



The Impact of Internet Penetration on Trading Activity in Gulf Cooperation Council Countries: 2000-2024

Othman HAMMAD

Laboratory of performance and human capital, University of Algiers 3, Algeria

hammad.othman@univ-alger3.dz

Nadjet AISSA

University of Algiers 3, Algeria

mhimrinadjet@gmail.com

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Abstract:

This study investigates the relationship between internet penetration and trading activity in the financial markets of the Gulf Cooperation Council (GCC) countries from 2000 to 2024. Using a panel vector autoregressive (PVAR) model, the analysis examines the dynamic interdependencies between internet usage, trading volume, economic growth, and inflation. The findings reveal a significant positive relationship between internet penetration and trading activity, with internet shocks causing initial declines in trading volume, followed by a rebound in subsequent periods. To address the negative impact observed at the beginning of the internet penetration period, it is recommended that policymakers focus on improving digital literacy, enhancing internet infrastructure, and providing support to market participants during the transition. These measures can help mitigate the initial shocks and foster a more stable and sustainable growth in trading activities over time.

Key Words: Internet Penetration, ICT, Financial Markets, Gulf Cooperation Council (GCC), Panel Vector Autoregressive (PVAR).

JEL Classification: O33, F14, L86

* Corresponding author: Hammad Othman (*hammad.othman@univ-alger3.dz*)

Introduction:

Information and Communication Technology (ICT) encompasses a wide array of tools and systems that facilitate communication, information processing, and digital interactions. One key component of ICT is the Internet, which has the potential to revolutionize the global financial markets. The Internet might play a pivotal role in the globalization of stock markets and the integration of information technology (IT) within financial systems. By facilitating instant communication, efficient data transfer, and real-time market access, the Internet holds the potential to enhance stock market trading volumes. The rise of electronic trading platforms, which offer reduced costs, faster settlements and greater transparency, underscores how the Internet could reshape traditional financial practices, making global markets more accessible, inclusive, and efficient (Peng, Peng, and Zhu 2024).



In the Gulf countries, the Internet plays a crucial role in driving economic diversification and enhancing integration into global financial systems. Despite significant improvement in financial markets, the true potential of financial markets remains untapped for many individuals and small businesses due to the lack of access to these markets. Without the enabling power of digital technologies, financial markets are often limited to a select group of large investors and institutions. This limited access to online trading and financial activities hinders economic growth by restricting the benefits of more inclusive financial markets (Bardesi 2020).

This raises an important question: can the Internet truly catalyze the evolution of financial markets in Gulf countries by improving access and increasing trading volumes? Understanding the transformative potential of digital technologies in these regions is essential to uncovering how they can democratize financial market participation, enhance efficiency, and contribute to more inclusive and dynamic financial systems. In response to the research question, the study proposes the following hypothesis: There is a positive relationship between the number of internet users and the trading volume in GCC stock markets.

This hypothesis is grounded in the Efficient Market Hypothesis (EMH) and Technology Acceptance Model (TAM), both of which provide a strong theoretical foundation for understanding the role of the internet in financial markets. EMH, proposed by (Fama 1970), posits that financial markets are efficient and that asset prices fully reflect all available information. The internet enhances this efficiency by providing rapid and widespread access to financial data, reducing information asymmetry, and enabling quicker price adjustments. Meanwhile, the Technology Acceptance Model (TAM) (Davis 1989) explains how individuals and institutions adopt and utilize new technologies. In the context of financial markets, the internet serves as a transformative tool that traders, investors, and analysts integrate into their decision-making processes. The perceived usefulness and ease of access to real-time financial data drive its widespread adoption, ultimately influencing market participation and trading volumes.

In addition, this research is based on a thorough literature review that highlights the impact of Information and Communication Technology (ICT) on financial market dynamics, specifically focusing on trading volumes in the Gulf Cooperation Council (GCC) countries. Several studies have examined the role of technology in enhancing market efficiency and investor participation, yet gaps remain in addressing the broader external factors affecting these markets.



I. Literature review:

For instance, (Messaoudi Houssam 2013) explored the effect of the old automated system, Asis, which was replaced by the electronic trading system, Tadawul, on the Saudi Stock Market. It examines the significance of the changes in some market indicators and the number of executed transactions across various market sectors from September 1999 to December 2003. The study found that the introduction of the Tadawul electronic trading system, as a substitute for the Asis system, facilitated monitoring of trading operations and the immediate dissemination of information to both local and foreign investors. It improved the efficiency and speed of transactions, ensuring greater transparency and security for participants in the Saudi market. Additionally, the system provided greater flexibility and different types of information to brokers, enabling them to more easily track executed and pending transactions and perform faster analyses of the traded companies and their stocks.

