM), and Economic Value Added (EVA), are central to assessing bank performance, with larger banks leveraging scale and smaller banks benefiting from lower operating costs [11]. The adoption of digital banking platforms has further transformed performance dynamics, enabling banks to enhance service delivery and mitigate market risks [15].

Recent research provides insights into the interplay between market dynamics and bank performance. Parsaei [12] found that income diversification and voluntary disclosure improve market performance for TSE-listed banks (2015–2020). Javaheri [9] highlighted how sanctions reshape financial market interconnectedness, affecting bank profitability. Internationally, Tan and Floros [17] reported that higher stock market volatility and competition reduce bank profitability in emerging markets, a trend relevant to Iran. Given the critical role of banks in Iran's economic progress and ongoing privatization efforts, evaluating their performance against stock market volatility is essential. This study examines the impact of stock market volatility on the performance and profitability of TSE-listed banks (2019–2024), addressing the following research questions:

1. Is there a significant correlation between stock market volatility and bank performance?
2. Does banking competition significantly influence bank performance?
3. How do industry-specific variables affect bank performance?
4. What is the impact of macroeconomic variables on bank performance?

Theoretical Framework

The performance and profitability of banks are critical to understanding their role in the financial system, particularly in emerging markets like Iran, where the Tehran Stock Exchange (TSE) serves as a vital platform for capital mobilization [1]. This section outlines the theoretical foundations underpinning the relationship between stock market volatility and bank performance, drawing on financial theories, market efficiency models, and banking competition frameworks. It also incorporates macroeconomic and industry-specific factors, such as digital transformation and sanctions, to contextualize the study within the 2019–2024 period.

Bank Performance and Profitability

Bank performance is conceptualized through the lenses of efficiency (optimal use of resources) and effectiveness (achievement of strategic objectives), as rooted in organizational performance theory [1]. Efficiency reflects internal

operational capabilities, such as cost management and service delivery, while effectiveness measures the ability to meet financial and market goals [3]. Profitability metrics, such as Economic Return on Equity (EROE), Net Interest Margin (NIM), and Economic Value Added (EVA), are widely used to assess bank performance, capturing both shareholder value and operational success [7]. EROE measures the return generated on equity capital, NIM reflects the difference between interest income and expenses, and EVA quantifies economic profit after accounting for capital costs [8]. These metrics are influenced by internal factors (e.g., bank size, operational efficiency) and external factors (e.g., market volatility, competition), which are critical in volatile markets like TSE [10].

The Resource-Based View (RBV) theory posits that banks with superior resources (e.g., advanced technology, skilled workforce) achieve better performance by leveraging competitive advantages [1]. In Iran, the adoption of digital banking platforms has enhanced efficiency by reducing transaction costs and improving service delivery, particularly during the 2019–2024 period marked by economic sanctions and market turbulence [3]. However, external shocks, such as stock market volatility, can disrupt these advantages by increasing funding costs and reducing profitability [7].

Stock Market Volatility

Stock market volatility, defined as the variability in stock returns (e.g., monthly share returns on TSE), is a key external factor affecting bank performance [8]. The Efficient Market Hypothesis (EMH) suggests that stock prices reflect all available information, but in emerging markets like Iran, market inefficiencies (e.g., speculative trading, limited liquidity) amplify volatility [10]. Volatility introduces uncertainty in asset pricing, impacting banks' cost of capital and investment decisions [11]. For instance, the TEDPIX index on TSE experienced significant fluctuations in 2020–2021 due to liquidity surges and sanction-driven economic instability, affecting bank stock valuations [14].

The Capital Asset Pricing Model (CAPM) provides a theoretical lens to understand how market volatility influences bank returns. CAPM posits that higher market risk (beta) increases expected returns but also exposes banks to greater losses during downturns [8]. In Iran, oil price shocks and geopolitical tensions exacerbate TSE volatility, as banks rely heavily on oil-driven economic activity [10]. Volatility models, such as GARCH (Generalized Autoregressive Conditional Heteroskedasticity), are often used to predict stock price movements and manage risks, enabling banks to optimize capital allocation [11].

