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Examining the impact of the stock market development on Economic growth- KSA Tadawul.

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ABSTRACT

The relationship between stock market development and economic growth has been a subject of debate, with arguments centered on the impact of a well-functioning stock market on economic growth. This study argues that economic growth is influenced by stock market development and economic reform indicators, while controlling for other determinants of growth. The research employs a comprehensive theoretical framework linking stock market development to economic growth, and it specifically focuses on the Tadawul stock market in Saudi Arabia. The empirical analysis, using sophisticated panel data econometric techniques, reveals a significant positive correlation between Tadawul stock market and economic growth, particularly in the oil sector. This suggests that the Tadawul stock market plays a crucial role in influencing and contributing to economic growth, especially within the context of the oil industry.

1. CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

The paper provides the background of a research study that explores the role of stock markets, particularly focusing on Tadawul, in influencing economic growth in Saudi Arabia. It emphasizes the multifaceted functions of stock markets, such as trading, investment, and information dissemination, and their impact on corporate finance and economic activity. The study aims to investigate conflicting perspectives on the importance of well-functioning stock markets for economic growth. It plans to use sophisticated econometric techniques on panel data sets to empirically test the significance of stock market development and economic reform as determinants of economic growth in Saudi Arabia. The research also considers the international context and the limited empirical evidence on the relationship between stock market development and economic growth, especially in Arab countries. The findings suggest a significant positive correlation between Tadawul stock market and economic growth in Saudi Arabia, while acknowledging variations in the impact of other macroeconomic determinants. The study highlights the recent availability of reliable data on Arab stock markets, signaling a growing international interest and government efforts to open these markets to foreign investors. However, it acknowledges limitations, such as the lack of data for comprehensive analysis and the focus solely on the effect of stock market development and economic reform on economic growth.

1.2. Research Problem and Questions

Numerous extensive studies have explored the relationship between stock market development and economic growth, primarily focusing on developed economies with some attention to emerging economies, but notably overlooking Arab countries. Existing research in developed economies indicates a positive association between stock market development and economic growth. This study aims to investigate whether a similar relationship exists in Arab countries, considering the pivotal role stock markets play in investment and corporate finance.

The central argument of this study posits that economic growth is intricately linked to stock market development and economic reform indicators, while controlling for key determinants of growth. This inquiry poses crucial questions for economists and policymakers in the Arab region, especially in the Kingdom of Saudi Arabia, echoing concerns raised in the existing literature.

Research Question 1: Do stock market (Tadawul) development and economic reform have an effect on economic growth and?

Research Question 2: How can Saudi Arabia's economy benefit from stock market (Tadawul) development?

Research Question 3: Are stock markets important for economic growth?

Deriving from those questions we drew the following hypotheses:

H1: A well-functioning stock market may affect economic activity in an economy through growth of saving, efficient allocation of resources, and better utilization of the existing resources.

H0: The stock market has a negative impact on economic growth in Saudi Arabia.

This research addresses the aforementioned inquiries and scrutinizes the hypotheses employing dynamic growth estimation methods. The prevailing literature and theoretical frameworks lack a unified concept or measure of stock market development. To address this gap, diverse metrics are employed in this study, encompassing liquidity through turnover ratio, stock market size, and activity gauged by market capitalization and value traded. Additionally, a novel variable, denoting the interplay between investment and turnover ratio, is introduced as an explanatory factor in the overall model specification. This addition is motivated by the potential impact of stock market development on economic growth through investment activities.

2. CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

Numerous academics have delved into the correlation between stock market development and economic progress, making it a well-explored field. Greenwood and Smith (1997) identified four main schools of thought guiding the exploration of the finance-growth nexus. These include the supply-leading hypothesis, the demand-following hypothesis,

the feedback hypothesis, and the neutrality hypothesis, with each school offering distinct perspectives on the relationship between financial development and economic growth.

2.2. The Evidence on Finance and Economic Growth: Arab Countries

The literature review on the evidence regarding finance and economic growth in Arab countries highlights a gap in research, as most empirical studies focus on advanced economies and developed emerging markets. Few studies specifically address Arab financial markets, and the relationship between Arab stock markets and economic growth is largely unexplored. The summarized studies by Darrat (1999), Al-Tamimi et al. (2001), Al-Awad and Harb (2003), and Omran and Bolbol (2003) investigate the relationship between financial development and economic growth in Middle Eastern countries, using various methodologies such as Granger-Causality tests, co-integration tests, and growth equations. The findings suggest that the connection between financial development and economic growth is complex, evolving gradually over the long run, with varying impacts on different sectors of the economy. The studies also highlight the importance of considering both short-term and long-term perspectives and emphasize the need for further research in this area.

The literature review introduces an estimation model based on the Cobb-Douglas production function, where per capita GDP growth rate in the Arab world (y) is modeled in Equation (2.1) using financial development indicators of the banking sector and stock market (x), along with control variables (Z). Another equation (2.2) represents per capita GDP (Y) with coefficients for total productivity (TP), foreign direct investment (FDI), financial development (FD), labor (L), and capital (K). The study finds that FDI positively influences economic growth, dependent on local conditions and absorptive capacities, with financial development being a crucial capacity. The research suggests that attracting more FDI could be facilitated by healthier stock market development, supported by an active economic policy. On the micro-level, Omet and Mashharawe (2003) underscores the significance of the stock market and the operational efficiency of the Amman Securities Market (ASM). He points out that elevated transaction costs might compel companies to list their stocks in more liquid markets, impeding the progress of the domestic market.

$$Y_i \quad \beta_i \quad \beta_1 x_i \quad \beta_2 z_i \quad \varepsilon_i \qquad (2.1)$$

$$Y \quad TP(FDI * FD)L^{\alpha}K^{\beta} \qquad (2.2)$$

2.3. Finance and Growth: Evidence from Individual Country Analysis

In the literature review, Arestis and Demetriades (1997) conduct a comparative analysis of cross-country and time-series data on the relationship between financial development and economic growth. Using King and Levine's cross-sectional database, they find a stronger contemporaneous correlation between financial development and economic growth than the correlation between lagged financial development and growth. Employing a time-series approach on quarterly data for Germany and the United States, the study reveals differences in the causality relationship. For Germany, there is a unidirectional causality from financial development to real GDP, while for the United States, evidence supports the reverse causality, indicating that real GDP affects stock market development and the banking system. Arestis and Demetriades suggest that time-series analysis provides deeper insights into the relationship compared to cross-country regressions.