(Talaat Abd El Hakim Hicham 2013)'s research examined the impact of foreign indirect investment on the Iraqi stock market during 2007–2013. The study revealed that such investments contributed to increased liquidity and market efficiency. Moreover, the study suggests that enhancing transparency, adopting advanced technologies, and establishing a well-regulated market are essential to attract more foreign indirect investments and ensure their beneficial impact on the Iraqi financial market.

Furthermore, the research by (Al Jouzi Djamila and EL Amri Safia 2017) further explored the efficiency of financial markets and the role of information and communication technology (ICT) in enhancing market efficiency, particularly in Gulf economies, and how their adoption of ICT influences the efficiency of their financial markets. The findings reveal that ICT is crucial for market pricing efficiency by providing quick information to all participants, ensuring equal opportunities for investors to profit. The adoption of electronic trading systems in Gulf markets, especially in the UAE, Saudi Arabia, and Kuwait, boosted activity by increasing the number of investors, trading volumes, and attracting foreign capital. Additionally, the structure of electronic trading improved transparency, credibility, accuracy, and clarity of information, directly affecting investment strategies and contributing to overall market efficiency.

More recent research has expanded on these insights. These newer studies, including (Al Tahar Cherif, Tagrout, and Ansaad 2019) who aimed to highlight the role of electronic trading systems in enhancing the performance of Arab financial markets and strengthening economic activity by providing financial resources to support the economy, stimulate investment, and build resilient economies. The findings demonstrate that electronic trading as a key component of ICT integration, significantly reducing investment costs in financial securities.



Moreover, (Aissa Nadjat, Tarek Belmahdi, and Bouazara Ahlem 2022) conducted a study that aimed to clarify the relationship between internet users in Arab stock markets and their impact on investment decisions, using a panel model from 2000 to 2021. It concluded that various factors influence investment decisions, some internal to investors and others external and beyond their control. The relationship between information technology and improved investment decisions was not observed in all Arab countries before and during the COVID-19 crisis, as the crisis did not directly rely on technology. This led to a lack of investment awareness, resulting in a decline in market value and stock market indices. Additionally, the study highlighted the absence of quick and effective solutions in Algeria to enhance investment, technology, and the Algerian Stock Exchange, pointing to the need for stronger legal protections for investors and lessons from more developed markets in other Arab countries. Lastly, the study showed a positive relationship between internet users, market value, trading volume, and the ability to predict market trends, especially during the pandemic.

Another recent study by (Rajaa and Bouran 2023) explored various theoretical aspects of electronic trading, its advantages, and the challenges associated with its implementation while using market size and liquidity as key performance indicators focusing on the Saudi stock market between 2000 and 2021. The study highlights the significance of electronic trading in financial markets and seeks to clarify misconceptions surrounding its adoption. The findings indicate that replacing traditional trading with electronic trading has enhanced market performance by increasing the number of listed companies and improving their annual results. Additionally, the market value and trading volume in the Saudi stock market have significantly increased after the adoption of electronic trading, driven by greater share turnover and rising market capitalization. Moreover, (Zaiter and Saidi 2024) examined the impact of international electronic connectivity on the Saudi financial market by leveraging information and communication technology (ICT), digital systems, focusing on the period from 1994 to 2023. The findings highlight that electronic connectivity enhances accuracy in the market by improving financial disclosure and ensuring timely and cost-effective information dissemination to investors. The introduction of the electronic trading system has notably increased trading volumes, demonstrating a strong correlation between electronic trading and market performance. Additionally, the modernization of financial markets through digital trading platforms has played a crucial role in stimulating investments and boosting the market capitalization of the Saudi financial market.

These studies collectively emphasize the crucial role of ICT in enhancing financial market performance, transparency, and efficiency. However, the study also highlights significant gaps in the current approaches, such as the need for alternative methodologies like Panel VAR model to better capture the



dynamic relationships in the financial markets across GCC countries. Additionally, there is a lack of comprehensive analysis on the specific conditions and challenges faced by Gulf countries in adopting information technology to enhance market efficiency. Building on this literature, the current research aims to investigate how the internet can impact trading volumes in the GCC stock markets. It explores the role of internet usage in shaping the investment environment, particularly in terms of supply and demand for financial securities in this region. This research, therefore, seeks to fill the gap by providing a clearer understanding of how the internet affects the dynamics of trading volumes and market participation in GCC countries.