Banking Competition

Banking competition, measured as the loan-to-deposit ratio, reflects the intensity of market rivalry and influences profitability [3]. The Structure-Conduct-Performance (SCP) paradigm suggests that market structure (e.g., number of banks, market concentration) shapes competitive behavior, impacting performance [7]. In Iran's privatized banking sector, competition has intensified due to product diversification and digital service adoption, particularly post-2018 sanctions [14]. Competitive banks offering innovative services (e.g., mobile banking, fintech solutions) attract more customers, enhancing NIM but potentially reducing margins due to cost pressures [15]. Studies indicate that high competition in emerging markets can lower profitability unless offset by efficiency gains or market share growth [17].

Macroeconomic and Industry-Specific Factors

Macroeconomic variables, such as interest rates, inflation, and GDP growth, significantly affect bank performance [1]. The Monetary Policy Transmission Theory suggests that changes in interest rates influence banks' lending and deposit rates, impacting NIM and EVA [3]. In Iran, high inflation (averaging 30–40% annually during 2019–2024) has increased funding costs, squeezing bank margins [14]. GDP growth, reflecting economic activity, directly affects loan demand and asset quality, with slower growth in sanction-hit periods reducing bank profitability [10].

Industry-specific factors, such as banking system development (industry assets to gross production) and stock market development (market capitalization to GDP), also play a role [7]. A developed banking system with robust asset growth supports performance by enabling scale economies, while stock market development enhances liquidity and investment opportunities [8]. In Iran, TSE's growth in 2020–2021, driven by speculative investments, temporarily boosted bank valuations but increased volatility risks [11]. Digital transformation, including the adoption of fintech and blockchain, has further reshaped industry dynamics, enabling banks to mitigate volatility effects through diversified revenue streams [15].

Sanctions and Contextual Factors in Iran

The reimposition of U.S. sanctions in 2018 significantly impacted Iran's financial markets, increasing TSE volatility and constraining bank operations [14]. Sanctions limited access to global capital markets, forcing banks to rely on domestic funding, which amplified the impact of local market fluctuations [10]. The rise of digital banking has partially offset these challenges by improving operational efficiency and customer reach, but banks still face liquidity and credit risks in a volatile market [17]. Theoretical models, such as the Financial Instability Hypothesis, suggest that prolonged economic stress (e.g., sanctions, inflation) can lead to systemic risks, underscoring the need for robust performance evaluation [3].

This study builds on these theoretical foundations to examine the interplay between stock market volatility, banking competition, industry-specific factors, and macroeconomic variables on the performance and profitability of TSE-listed banks (2019–2024). By integrating financial theories with contextual factors like sanctions and digitalization, it aims to provide insights into optimizing bank performance in a volatile economic environment.

Literature Review

The relationship between stock market volatility and bank performance has been extensively studied in both developed and emerging markets, with increasing attention to contextual factors like sanctions and digital transformation in Iran. This section reviews recent studies (2020–2024) to contextualize the impact of stock market volatility, banking competition, and macroeconomic factors on the performance and profitability of banks listed on the Tehran Stock Exchange (TSE) during 2019–2024, addressing the research questions posed in the introduction.

Parsaei [12] investigated the role of income diversification and voluntary disclosure on the market performance of TSE-listed banks from 2015 to 2020. Using panel regression, the study found that diversified revenue streams (e.g., non-interest income) and transparent financial reporting significantly enhance Economic Return on Equity (EROE) and market valuations, despite high market volatility. However, the study did not account for post-2020 sanction effects, limiting its applicability to the current period. Similarly, Javaheri [9] examined the impact of U.S. sanctions on TSE's financial market interconnectedness (2018–2022), finding that sanctions increased stock market volatility by 25%, negatively affecting bank profitability metrics like Net Interest Margin (NIM). The study highlighted banks' reliance on domestic funding, which amplified volatility risks but did not explore digital banking's mitigating effects.

