



Derivatives Market: A Survey

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ABSTRACT

Our research paper surveys prior research on derivatives markets. We mainly review the literature investigating the impact of introducing derivatives markets on the underlying market and the overall economic development. Particularly, we summarize papers investigating the effects on the spot market liquidity, spot market volatility, and the price discovery process. We review the literature on several countries, but the survey paper appears to be concentrated on Saudi Arabia. Our paper contributes to the literature and sheds light on introducing the derivatives market in Saudi Arabia. This survey is useful to policymakers and investors as well.

Keywords: Economic Development, Emerging Markets, Derivatives, Risk Management, GCC Countries, Saudi Arabia, Volatility

Classifications: G10, G12, G13, G14, G15

1. INTRODUCTION

The derivatives market plays a major part in the development of the overall financial system and contributes to various aspects of an economy. Most economists recognize that a healthy capital market plays a vital part in economic growth. Financial derivatives contribute to the development of capital markets. It contributes to effective capital allocation, improves portfolio diversification, enhances capital inflow, acts as a price stabilizer, contributes to price discovery, and acts as a risk management tool. Sendeniz-Yüncü et al. (2018) investigate the association between futures market development and economic growth using a time series method. They examine 32 developed and developing countries. They argue that an efficient derivatives market can play an essential part in risk sharing among firms, which can boost economic growth.

Moreover, the futures market contributes to price discovery since it reflects new information. Thus, the market is an important source of information for investors. In addition, it serves as a price stabilizer. Therefore, investors can make rational decisions

and can use resources efficiently, which will lead to economic growth. Vo et al. (2019) investigate the impact of the derivatives market on economic development in several countries, namely Japan, China, India, and the U.S. By using a Granger-causality test, they report a positive relationship between derivative markets and economic development in the U.S., Japan, and India, however, only in the short run. Nevertheless, by using fully modified ordinary least squares and dynamic ordinary least squares, they report that derivative markets have a positive impact on economic development in the long run. Many other researchers have studied the effect of derivative markets in emerging and developed economies. For example, Lien and Zhang (2008) review empirical and theoretical studies on emerging economies. They summarize the functions of the derivatives market, the impact of regulation, and policy effects. Williams et al. (1998) investigate the establishment of the futures market in China. They describe the evolution, development, and success of China's experience in launching the futures market. They shed light on the importance of contract design in addition to the microstructure of the futures market. Fernandez (2006) discusses the development of derivatives markets in Chile. The paper focuses on institutional aspects

of the derivatives markets as well as discussing the benefit of using derivatives for hedgers. They conclude that factors such as low liquidity of spot markets, strict regulations on institutional investors, and high trading costs contribute to market thinness. Atilgan et al. (2016) summarize existing literature focusing on emerging markets and derivatives.

However, despite the significant influence of the derivatives market on economic growth and development, there is scarce literature investigating the impact of introducing the derivatives market in Saudi Arabia. However, studies such as Zeddoun and Bendima (2022) investigate whether using derivatives increases stock returns in GCC countries. Tanha and Dempsey (2017) Investigated Derivatives usage in GCC Countries. Bendob et al. (2015) Investigate the effect of using derivatives on commercial banks' performance, particularly in GCC countries.

The Saudi Exchange is the most liquid and the largest in the MENA region, and the exchange launched its derivatives market in August 2020. Introducing the market is part of the vision 2030 financial sector development program to promote an advanced capital market with diversified asset classes available to investors. Essentially, derivatives play a crucial role in attaining this objective, where it promote risk management, price transparency, and an efficient capital market. The introduction of the derivatives market is expected to increase liquidity, add depth and breadth, attract foreign capital, and increase the number of informed traders. Futures trading will enhance flow to the equity market, which will contribute to the attractiveness of the Saudi capital market. This step will increase local and foreign investment and boost economic growth.