Mazur and Alexander (2001) examine the link between financial development and economic growth in New Zealand using time-series data from 1970-1996. They measure economic growth with real per capita GDP and its growth rate. The study employs Engle-Granger co-integration analysis and Ordinary Least Squares (OLS) to explore the relationship between banking sector and stock market development with economic growth and saving. Results indicate that banking sector development positively influences the level of output but has no significant effect on output growth and saving. On the other hand, stock market development shows no effect on the level of output but has a co-integrating relationship and an ambiguous effect on output growth and saving.

2.4. Recent Evidence on Economic Reform and Economic Growth

In this literature review section, recent empirical studies on economic reform as a crucial factor for

economic growth are discussed. The focus is on the significance of stock market development concerning the economic and structural environment in the Arab region, particularly Saudi Arabia. The exploration centers on the impact of economic reform measures on resource allocation and subsequent economic growth. Gwartney, Lawson, and Holcombe (1999) investigate the influence of economic freedom, political freedom, and the economic environment on growth using cross-sectional data from 82 countries between 1980 and 1995. Their study reveals a strong and robust relationship between the economic freedom index and economic growth, surpassing the explanatory impact of political freedom and civil liberties. Another study by Eltony and Babiker (2004) delves into Arab capital market development and institutions, examining the effect of the macroeconomic environment, globalization level, and institutional development on the efficiency of Arab stock markets. Using the International Country Risk Guide (ICRG) as an index of institutional quality, their findings suggest that even small improvements in institution quality lead to significant enhancements in stock market efficiency.

2.5. Theory of Economic Growth

The literature review discusses theoretical models of economic growth, emphasizing the prediction that higher saving and investment lead to increase per capita income and faster economic growth (Claus et al., 2001). The central question explored is the sustainability of economic growth in the long run and the factors determining the growth rate (Grossman and Helpman, 1994). Two complementary approaches are highlighted: the standard neoclassical growth theory, represented by the Solow-Swan model (1956), and the endogenous economic growth theory proposed by Lucas (1988) and Romer (1986). The focus is on understanding the determinants of the long-term output growth rate in the economic growth process.

2.6. The Neo-classical growth theory

The Solow model, a cornerstone in economic growth analysis, explains how a steady growth rate is achieved through the balanced application of labor, capital, and technology. This theory replaced capital fundamentalism, prevailing in the 1950s and 1960s, which advocated rapid capital accumulation for accelerated economic growth. The neo-classical growth theory, as outlined by Solow and Swan, posits that capital accumulation and its utilization, the interplay between capital and labor, and technological enhancements influencing labor productivity determine an economy's output level. The Solow model elucidates how saving, population growth, and technological progress impact a country's economic growth, offering insights into varied growth rates among different nations.

Technological advancements, according to the model, lead to increased productivity per unit of labor, fostering exponential economic growth. Mester (2015) finds empirical consistency with the neoclassical growth model but notes a positive correlation between savings rates and growth, contrary to the model's predictions. Jones and Romer (2009) challenge the neoclassical growth theory, proposing six facts that address its narrow focus on physical capital. In the context of this study on the Tadawul's economic effects, the neo-classical growth theory is deemed unsuitable, lacking explanations on how savings and investment rates impact the steady-state growth rate.

2.7. The Endogenous growth theory

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unsuitable, lacking explanations on how savings and investment rates impact the steady-state growth rate.

2.8. Stock Market Development and Economic Growth

In this literature review, Smith (1991) argues that stock market liquidity is expected to mitigate downside risks and reduce costs associated with long-term investment projects. A liquid market allows initial investors to easily and quickly sell their stake in a company, maintaining access to their savings throughout the investment duration. However, critics like Bhide (1994) contend that stock market liquidity might negatively impact corporate governance by inducing investor myopia. The ease of selling shares could weaken investor control over corporations, discouraging the development of long-term relationships with firms. Singh (1997) emphasizes that well-functioning stock markets' pricing and takeover mechanisms lead to short-term and lower rates of long-term investment. This system may reward managers for financial engineering rather than creating new wealth through organic growth. Bingswanger (1999) notes that stock market price volatility and undervaluation of long-term investment can discourage managers from undertaking such investments, as their performance is judged based on the financial assets' short-term performance.

Furthermore, Singh (1971) argues that the takeover mechanism does not effectively serve a disciplinary function, and competitive selection in the corporate control market is more influenced by size than performance. Consequently, large inefficient firms may have higher chances of survival than small, relatively efficient ones.

2.9. Stock Market: A Cause of Economic Growth

The paragraph discusses the role of stock markets in economic growth and the channels through which they contribute to development. Initially, the stock market serves as the primary market for issuing shares, raising funds for corporate development and expansion (Viney, 2003). While mainstream literature often emphasizes the efficiency of capital allocation and the encouragement of saving as key drivers of economic growth, the microeconomic impact on corporate finance and governance is also considered (Laurenceson, 2002).