II. Data And Methodology:

1. Data:

The data used in this study spans from 2000 to 2024 and includes key variables from six Gulf countries. The primary independent variable is the number of internet users, calculated as the percentage of the total population using the internet. The dependent variable, volume of trading, is measured by the total value of transactions executed in the stock market during a given period. Economic growth, the control variable, is represented by the annual growth rate of real GDP, reflecting the overall economic performance of each country. These variables allow for an in-depth analysis of the relationships between internet usage and trading activity across the Gulf region.

Table 1: Variables of the study

Variable	Definition	Source
Internet Users	The percentage of the population using the internet in a specific country.	World Bank
Volume of Trading	Total number of trades or the total value of trading in the stock market.	AMF AFS Periodic Bulletins
Economic Growth	The annual growth rate of real GDP, indicating the economic performance of a country.	World Bank
Inflation	Consumer prices	World Bank

1.1. Descriptive analysis:

The descriptive analysis reveals key trends across the Gulf countries from 2000 to 2024. The average internet penetration (INTERNET) stands at 60.29%, with substantial variation, as shown by the maximum value of 100% in Bahrain and the UAE. Trading volume (VOLUME) averages 49,372.25, with notable fluctuations, including a peak of 1,402,942 in Saudi Arabia in 2006, and a low of 27.4 in Bahrain in 2012, reflecting market volatility.



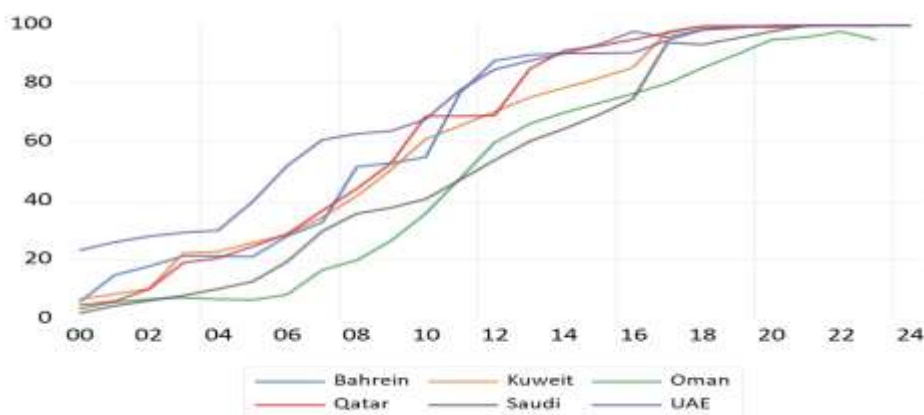
Economic growth (GDP_GROWTH) has an average rate of 4.25%, but the sharp negative value of -7.07% in 2020 highlights the severe impact of the COVID-19 pandemic, which led to a widespread economic downturn. These trends indicate a mix of stability and significant variability, with global events like COVID-19 clearly influencing the economic and market landscapes.

Table 2: Descriptive statistics

	GDP_GROWTH	VOLUME	INTERNET	Inflation
Mean	4.25	49372.25	60.29	2.43
Median	3.85	4829.4	67.22	2.078
Maximum	26.17	1402942	100	15.05
Minimum	-7.07	27.4	2.210	-4.863
Std. Dev.	4.97	170136.215	34.55	3.11
Observations	144	144	144	144

Source: Authors, based on Eviews 13 outputs

Fig.1: Evolution of Internet penetration (2000-2024)



Source: AFS Periodic Bulletins (AMF)