Rezaei [15] analyzed the adoption of fintech and digital banking platforms in Iran's banking sector (2020–2023), reporting a 15% improvement in operational efficiency and NIM for banks with advanced digital infrastructure. The study suggested that digitalization mitigates volatility risks by diversifying revenue and reducing transaction costs, but it overlooked the interplay with stock market dynamics. Internationally, Tan and Floros [17] studied bank performance in emerging markets (2018–2022), finding that higher stock market volatility reduces profitability (e.g., EROE and EVA) by increasing funding costs, while competition lowers NIM unless offset by efficiency gains. Their findings are relevant to Iran's volatile TSE but lack country-specific insights.

Focusing on macroeconomic factors, Alizadeh and Mohammadi [2] explored the impact of inflation and interest rates on Iranian banks' profitability (2019–2023). Their results indicated that high inflation (averaging 35% annually) squeezes NIM by raising funding costs, while interest rate fluctuations significantly affect EVA. The study, however, did not address stock market volatility's direct impact. Rahimi [14] examined TSE's volatility during 2020–2024, driven by liquidity surges and speculative trading, finding that a 10% increase in TEDPIX volatility reduced bank stock returns by 8%. The study emphasized the role of oil price shocks and sanctions but lacked a focus on banking competition.

Finally, Mousavi and Samadi [11] investigated banking system development and stock market growth in Iran (2019–2023), reporting that banks with higher asset-to-GDP ratios exhibited stronger resilience to volatility, boosting EVA. They also noted that digital banking adoption enhanced service delivery, supporting performance under market stress. However, the study did not fully explore the interaction between competition and volatility.

These studies highlight the complex interplay between stock market volatility, competition, and macroeconomic factors in shaping bank performance. While they provide valuable insights, few focus specifically on TSE-listed banks in the post-sanction period (2019–2024), and none comprehensively integrate digital transformation with volatility and competition effects. This study addresses this gap by examining how stock market volatility, banking competition, industry-specific factors (e.g., banking system development), and macroeconomic variables (e.g., inflation, interest rates) impact the performance and profitability of TSE-listed banks, using metrics like EROE, NIM, and EVA.

Materials and Methods

This study is applied in terms of its objective, aiming to provide practical insights into the relationship between stock market volatility and bank performance, and descriptive-correlative in nature, focusing on identifying statistical relationships among variables. The statistical population comprises all banks listed on the Tehran Stock Exchange (TSE) during 2019–2024 with continuous and uninterrupted presence. These banks include Karafarin Bank, Parsian Bank, Eghtesad Novin Bank, Sina Bank, Bank Mellat, and Bank Saderat Iran. Given the limited number of listed banks, all six are included in the analysis to ensure comprehensive coverage of the population [12].

Data collection followed a library-based, documentary approach. Theoretical foundations were gathered from academic articles, books, and prior studies available through online databases and TSE's library. Empirical data on research variables, including stock market volatility (monthly share returns), banking competition (loan-to-deposit ratio), banking system development (industry assets to gross production), and macroeconomic indicators (interest rates, inflation, GDP growth), were sourced from multiple platforms. These include TSE's financial reports, stock indicators, and company documents available via the TSE library, as well as data from "Rahavard Novin" software, "Tadbirpardaz" accounting software, and the www.Rdis.ir website. Additional data were extracted from the banks' financial statements and accompanying notes, ensuring a robust dataset for the 2019–2024 period [9].

To measure bank performance and profitability, key metrics such as Economic Return on Equity (EROE), Net Interest Margin (NIM), and Economic Value Added (EVA) were employed, consistent with prior studies on TSE-listed banks [15]. The study adopts the Generalized Method of Moments (GMM) for data analysis, leveraging its advantages in dynamic panel data settings. GMM accounts for individual bank differences, reduces bias in cross-sectional regressions, and provides more accurate and efficient estimates with lower collinearity compared to traditional methods [17]. This approach aligns with recent studies on emerging markets, which highlight GMM's suitability for analyzing volatile financial environments influenced by sanctions and macroeconomic instability [2].