Stock market development is thought to encourage saving by providing households with additional instruments that match their risk preferences and liquidity needs. Liquid equity markets reduce investment risk, making it more attractive for savers to acquire and sell assets quickly. This liquidity also benefits companies by ensuring continuous access to capital raised through equity issues. Stock market liquidity, by facilitating long-term and profitable investment, improves capital allocation and enhances prospects for long-run economic growth (Levine, 1996).

Rousseau and Wachtel (2000) highlight the importance of stock markets as financial institutions, even when equity issuance is a minor funding source. They note that stock markets provide exit mechanisms for investors and entrepreneurs, attract capital inflows, encourage the transfer of surplus from short-run to long-run assets, and improve information flow for efficient financial intermediation. The paragraph raises the critical question of how stock market development contributes to increased aggregate saving and investment or enhances the productivity of investment in the context of economic growth.

2.10. The Effect of Stock Market on Saving and Investment

2.10.1. Stock Market Development and Saving

Bonser-Neal and Dewenter (1999) investigate the impact of stock market development on saving by analyzing three factors: its influence on the return on saving, its effect on the riskiness of saving, and how individuals respond to changes in return and risk. The theoretical framework suggests that stock market development should increase the rate of return on saving for two reasons. Firstly, the ability to include stocks in a portfolio is expected to enhance the overall expected rate of return. Secondly, if capital controls on investment opportunities hinder individuals from holding their optimal portfolio, the liberalization and expansion of the stock market would enable more efficient allocation of financial resources through share purchases. This reallocation is anticipated to result in a higher rate of return on saving in the economy.

2.10.2. Determinants Stock Market Development

The efficient functioning of stock markets in Saudi Arabia is contingent on several essential preconditions, including a stable macroeconomic environment, a well-developed banking sector, transparent and accountable institutions, and robust shareholder protection. A stable macroeconomic environment is particularly crucial for stock market development, as volatility can exacerbate informational asymmetries and make the financial system more vulnerable. Low and predictable inflation rates are essential to attract domestic and foreign investors, as high inflation expectations can deter investments. It's important to note that the stock market in Saudi Arabia was established as a complement, not a substitute, for the banking sector.

Vacu (2013) suggests that developing the financial intermediary sector can foster stock market development, citing successful examples in several East Asian countries. The support services provided by the banking system significantly contribute to stock market development. A strong banking system with liquid inter-bank markets is crucial, while a weak banking system can constrain stock market development. Institutional quality plays a vital role, as efficient and accountable institutions enhance confidence in equity investment, making it more attractive over time. Countries with strong shareholder protection are more likely to experience stock market development, as investors are less fearful of expropriation. Additionally, markets with relatively dispersed ownership provide liquidity, further supporting stock market development.

2.10.3. Financial sector contribution to the economy.

Abdallah and Dafaalla (2011) emphasize the crucial role of financial system efficiency in economic growth, attributing its significance to the existence of substantial information and transaction costs. They argue that asymmetric information leads to adverse selection and moral hazard, along with high transaction costs, resulting in inefficiencies. According to their perspective, an efficient financial system enhances capital productivity, promoting economic growth through information collection, project evaluation, risk-sharing, and liquidity provision.

The authors propose three channels through which financial intermediation contributes to economic growth. The first channel, influenced by McKinnon and Shaw's works, suggests that financial liberalization increases savings levels, leading to higher investment, improved capital productivity, and overall growth. The second channel focuses on the reduction of information and transaction costs, resulting in increased funds flowing from lenders to borrowers, a concept supported by Gurley and Shaw's findings. The third channel highlights the role of the financial sector in improving resource allocation through fund pooling, risk diversification, liquidity management, screening, and monitoring mechanisms. These mechanisms collectively contribute to economic growth by facilitating large investment projects, reducing risks, ensuring liquidity, directing funds to profitable projects, and disciplining borrowers (Abdallah and Dafaalla, 2011).

Theoretical Approach to Finance and Growth (source Levine, 1997)

Levine's work in 1997 discusses various measures and control variables used in research on the relationship between finance and economic growth. Market Capitalization/GDP and Stock Turnover/GDP are highlighted as key indicators, with the former reflecting overall market size and the latter indicating trading activity relative to market size. The turnover ratio is emphasized as a complementary measure to assess liquidity, often considered an indicator of low transaction costs. Wang (2010) introduces foreign direct investment (FDI) and inflation as control variables, recognizing their significance in determining economic growth. Beck et al. (2000) analyze the relationship between financial development and various economic factors, finding a positive effect on short-term productivity growth but a lesser impact on long-term economic growth. El-Wassal (2005) links stock market growth to financial liberalization and foreign portfolio investment in emerging markets. Adjasi and Biekpe (2006) discover a positive relationship between stock market development and economic growth, particularly in upper middle-income economies. Capasso (2006) identifies a strong and positive correlation between stock market development and economic growth, suggesting that stock markets tend to emerge and develop in larger economies with high levels of capital accumulation. Rousseau and Watchel (2001) and Arestis and Luintel (2001) emphasize the influence of stock markets on growth through the value traded and

time-series analysis, respectively. King and Lavine (1993) empirically show that the level of financial intermediation is a good predictor of long-run rates of economic growth, capital accumulation, and productivity improvements.

2.10.4. Pitfalls associated with stock market development

Over time, various scholars have expressed concerns regarding the proposition advocating the development of equity markets as a means to spur economic growth. Keynes (1936) proposed that excessive volatility, while somewhat useful in reflecting new information in efficient markets (Shiller, 1980), might actually undermine a stock exchange's efficiency in capital allocation for investment. Federer (1993) supports this view, suggesting that situations of excess volatility could lead to an increase in interest rates due to heightened uncertainty. According to Federer, elevated interest rates may result in suppressed levels of productivity in investment, consequently leading to lower economic growth.