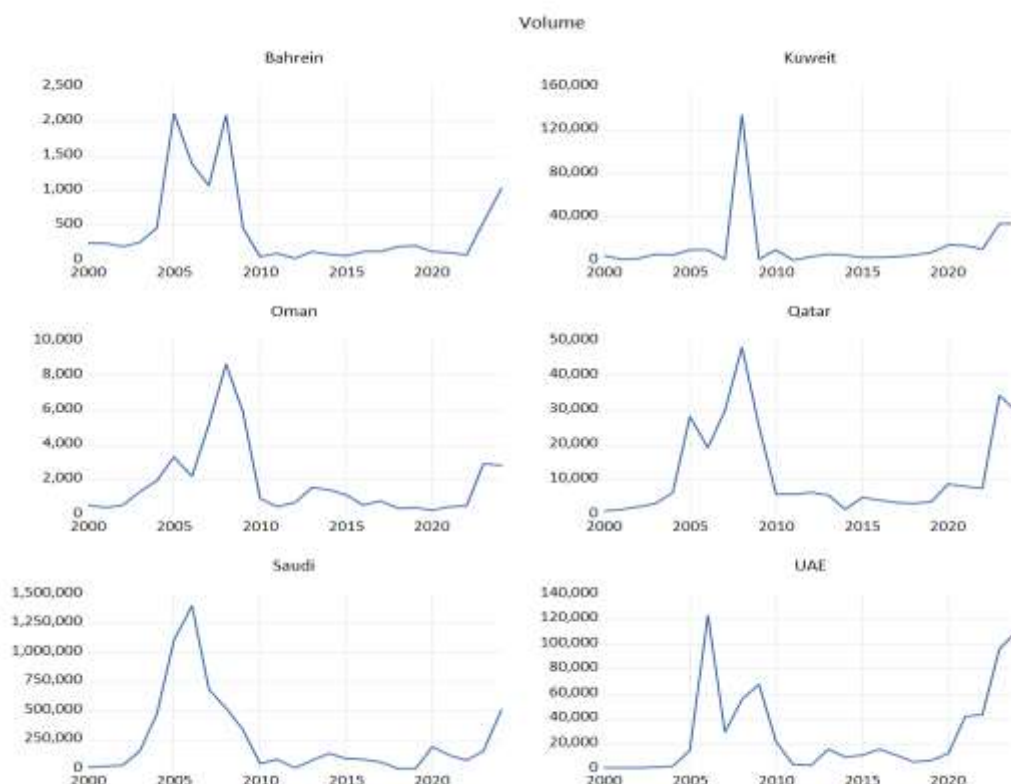
Internet penetration across the six countries has shown a consistent upward trend, with each nation rapidly expanding its internet infrastructure. Bahrain led the group with a significant increase from 6.15% in 2000 to 100% by 2023. Kuwait similarly demonstrated robust growth, starting at 6.73% in 2000 and nearing full penetration by 2023. Oman followed suit, increasing its internet access from just 3.52% in 2000 to approximately 97% in 2023. Qatar also saw a dramatic rise, starting at 4.86% in 2000 and reaching full penetration by 2021. Saudi Arabia showed a similar pattern, with steady growth in internet use, reaching nearly 100% by 2023. The UAE, known for its digital advancements, achieved near-total internet penetration much earlier, reflecting its strong focus on technological progress. This rapid increase in internet



penetration across the region points to significant efforts by these countries to integrate technology into daily life, boost digital economies, and foster greater connectivity.

The volume data for the six countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE) displays considerable fluctuations, with each country experiencing notable peaks and valleys. For instance, Bahrain's volume surged in 2005, reaching over 2,100, before a significant drop in the following years. Kuwait, on the other hand, saw its highest volume in 2008, peaking above 133,000, which could be attributed to economic factors such as oil price variations or market events. Oman and Qatar both showed growth in volume from 2005 onward, with Qatar reaching a peak of 48,220 in 2008. Saudi Arabia also demonstrated large changes in volume, especially with an exceptional increase in 2004. The UAE's volume data highlighted a more consistent increase over time, with sharp rises during key economic growth periods. These volume trends are likely driven by regional economic conditions, reflecting the effects of both local and global factors on the financial markets.

Fig.2: Evolution of trading volume in financial markets (2000-2024)



Source: World Development Indicators (World Bank)



2. Methodology:

This study uses the Panel Vector Autoregressive (VAR) model, which is appropriate when all variables are endogenous and stationary at their level. (Sims 1980) The Panel VAR model allows for the examination of the dynamic interrelationships between Internet penetration, trading volume in financial markets, economic growth and inflation, where the past values of these variables are used to explain their current values from 2000 to 2024 across the Gulf countries. To ensure the reliability of the model, stationarity of all variables is checked (see table 3).

The choice of the Panel Vector Autoregression (PVAR) model over other econometric approaches is driven by several key considerations. First, given the panel structure of the data where the time dimension (T) is greater than the cross-sectional dimension (N), PVAR is more appropriate than the Generalized Method of Moments (GMM), which is typically suited for cases where N is larger than T. Additionally, PVAR allows for the examination of dynamic interrelationships among variables over time, making it superior to static models. When comparing PVAR to alternatives such as Vector Error Correction Models (VECM) or Autoregressive Distributed Lag (ARDL) models, the stationarity properties of the variables play a crucial role. If all variables are stationary at level, PVAR is the preferred choice, whereas VECM and ARDL are more appropriate when there is evidence of cointegration among the variables. This methodological choice ensures a robust analysis of the dynamic interactions within the financial market framework.