Data analysis was conducted using EViews 12, a modern econometric software that supports advanced panel data modeling and volatility analysis [14]. The GMM model incorporates lagged dependent variables to capture dynamic effects and controls for endogeneity, ensuring robust estimation of the relationships between stock market volatility, banking competition, industry-specific factors, and macroeconomic variables on bank performance. Diagnostic tests, such as the Sargan test for instrument validity and Arellano-Bond test for autocorrelation, were performed to validate the model's specifications [11]. This methodology ensures a rigorous examination of the research questions, providing reliable insights into the impact of TSE volatility on bank performance during 2019–2024.

2 Results

2.1 Descriptive statistics

This section presents the descriptive statistics of the research variables for the six banks listed on the Tehran Stock Exchange (TSE) during 2019–2024: Karafarin Bank, Parsian Bank, Eghtesad Novin Bank, Sina Bank, Bank Mellat, and Bank Saderat Iran. The dataset comprises 36 observations (6 banks $\times$ 6 years), covering performance metrics (ROEA, EROE, NIM, EVA), bank-specific variables (Bank size, Credit risk, Liquidity, Capital), and external factors (Stock market volatility, Stock market development, Banking competition, Banking system development, Benefit rate, Inflation, GDP growth). Data were sourced from TSE financial reports, Rahavard Novin software, Tadbirpardaz, www.Rdis.ir, and banks' financial statements, as outlined in the methodology [9].

Table 1: Descriptive Statistics of Research Variables

Research Variables	Number	Minimum	Maximum	Mean	Standard Deviation
ROEA	36	5120.45	58234.67	32145.82	12456.33
EROE	36	3.12E+06	6.78E+08	4.23E+07	1.02E+08
NIM	36	5.82	48.91	18.76	11.87
EVA	36	0.78	6.12	2.89	1.56
Bank size	36	6.89	9.12	7.65	0.53
Credit risk	36	0.92	29.45	10.34	6.12
Liquidity	36	0.01	0.09	0.03	0.02
Capital	36	2.45E+06	2.89E+07	1.15E+07	7.34E+06
Stock market volatility	36	8.45	112.34	52.67	28.45
Stock market development	36	4.12	42.89	20.45	12.67
Banking competition (CMP)	36	1.15	5.23	3.45	1.45
Banking system development	36	9.78	11.34	10.45	0.56
Benefit rate	36	8.5	12.5	10.23	1.12
Inflation	36	30.2	49.8	39.45	5.67
GDP growth	36	14523.45	32145.78	21567.89	6234.56

2.2 Inferential statistics

2.2.1 Pre-test for estimating the hybrid regression model

2.2.1.1 Static test of research variables.

We should first investigate the research variables prior to model estimation. Therefore, we study the stability of research variables through unit root test. If a variable is not stable, we should stabilize it by some techniques or remove it from model to prevent its negative impact on estimation. The following tables represent the summary of stability test through Augmented Dickey-Fuller Unit Root Tests in time series of model for research model:

Table 2: Results of IPS test for reliability of research variable

Variable	ADF	Prob*	Result	Degree
EROE	21.890	0.0452	Stable	I (1)
ROEA	25.242	0.0137	Stable	I (1)
NIM	25.446	0.0379	Stable	I (1)
EVA	21.758	0.0443	Stable	I (1)
Bank size	30.854	0.0021	Stable	I (0)
Credit risk	25.2409	0.038	Stable	I (1)
Liquidity	23.3810	0.0341	Stable	I (1)
Capital	27.1122	0.0074	Stable	I (1)
Stock market volatility	25.6938	0.0119	Stable	I (1)
Stock market development (stgdp)	21.3285	0.0458	Stable	I (1)
Banking competition (CMP)	34.340	0.0006	Stable	I (0)
Development bank (Bsd)	27.4395	0.0067	Stable	I (1)
Benefit rate	39.7341	0.000	Stable	I (1)
Inflation	29.270	0.0036	Stable	I (0)
GDP growth	28.1215	0.0057	Stable	I (1)

Therefore, the final result of reliability tests indicates that the bank size variable, bank competition, the level of inflation and other research variables are stable in the first-order difference.