Stieglitz (1985) points out that information asymmetry between shareholders and outsiders diminishes the effectiveness of the threat of a corporate takeover as a mechanism for exerting corporate control. Stieglitz contends that outsiders would be hesitant to initiate takeovers because they possess less information than current shareholders, and the cost associated with acquiring reliable information could lead to overpriced successful takeovers.

Demirguc-Kunt and Levine (1996) also highlight potential drawbacks associated with the advancement of stock markets in relation to economic growth. They caution that the heightened liquidity resulting from stock market development might hinder capital accumulation and economic progress by diminishing savings rates through both income and substitution effects. Additionally, they propose that the reduced uncertainty regarding investment returns in comparison to savings could lead to a decrease in precautionary savings, resulting in uncertain effects on the economy. Furthermore, they express concerns about the negative impact on corporate governance due to investor myopia. Investor myopia, or short-termism, could be exacerbated by the ease with which dissatisfied investors can exit stocks instead of actively participating in corporate control by overseeing management performance.

2.11. Unemployment rate and the stock market

The unemployment rate in Saudi Arabia is calculated as the percentage of individuals actively seeking employment relative to the total labor force. In the second quarter of 2018, the unemployment rate decreased to 6 percent from the first quarter's 6.10 percent. Over the years (2010-2022), the average unemployment rate in Saudi Arabia was 5.61 percent. The highest recorded rate was 7.40 percent in year 2020, while the lowest was 5.5 percent in the year 2010.

2.12. Inflation Rate and the Stock Market

In 2016, the annual inflation rate in Saudi Arabia increased to 2%, The rise in inflation in 2019 was driven by accelerated price growth in categories such as food and beverage, transport, furniture and household equipment, recreation and culture, and miscellaneous goods and services. However, prices in housing and utilities, as well as clothing and footwear, experienced less decline than in the previous month. Inflation remained stable for tobacco, education, and health, while softer increases were observed in restaurant and hotels, as well as communication.

2.13. The Oil Boom: Saudi Arabia

In the latter half of the 20th century, there was a significant divergence in per capita GDP among Arab countries, making it challenging to generalize regional trends. The Gulf Cooperation Council (GCC) nations heavily rely on oil resources, with varying degrees of economic development. Over the past three decades, the GCC countries have experienced substantial economic and social transformations, utilizing oil revenues to modernize infrastructure and improve socio-economic indicators. While sharing common economic characteristics, such as substantial oil contributions, there are notable differences among GCC countries, including varying per capita GDP and sectoral emphases. Oil export revenues have played a crucial role in enhancing welfare and supporting investments in infrastructure and human capital in several Arab countries. However, these nations, particularly those in the GCC, face challenges related to oil dependency and price volatility, necessitating accelerated economic reforms to diversify their

economies, promote investment, and stimulate private sector growth.

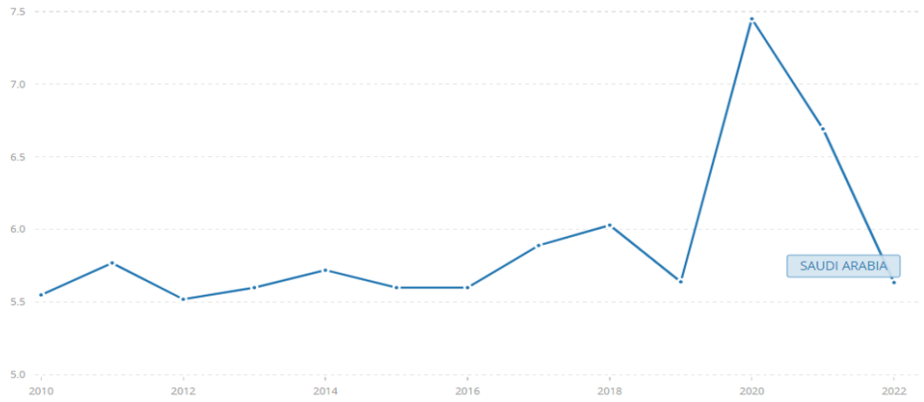

Figure 1: Saudi Arabia unemployment rate histories. (2010-2022), Source: World Bank

Figure 2: Inflation Rate and the stock market in Saudi Arabia (2010-2022), Source: World Bank

Joint-stock companies have been operating in Saudi Arabia since the 1930s, and a formal market was established in 1984, regulated by the Saudi Arabian Monetary Agency (SAMA) and utilizing electronic trading of publicly listed shares. In 1990, a computerized screening system was introduced to facilitate trading. The stock market was further regulated by a law passed in June 2003, which mandated a physical location for trading. Trading in Saudi shares is exclusively conducted through banks acting as brokers as per SAMA requirements. This market has strict foreign ownership restrictions, allowing foreign investment only in mutual funds, while other Gulf Cooperation Council (GCC) nationals are limited to a maximum ownership of 25 percent in locally listed companies.

Stock Market Development

The Saudi Arabian stock market is the largest in the Arab world, with a market capitalization twice the size of the Egyptian stock market. It constitutes 43.6 percent of the total market capitalization in the Arab world, experiencing significant growth from USD $38.7 billion to USD $157.3 billion between 1994 and 2003. In 2003, the market listed 70 companies, mainly in manufacturing and financial services, with a few in agriculture and transport sectors. The value traded surged from USD $6.6 billion to USD $159.1 billion during the same period, resulting in turnover ratios of 17.1 percent and 101.1 percent, respectively.