The form of the VAR model can be expressed as follows:

$$Y_{i,t} = \alpha_i + \sum_{l=1}^p B_l Y_{i,t-l} + \epsilon_{i,t}$$

Where:

- $Y_{i,t}$ is Contains the values of the four variables (Internet penetration, trading volume, economic growth, and inflation) at time t for cross-sectional unit i
- α_i is the vector of fixed effects (intercepts) for cross-sectional unit i
- B_l Captures how each variable is influenced by the lags of all the variables in the system, including itself
- ϵ_t Accounts for the residual variation in each equation for unit i at time t

2.1. Stationarity:

Conducting stationarity tests is a crucial step in time series and panel data analysis, as it ensures the reliability and validity of econometric modeling. In the context of this study, stationarity tests help determine the appropriate modeling approach, whether a Panel Vector Autoregression (PVAR) model is suitable or if alternative methods like Vector Error Correction Models



(VECM) or Autoregressive Distributed Lag (ARDL) models should be considered in the presence of cointegration. By confirming stationarity, the study ensures that the estimated relationships between financial market variables are robust and not driven by underlying trends or structural shifts.

We conducted unit root tests to examine the stationarity of the variables. Specifically, we used the Levin, Lin, and Chu (LLC) test and the Im, Pesaran, and Shin (IPS) test for panel data unit roots. These tests are commonly used to assess whether the individual series in the panel exhibit stationarity at the level.

Table 3: Stationarity test

	Inflation		Economic growth		Internet		Volume	
Test	llc	ips	llc	ips	llc	ips	llc	ips
P- value	0.0116	0.00255	0.000	0.0001	0.0019	0.0019	0.04	0.01
Interpretation	Stationary		Stationary		Stationary		Stationary	

Source: Author, based on Eviews 13 outputs

The results in table 3, from both tests indicate that all variables in the model, Internet Penetration (IP), Volume of Trading in Financial Markets (VTFM), Economic Growth (EG), and Inflation (CPI) are stationary at the level. This suggests that no further differencing or transformation of the data was necessary, ensuring that the series are appropriate for use in a Panel VAR model.

Thus, we can proceed with the analysis using the Panel VAR approach, as the assumption of stationarity is satisfied for all the included variables.

III. Results:

1. Main result:

In order to determine the appropriate lag length for the Panel VAR model, we conducted a series of lag length criteria tests, including the Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan-Quinn Information Criterion (HQIC). The objective of these tests was to identify the optimal lag length that balances model complexity and goodness of fit.

As shown in Figure 3, the optimal lag length selected for the model is 2 according to AIC. This indicates that a two-period lag is most appropriate for capturing the dynamic relationships between Internet Penetration (IP), Volume of Trading in Financial Markets (VTFM), Economic Growth (EG), and Inflation (CPI) in our panel data set.

**Fig.3: Lag order selection**

VAR Lag Order Selection Criteria
 Endogenous variables: VOLUME INTERNET INFLATION GDP_GROWTH
 Exogenous variables: C
 Date: 01/26/25 Time: 11:03
 Sample: 2000 2023
 Included observations: 126

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2994.142	NA	5.47e+15	47.58956	47.67960	47.62614
1	-2644.675	671.2000	2.75e+13	42.29642	42.74663*	42.47933*
2	-2619.693	46.39524*	2.39e+13*	42.15385*	42.96422	42.48308
3	-2606.653	23.38802	2.51e+13	42.20084	43.37137	42.67639

* indicates lag order selected by the criterion
 LR: sequential modified LR test statistic (each test at 5% level)
 FPE: Final prediction error
 AIC: Akaike information criterion
 SC: Schwarz information criterion
 HQ: Hannan-Quinn information criterion

Source: Eviews 13 outputs

Upon estimating the Panel VAR model with the optimal lag length of 2, we can examine the dynamic relationships among the variables: Internet Penetration, Volume of Trading in Financial Markets, Economic Growth, and Inflation.