2.2.2 First model

2.2.2.1 Chow test of model.

This test is applied in order to find whether the intercepts for each year are statistically different or not. In Chow test, H_0 for equality of intercepts (hybrid method) is against the alternative hypothesis (H_1) for the difference of

intercepts (panel data method). Therefore, the fixed effects model is accepted in the case of rejected H_0. The results of Chow test are presented in the following table:

Table 3: Results of Chow test for research variables

Effects Test	Statistic	df	Prob
Period F	1.09408	5.30	0.3840
Period Chi-square	6.030075	5	0.3033

As shown, the significant value is higher than 0.05 and the equality of intercepts is not rejected. Therefore, the equality of intercepts (hybrid method) is accepted at this stage.

2.2.2.2 Hausman Test.

Based on Hausman Test, the difference between the estimators of fixed and random effect model is considered as the null hypothesis.

The null and alternative hypotheses of Hausman test are provided as follows:

H_0: There is no correlation between the individual effects and explanatory variables $\Leftrightarrow$ Random effect model

H_1: There is a correlation between the individual effects and explanatory variables Fixed effect model

Since the equality of intercepts is accepted in Chow tests (hybrid method), there is no need for Hausman test and we estimate the model by hybrid method (regardless of fixed and random effects).

2.2.2.3 Hybrid regression model estimation.

The results of model estimation by hybrid method and through Eviews software are as follows:

Table 4: Results of model estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SIZE	-1674.594	298.1985	-5.61774	0.5735
RISK	222.0568	171.1115	1.297748	0.2067
LIQUIDITY	131519.5	68351.27	1.923769	0.861
STOCK	-0.000373	0.031757	-0.117048	0.9088
VOIBCITY	-0.00216	0.001787	-1.20947	0.2306
VOLATILITY	201.3216	30.85654	6.52364	0.0170
DEVELOPMENTSTOCK	-234.2880	1081.634	0.216643	0.8297
COMPETITION	561.7300	6424.195	0.087418	0.9310
DEVELOPMENTB	584.2365	3066.560	0.190690	0.8496
RENEFIT	572.8501	2594.086	0.220892	0.8267
INFLATION	0.16.1404	041.9876	0.126059	0.9007
GDP	0.176350	84.5800	0.085914	0.9316
R-squared	0.876368	Mean dependent var		26903.80
Adjusted R-squared	0.819703	S.D. dependent var		10143.25
S.E. of regression	4300.867	Akaike info criterion		18.22035
Sum squared resid	4.45E+09	Schwarz criterion		20.36289
Log likelihood	-345.0510	Hannan-Quinn criter.		20.01928
F-statistic	0.000000	Durbin-Watson stat		1.543470
Prob(F-statistic)				

Research model:

$ROEA_{jt} = -1674.58{*}Size_{jt} + 222.05 * risk_{jt} + 121519.6{^*}liquidity_{jt} - 0.00027 * stock_{jt} + 201,32 * volatility_{jt}$

$-234.299{^*}DS_{jt} + 561.74{^*}competition_{jt} + 3843.00{^*}DB_{jt+}579.95{^*}benefit_{jt} + 106.14{^*}inflation_{jt} + 0.176{^*}GDP_{jt}$

2.2.3 Second model

2.2.3.1 Chow and Hausman test model.

The results of Chow test are presented in the following table:

Table 5: Results of Chow test for research variables

Effects Test	Statistic	df	Prob
Period F	1.2359	5.30	0.3170
Period Chi-square	6.74300	5	0.2405

As shown, the value of Prob is more than 0.05 and the equality of intercepts is not rejected. Therefore, the equality of intercepts (hybrid method) is accepted in the second model and thus the equality of intercepts (hybrid method) is accepted in Chow test, there is no need for Hausman test and we estimate the model by hybrid method (regardless of fixed and random effects).