Banking and Finance

Saudi banks represent approximately one third of the total financial capital in the Arab region. The largest Arab bank, privately owned by the Mahfouz family, is the Saudi Al-Ahli Commercial Bank, which received a significant infusion of USD $1.6 billion in 1993. The 10 major Saudi banks experienced a 6.4 percent average growth in net income, reaching USD $2.9 billion, with an average return-on-equity of 21 percent in 2001. The Saudi Arabian Monetary Agency (SAMA) serves as the central bank. Foreign investors are gradually being granted access to commercial banking, with a few GCC banks currently permitted to establish a presence in the kingdom.

2.14. Conclusion

The debate on the relationship between finance and economic growth, as per Romer (1990), remains unsettled and complex, influenced by dynamic results and the sensitivity of econometric methodology and variable choices. Despite the lack of unanimity, there is a consensus that financial development contributes to economic growth. The study on the link between Tadawul's development and Saudi Arabia's economic growth is expected to provide insights, especially considering the unbalanced economic growth and the Tadawul's significant growth. Additionally, financial sector development is contingent on factors like human capital development, investment policy, and effective macroeconomic policies, according to Romer (1998)

3. CHAPTER 3: FINDINGS AND RESULTS

The research relied on secondary data, encompassing annual economic growth rates, stock market liquidity, and capitalization ratios. This information was sourced from various entities, including Tadawul, the Central Bureau of Statistics, the Saudi Investment Authority, and the World Bank's financial structure database. Additionally, data and information were gathered from articles, books, and various online resources.

The paragraph describes the model specification for examining the relationship between banking sector development (BSD), stock market development (SMD), and economic growth (EG). The fundamental model is expressed as "EGt = f(BSDt, SMDt)," and the log-linear econometric form is presented as "$\ln(EGt) = ß_o + ß1\ln(BSDt) + ß2\ln(SMDt) + \epsilon t$." The analysis involves several steps: a unit root test is conducted to check for the stationary attributes of the data, followed by the formulation of a VAR (Vector Autoregressive) model for the three variables. The Johansen cointegration test is then performed to assess the presence of cointegration. Subsequently, the Granger causality test is used to identify causal relationships, and the dynamic performance of the VAR model is explored through impulse response function and variance decomposition.

The unit root test is carried out using the Augmented Dickey Fuller (ADF) test and the Phillips & Perron (PP) approach. The results, presented in Tables 1 and 2, indicate that at the first difference, the "t statistics" exceed the critical value, leading to the rejection of the null hypothesis. This suggests that the

variables are non-stationary at the level but become stationary at the first difference, indicating that the variables are integrated of order one (1(1)).

Table 1
UNIT ROOT TEST (ADF) FOR THE SELECTED VARIABLES

	At level				At first difference			
	With constant		With constant linear trend		Constant		With constant linear trend	
	t-stat	C-value	t-stat	C-value	t-stat	C-value	t-stat	C-value
EG	-2.114623	-3.661661	-2.790071	-4.284580	-7.230896	-3.670170	-7.096031	-4.296729
BSD	-1.655579	-3.661661	-2.529422	-4.284580	-6.095563	-3.670170	-6.238561	-4.296729
SMD	-2.111079	-3.661661	-2.674013	-4.284580	-7.585404	-3.670170	-7.526869	-4.296729

*Indicates statistical significance at 1%

Table 1:Unit Root Test (ADF) For the selected variables.

Table 2
UNIT ROOT TEST (PP) FOR THE SELECTED VARIABLES

	At level				At first difference			
	With constant		With constant linear trend		Constant		With constant linear trend	
	t-stat	C-value	t-stat	C-value	t-stat	C-value	t-stat	C-value
EG	-2.085945	-3.661661	-2.788660	-4.284580	-7.146970	-3.670170	-7.013875	-4.296729
BSD	-1.655579	-3.661661	-2.529422	-4.284580	-6.720473	-3.670170	-15.19036	-4.296729
SMD	-2.025775	-3.661661	-2.569602	-4.284580	-7.494626	-3.670170	-7.549217	-4.296729

*Indicates statistical significance at 1%

Table 2: Unit Root Test (PP) For the selected variables.

Table 3
VAR LAG ORDER SELECTION CRITERIA

Lag	LogL	LR	FPE	AIC	SC	HQ
0	32.55547	NA	2.61e-05	-2.038308	-1.896864	-1.994010
1	75.48108	74.00967	2.53e-06	-4.378006	-3.812228*	-4.200811
2	87.33923	17.99167*	2.13e-06*	-4.575119*	-3.585008	-4.265029*
3	94.27277	9.085334	2.61e-06	-4.432605	-3.018161	-3.989619

* 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 Cri. SC: Schwarz Information Cri. HQ: Hannan-Quinn Information Cri.

Table 3: Var lag Order selection Criteria.

In the process of estimating the VAR model, determining the optimal lag length is a crucial initial step to avoid under-parameterization or over-parameterization that could reduce the model's effectiveness. The study uses lag order length selection criteria, and Table 3 shows that the AIC (Akaike Information Criterion) is considered superior. Consequently, the chosen lag order for the study is 2.

After confirming that the selected variables exhibit integrated of order one (I(1)) through the unit root test, a co-integration test is performed using the Johansen test, a multivariate co-integration method. The test involves trace and maximum eigenvalue statistical tests to examine the co-integration linkage among the three variables in the study. Table 4 reveals that both the "trace test" and maximum eigenvalues are lower than the critical values, and their corresponding p-values are insignificant. This indicates a lack of co-integration among the variables. Consequently, the study opts for the vector autoregressive (VAR) approach due to the absence of co-integration.