Based on the results shown in Figure 4, we observe that the Volume of Trading in Financial Markets is significantly influenced by its own past values, with lag(-1) and lag(-2) showing positive and significant relationships, indicating market momentum. This suggests that past trading activity reinforces itself, likely due to investor behavior, market trends, and liquidity persistence. Internet Penetration exhibits mixed effects, with lag(-2) positively affecting current internet penetration, suggesting that increased digital access enhances market participation over time, while lag(-1) shows a negative relationship, indicating a possible short-term adjustment period or transitional effects in adoption. This highlights the delayed and non-linear role of internet access in financial activity. Economic Growth (GDP) does not show any significant impact on trading volume or internet penetration in this model, implying that short-term variations in economic output may not directly translate into immediate changes in market participation or digital financial inclusion. Finally, Inflation is only significant at lag(-2), with a negative sign, indicating that past inflation negatively impacts market activity with a delayed effect, possibly due to increased uncertainty, reduced purchasing power, or shifts in investment behavior in response to inflationary pressures.



Fig.4: PVAR estimation

Vector Autoregression Estimates
Date: 01/26/25 Time: 11:11
Sample (adjusted): 2002 2023
Included observations: 132 after adjustments
Standard errors in () & t-statistics in []

	LOG(VOLUME)	INTERNET	INFLATION	GDP_GROW
LOG(VOLUME(-1))	0.583943 (0.08317) [7.02144]	-0.424070 (0.33124) [-1.28026]	0.051672 (0.21586) [0.23938]	0.155072 (0.36311) [0.42707]
LOG(VOLUME(-2))	0.355667 (0.08440) [4.21396]	0.449465 (0.33616) [1.33705]	0.117894 (0.21906) [0.53817]	-0.164932 (0.36851) [-0.44757]
INTERNET(-1)	-0.068492 (0.02089) [-3.27934]	1.161293 (0.08319) [13.9604]	0.094715 (0.05421) [1.74723]	0.079445 (0.09119) [0.87121]
INTERNET(-2)	0.066593 (0.02061) [3.23144]	-0.192500 (0.08208) [-2.34632]	-0.106698 (0.05349) [-1.99482]	-0.116264 (0.08998) [-1.29217]
INFLATION(-1)	0.026209 (0.03556) [0.73703]	-0.107548 (0.14163) [-0.75936]	0.524277 (0.09230) [5.68040]	-0.099028 (0.15526) [-0.63783]
INFLATION(-2)	-0.096626 (0.03529) [-2.73773]	0.398578 (0.14057) [2.83540]	-0.181754 (0.09161) [-1.98409]	0.066445 (0.15410) [0.43119]
GDP_GROWTH(-1)	0.021859 (0.02131) [1.02577]	0.005128 (0.08487) [0.06042]	0.026255 (0.05531) [0.47470]	0.384397 (0.09304) [4.13159]
GDP_GROWTH(-2)	0.020497 (0.02163) [0.94777]	0.062943 (0.08613) [0.73076]	0.022349 (0.05613) [0.39816]	0.049551 (0.09442) [0.52479]
C	1.021448 (0.43417) [2.35266]	3.937646 (1.72922) [2.27712]	0.377247 (1.12687) [0.33477]	4.299745 (1.89561) [2.26827]
R-squared	0.813929	0.985350	0.350230	0.300328
Adj. R-squared	0.801827	0.984397	0.307968	0.254820

Source: Eviews 13 outputs

The impulse response results confirm the relationship between Internet Penetration and Trading Volume, as depicted in Figure 5. Specifically, a 1 standard deviation (SD) shock in Internet Penetration initially leads to a decline of -0.28% in Trading Volume in the first period, indicating a short-term negative relationship. This initial decline may be attributed to market adaptation effects, where increased internet access disrupts traditional trading patterns or leads to a temporary shift in investor behavior. However, as time progresses, the effect reverses, and the response becomes positive after the second period. This suggests that, over time, higher internet penetration facilitates greater market participation, enhances accessibility to financial information, and ultimately fosters increased trading activity. The delayed positive effect highlights the evolving nature of digital financial inclusion, where short-term frictions give way to long-term benefits in market liquidity and efficiency.

**Figure 5: Response of volume to internet**

Response of LOG(VOLUME) to INTERNET Cholesky One S.D. (d.f. adjusted) Innovation
95% CI using analytic asymptotic S.E.s



Source: Eviews 13 outputs

Moreover, the Granger Causality Test, as presented in Figure 6, provides further evidence of a causal effect of Internet Penetration on Trading Volume. The test results indicate that past values of Internet Penetration help predict future values of Trading Volume, reinforcing the dynamic relationship between these two variables. This causal effect supports the findings from the impulse response analysis, suggesting that changes in Internet Penetration not only correlate with but actively drive fluctuations in Trading Volume over time. These results underscore the importance of digital infrastructure in shaping modern financial markets, where increased connectivity can serve as a catalyst for greater market activity and efficiency.