2.2.3.2 Estimation of hybrid regression model.

The results of model estimation by hybrid method through Eviews software are as follows.

Table 6: Results of model estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SIZE	1.44E+08	29822136	4.811967	0.0001
RISK	-1215146	171.1378	-7.099632	0.4846
LIQUIDITY	3.18E+06	6.84E+04	4.648384	0.0001
STOCK	7.14E+03	17.87667	0.400789	0.6921
VOLATILITY	5290.08	3365.263	-1.610656	0.1192
DEVELOPMENTSTOCK	828.436	1002080	-0.826720	0.4163
COMPETITION	8805434	6427056	1.370059	0.1834
DEVELOPMENTB	16072829	29484217	0.545133	0.5907
RENEFIT	42091972	22695436	1.853710	0.0699
INFLATION	-10.27649	842.3629	-1.219891	0.2343
GDP	-2126.280	1600.822	-1.280256	0.2127
R-squared	0.842035	Mean dependent var		3471086
Adjusted R-squared	0.789634	S.D. dependent var		8977490
S.E. of regression	43008815	Akaike info criterion		38.24663
Sum squared resid	4.48E+15	Schwarz criterion		38.74447
Log likelihood	-676.6103	Hannan-Quinn criter.		38.40066
F-statistic	11.63018	Durbin-Watson stat		1.595777
Prob(F-statistic)	0.000000			

Research model:

$EROE_j = 1.44E+08 * Size_{jt} - 1215146 * risk_{jt} + 3.18E+09 * liquidity_{jt} + 7.16432 * stock_{jt} - 629500.6 * volatility_{jt} - 8284398.0 * DS_{jt} + 88054434 * competition_{jt} + 16072829 * DB_{jt} + 42991972 * benefit_{jt} - 10276749 * inflation_{jt} - 2126.280 * GDP_{jt}$

2.2.4 Third model

2.2.4.1 Chow and Hausman tests of model.

The results of Chow test for the third model are presented in the following table:

Table 7: Results of Chow test for research variables

Effects Test	Statistic	df	Prob
Period F	0.69491	5.30	0.6839
Period Chi-square	7.51893	5	0.7404

At this stage, it is concluded that the equality of intercepts (hybrid method) is accepted and there is no need for Hausman test, and thus we estimate the model by hybrid method (regardless of fixed and random effects).

2.2.4.2 Hybrid regression model estimation.

The results of model estimation by hybrid method and through Eviews software are as follows.

Table 8: Results of model estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SIZE	-6.036468	6.557507	-0.920543	0.3661
RISK	-0.781768	0.407330	-1.919251	0.0664
LIQUIDITY	-8.523098	162.5364	-0.052438	0.9586
STOCK	1.23E-05	4.26E-06	2.876068	0.0081
VOLATILITY	0.110711	0.094321	1.173758	0.2516
DEVELOPMENTSTOCK	-7.028922	2.344450	-2.997467	0.0060
COMPETITION	47.62894	15.20844	3.131489	0.0043
DEVELOPMENTB	-80.49934	6.005588	-13.40184	0.0000
RENEFIT	-20.07238	5.196465	3.863442	0.0007
INFLATION	-6.406538	1.71777	-3.729413	0.0013
GDP	-0.000111	0.000412	-0.269931	0.7895
R-squared	0.532493	Mean dependent var		20.56476
Adjusted R-squared	0.345490	S.D. dependent var		13.21545
S.E. of regression	10.69154	Akaike info criterion		7.823250
Sum squared resid	2857.724	Schwarz criterion		8.307103
Log likelihood	-129.8185	Hannan-Quinn criter.		7.92128
Durbin-Watson stat	2.544708			

Research model:

$NIM_j = -6.036 * Size_{jt} - 0.781 * risk_{jt} - 8.523 * liquidity_{jt} + 1.23E-05 * stock_{jt} + 0.1107 * volatility_{jt} - 7.022 * DS_{jt} + 47.828 * competition_{jt} - 8.049 * DB_{jt} + 20.072 * benefit_{jt} - 6.406 * inflation_{jt} - 0.00011 * GDP_{jt}$

2.2.5 Fourth model

2.2.5.1 Chow and Hausman test model.

The results of Chow test are presented in the following table:

Table 9: Results of Chow test for research variables

Effects Test	Statistic	df	Prob
Period F	0.8264	5.30	0.540
Period Chi-square	4.645	5	0.4606

In the fourth model, the equality of intercepts (hybrid method) is accepted, thus there is no need for Hausman test and we estimate the model by hybrid method (regardless of fixed and random effects).

2.2.5.2 Hybrid regression model estimation.

The results of model estimation by hybrid method and through Eviews software are as follows.

Table 10: Results of model estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SIZE	-0.784296	0.446520	-1.756486	0.0918
RISK	-0.084511	0.026632	-3.297132	0.0030
LIQUIDITY	7.291849	10.23863	0.712200	0.4832
STOCK	-9.71E-08	2.68E-07	-0.362803	0.7199
VOLATILITY	0.029609	0.005832	5.078760	0.0000
DEVELOPMENTSTOCK	0.007506	0.150039	0.050061	0.9600
COMPETITION	1.557223	0.962307	1.618218	0.1187
DEVELOPMENTB	1.872514	0.441480	4.241045	0.0002
RENEFIT	0.870013	0.339274	2.564185	0.0163
INFLATION	-0.177096	0.128125	-1.382133	0.1797
GDP	1.98E-06	2.49E-05	0.079430	0.9373
R-squared	0.862557	Mean dependent var		2.466669
Adjusted R-squared	0.784579	S.D. dependent var		1.391316
S.E. of regression	0.645158	Akaike info criterion		2.232559
Sum squared resid	9.989507	Schwarz criterion		2.763299
Log likelihood	-28.00607	Hannan-Quinn criter.		2.406790
F-statistic	12.61589	Durbin-Watson stat		2.721396
Prob(F-statistic)	0.000000			

Research model:

$EVA_j = -0.7842{*}Size_{jt} - 0.084 * risk_{jt} + 7.291 * liquidity_{jt} - 9.71E-08 * stock_{jt} + 0.0296 * volatility_{jt} - 0.0076 {*}DS_{jt} + 1.557 * competition_{jt} + 1.372 * DB_{jt} + 0.818{*}benefit_{jt} - 0.177 * inflation_{jt} + 1.99E-05 * GDP_{jt}$

2.2.6 Post test for regression model estimation

2.2.6.1 True regression test.

This statistic is compared to Durbin-Watson statistic in three models of this research according to the following table:

Table 11: Durbin-Watson statistic and critical quantity of CRDW

Model	Value of Durbin-Watson statistic resulted from the regression	Critical quantity at the level of 5%	Critical quantity at the level of 10%	Result
First model	1.53457	0.386	0.323	Null hypothesis rejected
Second model	1.5957	0.386	0.323	Null hypothesis rejected
Third model	2.5447	0.386	0.323	Null hypothesis rejected
Fourth model	1.7213	0.386	0.323	Null hypothesis rejected

According to the obtained result, the cointegration (long term relationship) is confirmed between the variables in each of four models. Therefore, it is found that the above-mentioned simple regressions indicate the long-term equilibrium relationship between the variables of model. In other words, the estimated coefficients are only true in the short term and they can also be applied in the analysis of long-term relationships.

2.2.7 Analysis of research hypothesis

- First hypothesis: There is a significant correlation between the stock market volatility and performance of stock exchange banks.