3.1. Unrestricted Vector Auto-Regression (VAR)

The Unrestricted Vector Auto-Regression (VAR) is employed, offering flexibility for analyzing multivariate time series. The dynamic nature of VAR (P) involves Granger causality tests, impulse response functions, and forecast error variance decompositions. VAR models are examined through the equation method, treating variables as endogenous and forming separate equations for each variable. The assessment of a variable is presented as a linear function of its past lags and the past lags of other variables in the model. The reduced form is expressed as VAR (1), with Table 5 displaying the vector autoregression estimates for the studied variables. Examples of these equations include expressions for economic growth (EGt), banking sector development (BSDt), and stock market development (SMDt).

$$\text{“}EGt,\ 1 = \alpha 1 + \varphi 11 EGt{-}1,\ 1 + \varphi 12 BSDt{-}1,\ 2 + \varphi 13 SMDt{-}1,\ 3 + wt,\ 1\text{”}$$

$$\text{“}BSDt,\ 2 = \alpha 2 + \varphi 21 BSDt{-}1,\ 1 + \varphi 22 EGt{-}1,\ 2 + \varphi 23 SMDt{-}1,\ 3 + wt,\ 2\text{”}$$

$$\text{“}SMDt,\ 3 = \alpha 3 + \varphi 31 SMDt{-}1,\ 1 + \varphi 32 EGt{-}1,\ 2 + \varphi 33 BSDt{-}1,\ 3 + wt,\ 3\text{”}$$

Table 4
TRACE TEST

Unrestricted cointegration rank test (Trace)					**Unrestricted cointegration rank test (Maximum Eigen value)**			
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.407202	22.89959	29.79707	0.2510	0.40720	15.16414	21.13162	0.2776
At most 1	0.225730	7.735441	15.49471	0.4941	0.22573	7.419215	14.26460	0.4408
At most 2	0.010845	0.316227	3.841466	0.5739	0.01084	0.316227	3.841466	0.5739

Max-Eigenvalue test indicates no cointegration at the 0.05 level
* Denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 4: Trace Test

Table 5 VECTOR AUTOREGRESSION ESTIMATES Standard errors in ( ) & t-statistics in [ ]			
	EG	BSD	SMD
EG(-1)	0.604429	0.496540	1.420914
	(0.15411)	(0.34797)	(1.26075)
	[3.92200]	[1.42696]	[1.12704]
EG(-2)	0.250804	-0.029594	-2.391791
	(0.15383)	(0.34734)	(1.25847)
	[1.63036]	[-0.08520]	[-1.90056]
BSD(-1)	-0.143054	0.903509	0.745388
	(0.07694)	(0.17372)	(0.62940)
	[-1.85937]	[5.20110]	[1.18429]
BSD(-2)	0.336601	-0.130158	-0.191433
	(0.08650)	(0.19531)	(0.70765)
	[3.89122]	[-0.66641]	[-0.27052]
SMD(-1)	0.030422	-0.116444	0.498488
	(0.02296)	(0.05183)	(0.18780)
	[1.32517]	[-2.24648]	[2.65431]
SMD(-2)	-0.028445	0.116229	0.348535
	(0.02344)	(0.05292)	(0.19176)
	[-1.21352]	[2.19611]	[1.81760]
C	0.866850	-4.310173	9.285126
	(1.30842)	(2.95428)	(10.7038)
	[0.66251]	[-1.45896]	[0.86746]
R-squared	0.813488	0.703219	0.705925
Adj. R-squared	0.764833	0.625798	0.629210
F-statistic	16.71943	9.083037	9.201881

Table 5: Vector Auto Regression ESTIMATES

We find below the equations covering the lagged values of the purported indicators as the dependent variables.

"*EG* = 0.604429**EG*(-1) + 0.250804**EG*(-2) + -0.143054**BSD*(-1) + 0.336601**BSD*(-2) +0.030422**SMD* (-1) + -0.028445**SMD* (-2) + 0.866850"

"*BSD* = 0.496540**EG* (-1) + -0.029594**EG* (-2) + 0.903509**BSD* (-1) + -0.130158**BSD* (-2) + -0.116444**SMD* (-1) + 0.116229**SMD* (-2) + *C* (14)"

"*SMD* = 1.420914**EG* (-1) + -2.391791**EG* (-2) + 0.745388* *BSD* (-1) + -0.191433**BSD* (-2) +0.498488* *SMD* (-1) + 0.348535* *SMD* (-2) + *C* (21)"

Table 6 TOTAL SYSTEM (BALANCED) OBSERVATIONS 90				
	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	0.604429	0.154112	3.921998	0.0002
C(2)	0.250804	0.153833	1.630362	0.1076
C(3)	-0.143054	0.076937	-1.859372	0.0672
C(4)	0.336601	0.086503	3.891224	0.0002
C(5)	0.030422	0.022957	1.325171	0.1895
C(6)	-0.028445	0.023440	-1.213521	0.2291
C(7)	0.866850	1.308423	0.662515	0.5098
C(8)	0.496540	0.347970	1.426963	0.1581
C(9)	-0.029594	0.347339	-0.085203	0.9323
C(10)	0.903509	0.173715	5.201097	0.0000
C(11)	-0.130158	0.195314	-0.666407	0.5074
C(12)	-0.116444	0.051834	-2.246479	0.0279
C(13)	0.116229	0.052925	2.196111	0.0314
C(14)	-4.310173	2.954282	-1.458958	0.1491
C(15)	1.420914	1.260750	1.127039	0.2636
C(16)	-2.391791	1.258466	-1.900560	0.0615
C(17)	0.745388	0.629398	1.184287	0.2404
C(18)	-0.191433	0.707652	-0.270518	0.7876
C(19)	0.498488	0.187803	2.654306	0.0099
C(20)	0.348535	0.191756	1.817599	0.0735
C(21)	9.285127	10.70384	0.867458	0.3887

Table 6: Total System (Balanced) Observations 90.