Fig.6: Granger causality test

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 01/26/25 Time: 11:44
Sample: 2000 2023
Included observations: 132

Dependent variable: LOG(VOLUME)

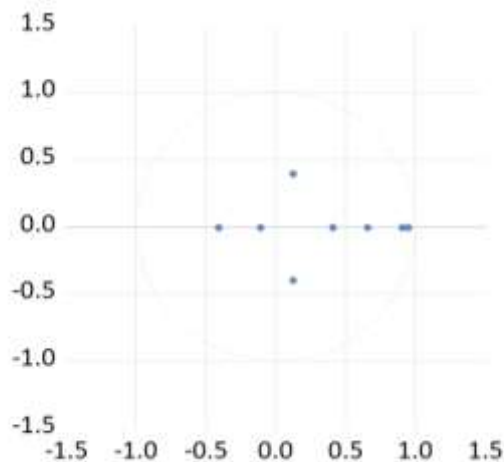
Excluded	Chi-sq	df	Prob.
INTERNET	10.76940	2	0.0046
INFLATION	7.955975	2	0.0187
GDP_GROWTH	3.221989	2	0.1997
All	22.74277	6	0.0009

Source: Eviews 13 outputs



Finally, the stability test, as illustrated in the AR Inverted Roots plot in Figure 7, confirms that the model is stable. Since all roots lie within the unit circle, the system does not exhibit explosive behavior, ensuring that the estimated relationships remain valid over time. This stability is essential for reliable economic and financial analysis, as it guarantees that the model's parameters are not subject to drastic fluctuations. Moreover, it reinforces the credibility of previous findings, such as the impulse response and Granger causality results, confirming that the observed effects of Internet Penetration on Trading Volume are consistent and meaningful for policy and market analysis.

Fig.7: Stability test



Source: Eviews 13 outputs

2. Robustness check analysis

To check the validity and robustness of the findings, a robustness check was conducted using a sub-sample analysis. The countries in the study were divided into two groups based on their financial market activity: those with higher trading volumes and those with lower trading volumes. The estimation results, as presented in Figures 8 and 9, confirm the consistency of the findings across both sub-samples. The similarity in trends and statistical significance across the two groups reinforces the reliability of the main results, indicating that the impact of internet usage on financial markets holds across different market conditions.

**Fig.8: PVAR estimation (lower trading volume countries)**

Vector Autoregression Estimates
Date: 02/17/25 Time: 12:37
Sample (adjusted): 2002 2024
Included observations: 67 after adjustments
Standard errors in () & t-statistics in []

	LOG(VOLUM	INTERNET	GDP_GROW
LOG(VOLUME(-1))	0.363893 (0.11125) [3.26917]	-0.862529 (0.48617) [-1.77414]	-0.317749 (0.41169) [-0.77182]
LOG(VOLUME(-2))	0.465876 (0.11521) [4.04360]	1.010184 (0.50349) [2.00637]	-0.331006 (0.42636) [-0.77636]
INTERNET(-1)	-0.060972 (0.02790) [-2.18541]	1.234351 (0.12192) [10.1241]	-0.003117 (0.10324) [-0.03019]
INTERNET(-2)	0.061757 (0.02751) [2.24494]	-0.260703 (0.12022) [-2.16860]	-0.039515 (0.10180) [-0.38816]
GDP_GROWTH(-1)	0.053890 (0.03358) [1.60460]	-0.015512 (0.14677) [-0.10569]	0.320576 (0.12428) [2.57939]
GDP_GROWTH(-2)	-0.011694 (0.03414) [-0.34252]	0.080543 (0.14919) [0.53986]	-0.269402 (0.12634) [-2.13242]
INFLATION	0.096602 (0.06321) [1.51240]	0.106386 (0.27624) [0.38512]	0.420469 (0.23392) [1.79749]
C	1.130466 (0.75001) [1.50727]	2.959755 (3.27759) [0.90303]	9.098556 (2.77548) [3.27820]
R-squared	0.692394	0.984448	0.300260

Sources: Eviews 13 outputs

Fig.9: Stability test (higher trading volume countries)

Vector Autoregression Estimates
Date: 02/16/25 Time: 23:52
Sample (adjusted): 2002 2024
Included observations: 69 after adjustments
Standard errors in () & t-statistics in []