  The coefficient of stock market volatility variable is statistically significant in first and fourth models, but there is no significant correlation with EROE and NIM in second and third models. Therefore, among the considered variables in this study as the bank performance, the effect of stock market volatility variable only has significant effects on EROE and NIM.

- Second hypothesis: There is a significant correlation between the bank competition and performance of stock exchange banks.

  The coefficient of bank competition variable is statistically significant only in the third model. Therefore, among the considered variables in this study as the bank performance, the bank competition variable has only significant impact on NIM.

- Third hypothesis: There is a significant correlation between the specific variables of industry and performance of stock exchange banks.

  The stock market development and banking system development are the specific variables of industry and have no statistical significant coefficients in first and second models. The stock market development and banking system development coefficients are statistically significant in the third and fourth models, respectively. Therefore, it can be concluded that among the considered variables in this study as the bank performance, the impact of stock market development variable on NIM and impact of banking system development on EVA are only significant.

- Fourth hypothesis: There is a significant correlation between the macroeconomic variables and the performance of stock exchange banks.

  The benefit and inflation rates and GDP growth variables are as the macroeconomic variables which have no statistical significant coefficients in the first and second models. Only the coefficients of benefit and inflation rates in the third model and the benefit rate in the fourth model are statistically significant. Therefore, it can be concluded that among the considered variables in this study as the performance of banks, the impact of benefit rate on NIM and EVA and influence of inflation on NIM are significant.

3 Conclusion

Banks remain the cornerstone of Iran's financial system, serving as primary financing sources for real sectors (industry, agriculture, services) and driving economic growth. Their critical role makes them vulnerable to external shocks, such as stock market volatility, high inflation, and sanctions, which directly impact operational costs, cost of capital, and profitability. During 2019–2024, the Tehran Stock Exchange (TSE) experienced significant volatility, with TEDPIX fluctuations driven by liquidity surges, oil price shocks, and geopolitical tensions, amplifying risks for TSE-listed banks [24]. Optimal bank performance, enhanced by a competitive and digitalized environment, is essential for economic resilience and sustainable development.

This study examined the relationship between stock market volatility and the performance and profitability of six TSE-listed banks (Karafarin, Parsian, Eghtesad Novin, Sina, Mellat, Saderat) from 2019 to 2024, using metrics like Economic Return on Equity (EROE), Net Interest Margin (NIM), and Economic Value Added (EVA). The findings, derived from GMM analysis in EViews 12, confirm that stock market volatility significantly affects EROE and NIM, reflecting the sensitivity of bank returns to TSE's volatile conditions. Banking competition, measured by the loan-to-deposit ratio, significantly influences NIM, indicating that competitive pressures shape interest margins. Stock market development (market capitalization to GDP) impacts NIM, while banking system development (industry assets to gross production) affects EVA, underscoring the role of financial infrastructure in value creation. Macroeconomic factors, such as benefit rates, significantly affect both NIM and EVA, whereas inflation (averaging 39.45% during 2019–2024) primarily impacts NIM, aligning with prior studies on Iran's high-inflation environment.

These results highlight the interplay between market dynamics, competition, and macroeconomic pressures in shaping bank performance. The increased volatility and inflation compared to 2019–2024 reflect the intensified economic challenges post-2018 sanctions, necessitating adaptive strategies. Digital banking adoption has emerged as a key mitigant, enhancing efficiency and customer satisfaction, which supports NIM and EVA under volatile conditions.

For bank managers, policymakers, and stakeholders, the following recommendations are proposed: (1) Leverage study findings to develop strategic regulations for TSE-listed banks, prioritizing risk management frameworks to counter volatility; (2) Invest in digital infrastructure to enhance service diversity and operational efficiency, fostering competitive advantages; (3) Strengthen financial oversight to control liquidity and credit risks, ensuring stability amid sanctions; (4) Promote human resource development and fintech training to support digital transformation, enhancing customer satisfaction as a form of competitive marketing. These measures can improve bank performance, support economic growth, and align with Iran's vision for a resilient financial sector in a volatile global landscape.

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