The results presented in Table 6 indicate the outcomes of VAR analysis, revealing a limited number of noteworthy coefficient values. These findings suggest a potential association among the variables. Specifically, the coefficients related to economic growth exhibit significance for C (1) and C (4). In the case of BSD, significance is observed for C (10) and C (13), while for SMD, significance is evident for C (19).

3.2. Granger Causality Test

The study employs the Granger causality test to explore the causal relationships among the selected variables. Table 7 presents significant findings, indicating bidirectional causation between economic growth (measured by real GDP per capita) and banking sector development (measured by the ratio of Broad Money to GDP) at a ten percent level of significance. Additionally, stock market development (measured by the ratio of stock market capitalization to GDP) is found to cause banking sector development, with the direction of causation being from stock market development to banking sector development.

3.3. Impulse Response Function

The Impulse Response Function is employed to examine the interactions among selected variables within a VAR framework. In this function, a one-period standard deviation shock is applied to the

endogenous variable, revealing the response of one variable to an impulse in another within a model

involving multiple variables. The analysis is presented through 3x3 graphs, as shown in Figure 3. The graphs illustrate the impulse response functions, showcasing how each variable responds to shocks from itself and other variables in the VAR model. The results indicate both positive and negative responses of economic growth (EG) to shocks in itself and banking sector development (BSD). The response of BSD to shocks in economic growth and itself is oscillating, while the impulse response of stock market development (SMD) to shocks in banking sector development and itself is wavering. Additionally, consistent responses are observed in the cases of economic growth to stock market development, banking sector development to stock market development, and stock market development to economic growth.

Table 7
PAIRWISE GRANGER CAUSALITY TESTS

Null Hypothesis:	Obs.	F-Statistic	Prob.
BSD does not Granger cause EG	30	8.37416	0.0016
EG does not Granger cause BSD		3.03956	0.0658
SMD does not Granger cause EG	30	1.03818	0.3689
EG does not Granger cause SMD		1.35949	0.2751
SMD does not Granger cause BSD	30	4.24092	0.0259
BSD does not Granger cause SMD		0.30632	0.7389

Table 7: Pairwise Granger Causality Tests

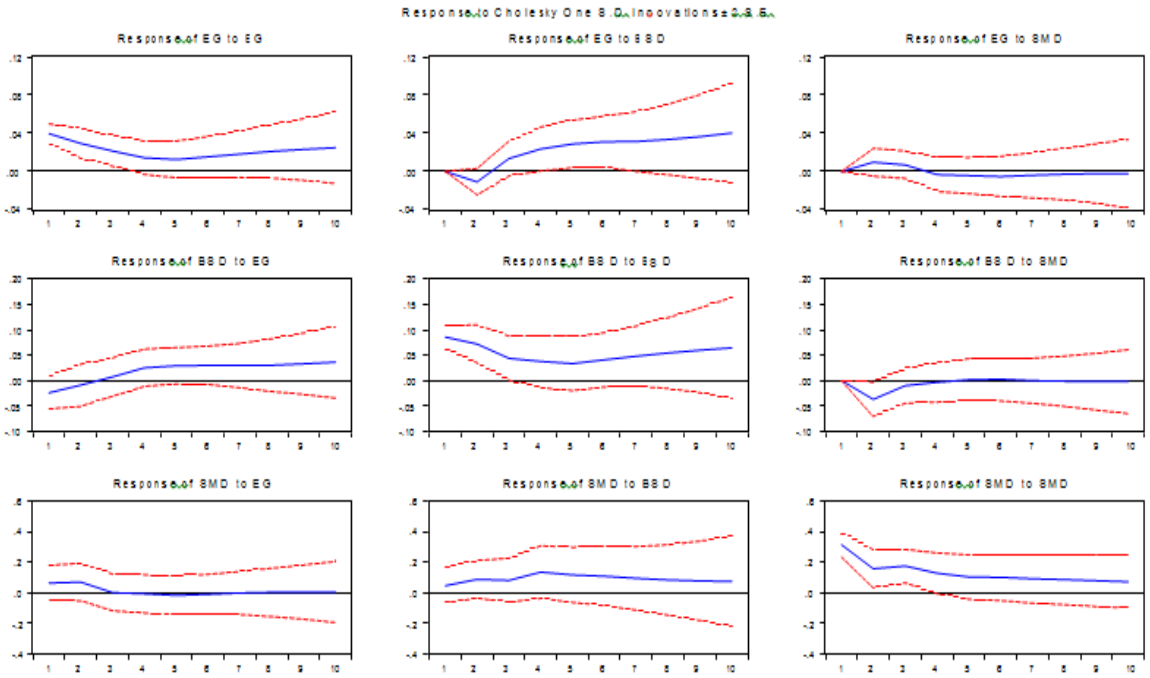

Figure 3: Impulse Response Functions

3.4. Variance Decomposition Method

Tables 8, 9, and 10 provide variance decomposition results for economic growth (EG), banking sector development (BSD), and stock market development (SMD). These tables analyze and assess the variance of the forecast error for each variable, breaking it down into different components. In Table 8, for the tenth period, it is revealed that 57.76% of economic growth is explained by the effects of banking sector development (BSD), while 40.45% is attributed to its own innovative shocks. Table 9 indicates that BSD is the primary factor in explaining its own variation. Table 10 shows that 2.93% of economic growth and 27.85% of banking sector development contribute to the variation in stock market development. Additionally, 69.20% of stock market development is explained by its own innovations.