	LOG(VOLUM	INTERNET	INFLATION	GDP_GROW
LOG(VOLUME(-1))	0.815980 (0.12154) [6.71391]	0.067742 (0.49782) [0.13608]	0.480763 (0.41227) [1.16615]	0.215788 (0.59699) [0.36146]
LOG(VOLUME(-2))	0.035211 (0.11995) [0.29354]	0.182269 (0.49133) [0.37097]	-0.309036 (0.40689) [-0.76950]	-0.584513 (0.58921) [-0.99203]
INTERNET(-1)	-0.087740 (0.02960) [-2.96407]	1.136959 (0.12125) [9.37705]	0.145925 (0.10041) [1.45327]	0.164148 (0.14540) [1.12892]
INTERNET(-2)	0.083508 (0.02913) [2.86687]	-0.169629 (0.11931) [-1.42170]	-0.156971 (0.09881) [-1.58864]	-0.210402 (0.14308) [-1.47050]
INFLATION(-1)	0.031185 (0.03826) [0.81511]	-0.243525 (0.15671) [-1.55396]	0.515155 (0.12978) [3.96946]	-0.041020 (0.18793) [-0.21827]
INFLATION(-2)	-0.084137 (0.03741) [-2.24877]	0.286350 (0.15325) [1.86847]	-0.211576 (0.12692) [-1.66707]	0.120885 (0.18378) [0.65776]
GDP_GROWTH(-1)	0.002139 (0.02573) [0.08312]	0.068891 (0.10541) [0.65354]	0.053297 (0.08730) [0.61054]	0.323106 (0.12641) [2.55602]
GDP_GROWTH(-2)	0.027281 (0.02584) [1.05573]	0.107532 (0.10584) [1.01594]	0.034905 (0.08765) [0.39821]	0.151007 (0.12693) [1.18969]
C	2.225003 (0.82474) [2.69783]	1.794202 (3.37820) [0.53111]	-0.136781 (2.79762) [-0.04889]	8.046724 (4.05116) [1.98628]
R-squared	0.738522	0.986753	0.368919	0.425529

Sources: Eviews 13 outputs

**Conclusion:**

In conclusion, this study explores the dynamic relationship between internet penetration, trading volume in financial markets, and economic growth in the Gulf Cooperation Council (GCC) countries over the period from 2000 to 2024 using a panel VAR approach. Our results confirm a significant connection between internet penetration and trading volume, where a positive shock in internet penetration initially leads to a decline in trading volume but eventually fosters positive growth in the subsequent periods. The Granger causality test shows a unidirectional causal effect from internet penetration to trading volume, supporting the hypothesis that internet growth drives financial market activity.

This decline in trading volume during the early phase can be attributed to a combination of factors, such as limited internet infrastructure, low digital literacy and regulatory challenges that hindered the full potential of internet-based financial activities. Additionally, market participants were initially hesitant to trust online platforms, contributing to a slow adoption of internet-enabled trading. Over time, as internet access and digital skills improved, a positive relationship between internet penetration and trading volume emerged, confirming that the internet plays a vital role in shaping modern financial markets.

Building on the positive relationship between internet penetration and trading volumes in financial markets, it is clear that effective digital infrastructure and technological innovation are key drivers of market activity. In this regard, the UAE has adopted various strategies to drive the development of technology within its financial services sector, including the UAE Centennial 2071, UAE Vision 2021, Abu Dhabi Vision 2030, Smart Dubai 2021, and the Emirates Blockchain Strategy 2021 (Richie Santosdiaz, 2022). These programs aim to strengthen digital infrastructure and foster innovation in financial technology. Similarly, Saudi Arabia's Financial Sector Development Program (FSDP), launched under Saudi Vision 2030 in 2017, originally focused on three key pillars: empowering financial institutions, boosting private sector growth, and advancing the capital market. Acknowledging the growing significance of technology in financial services, a dedicated Fintech Strategy was subsequently integrated as the fourth pillar of the FSDP (Fintech Saudi, 2022).

These strategies underscore the critical role of internet infrastructure and technology in driving financial market activity. By referencing these policies, we emphasize how enhancing internet penetration and digitalization in the GCC region can significantly boost trading volumes and market efficiency. To maximize these benefits, policymakers should continue strengthening ICT infrastructure, expanding broadband access, supporting technological innovation in financial services and promoting digital literacy. Furthermore, adopting regulatory frameworks, including digital asset regulations,



cybersecurity policies and open banking initiatives will further improve investor confidence and market efficiency.

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