The model's robustness is assessed through diagnostic tests in Table 11, where the "Jarque Bera" statistic of 1.9759 and the corresponding p-value of .3723 suggest normality of residuals. Other diagnostic tests in the table affirm the model's reliability. To gauge structural stability, cumulative sum (CUSUM) and cumulative sum of square (CUSUMSQ) plots are employed.

Tables 8
VARIANCE DECOMPOSITION OF THE THREE VARIABLES

Period	S.E.	EG	BSD	SMD
1	0.039563	100.0000	0.000000	0.000000
2	0.051257	91.98467	4.538119	3.477215
3	0.057488	86.79726	9.023428	4.179315
4	0.063773	75.45886	20.84136	3.699778
5	0.071178	63.65179	32.99866	3.349554
6	0.079263	55.00285	41.83349	3.163655
7	0.087207	49.74966	47.42119	2.829145
8	0.095718	46.04661	51.51027	2.443117
9	0.104935	43.07767	54.83063	2.091703
10	0.115047	40.45117	57.76503	1.783800

Table 8: Variance Decomposition of the Three varibales

Tables 9
VARIANCE DECOMPOSITION OF THE THREE VARIABLES

Period	S.E.	EG	BSD	SMD
1	0.089329	6.942953	93.05705	0.000000
2	0.121032	4.321834	86.54120	9.136965
3	0.129405	4.114496	87.29211	8.593390
4	0.137302	7.122696	85.18859	7.688710
5	0.144408	10.62122	82.41286	6.965919
6	0.153155	13.32623	80.44562	6.228156
7	0.163321	15.05523	79.46780	5.476969
8	0.174875	16.20699	79.01242	4.780590
9	0.187799	17.18715	78.65776	4.155088
10	0.201932	18.14417	78.25307	3.602760

Table 9: Variance Decomposition of the Three varibales

Tables 10
VARIANCE DECOMPOSITION OF THE THREE VARIABLES

Period	S.E.	EG	BSD	SMD
1	0.323654	3.721224	2.045276	94.23350
2	0.376529	6.185345	6.887481	86.92717
3	0.422706	4.908662	9.196717	85.89462
4	0.461860	4.137054	16.27547	79.58747
5	0.487613	3.823667	20.36362	75.81272
6	0.509359	3.540407	23.15396	73.30563
7	0.525733	3.324707	24.93418	71.74111
8	0.539206	3.161401	26.07790	70.76070
9	0.550562	3.036478	27.02804	69.93548
10	0.560121	2.938436	27.85304	69.20853

Table 10: Variance Decomposition of the Three variables

Table 11
DIAGNOSTIC TESTS

Normality	LM	White	ARCH	REMSEY RESET
1.9759 (.3723)	1.37045(0.5040)	3.6065(.6073)	1.99(0.3689)	0.98 (0.3295)

Table 11: Diagnostic Tests

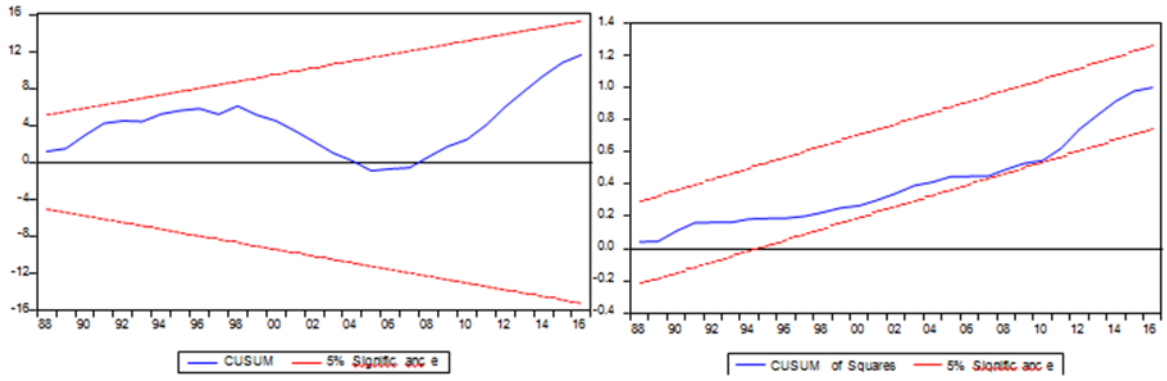

Figure 4: PLOT OF CUSUM and PLOT OF CUSUMSQ

3.5. CONCLUSIONS

The study aimed to investigate the relationship between stock market development and economic growth in Saudi Arabia. Covering the period from 2011 to 2022, the Johansen co-integration test suggested no long-run co-integration among banking sector development, stock market development (Tadawul), and economic growth. However, the VAR results indicated some significant coefficients, suggesting a potential relationship among the variables. The Granger causality test revealed a bi-directional relationship between economic growth and banking sector development at a ten percent level of significance.

The study emphasized the crucial role of the banking sector in facilitating the country's strong economy, affirming causal linkages between banking sector development and economic growth. Urgent banking reforms were recommended to position Saudi Arabia as the financial hub of the GCC region, fostering economic growth. Additionally, stock market development, particularly Tadawul, was found to be significant, with the advancement to an emerging market enhancing its prospects.

Empirical results supported the hypothesis that the relationship between the Saudi Arabia stock market and economic growth is strong and statistically significant. Institutional quality, as an indicator of economic reform, was also found to have a significant effect on economic growth. Analysis of macroeconomic control variables such as investment, inflation rate, employment growth rate, trade openness, and government consumption showed consistency with economic theory, with the new variable of interaction (Investment Turnover Ratio) having a positive and significant effect on economic growth. The findings suggest that stock market liquidity and investment may indeed support economic growth in Saudi Arabia.

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