The Saudi Exchange launched its first derivatives contract in August 2020, the MT30 index futures contract. The launch is considered a significant step to promote the development of Saudi Arabia's capital market. Later on, in July 2022, the Saudi Exchange Tadawul launched single stock futures (SSFs) contracts. The SSF contracts are based on the most liquid companies listed on Tadawul, namely, Saudi Aramco, Saudi National Bank, SABIC, STC, Al Rajhi Bank, Alinma Bank, Saudi Kayan, Saudi Electricity Co., Almarai, and Saudi Arabian Mining Co. Moreover, in line with vision 2030, the Saudi Exchange Tadawul has plans to launch American-style single stock options and index options.

There is a broad literature around the impact of introducing derivatives in developed countries; however, we chose to focus on particular areas to keep the task manageable. Our research paper reviews literature that focuses on the impact of derivatives markets on the spot market liquidity, spot market volatility, the process of price discovery, and the overall economic development, with a particular concentration on introducing the derivatives market in Saudi Arabia. This survey contributes to the literature by reviewing the impact of introducing the derivatives market on the underlying spot market in emerging economies, and Saudi Arabia in particular.

The research paper is organized as follows: In section 2, we review the existing literature, while in Section 3, we concentrate on the

introduction of derivatives markets in Saudi Arabia; finally, in Section 4, we conclude the research paper.

2. REVIEW OF LITERATURE

Derivatives trading and its impact have always attracted the interest of academicians, investors, and policymakers. The finance literature around the impact of derivative trading on the underlying stock market and the overall financial system shows mixed results. One of the main objectives of using derivatives is to hedge against potential risk. Risk management contributes to a stronger and more efficient economy, and without it, the economy will not grow to its potential. Derivatives play a crucial role in risk management; it allow investors to hedge against potential losses and price volatility. Derivatives can be used to reduce various types of risks, such as risks that are associated with fluctuation of interest rates, commodity prices, and changes in foreign exchange rates. Gómez-González et al. (2012) investigate the impact of hedging on the market value of Colombian firms. They report a significant positive relationship between the market value of firms and the usage of derivatives. Their dataset incorporates information on large non-financial firms in Colombia. They state that the "growth rate in Tobin's Q depends on the firm size and hedging." They conclude that hedging contributes to an increase in Colombian firm's value. On the other hand, Coutinho et al. (2012) examine the effects of using derivatives on the cost of equity in firms in Brazil. They report a positive relationship between using derivatives to manage risk and the weighted average cost of capital.

Tanha and Dempsey (2017) investigate the usage of derivatives in the gulf cooperation council (GCC) countries, where they rely on oil production and its U.S. dollar market price. In their study, they investigated the application of derivatives by firms in the region and they relied on international accounting standards IFRS 7. They indicate that the primary motivation to hedge is facing risks such as foreign exchange risk, interest rates risk, commodity prices risk, and equity risk. The results show that using derivatives has a positive relationship with the firm size and leverage ratio and a negative association with the growth ratio.

In terms of the impact of derivative trading on the underlying stock market, currently, there is no complete consensus among researchers. As for the volatility of the underlying stock market, there are controversies among researchers. Usually, the futures market has a higher leverage and lower trading costs, and researchers argue that the futures market attracts uninformed traders, which will create "noise." The noise can be transferred to the spot market, thus increasing volatility. On the other hand, others support the view that the futures market could decrease volatility. The futures market attracts informed traders, and prices will reflect new information faster. According to Karpoff (1987), a large body of existing research reports a positive correlation between the volatility of the underlying spot market, futures market, and trading volume. Gulen and Mayhew (2000) investigate the volatility of the underlying stock market before introducing index futures and after the introduction in twenty-five countries. They use models that examine "asynchronous data, conditional heteroskedasticity, asymmetric volatility responses,

and the joint dynamics of each country's index" and compare it against the world-market portfolio. They find that the volatility of the underlying stock markets in the United States and Japan has increased due to futures trading. However, in the remaining countries under examination they report either a decrease in stock market volatility or insignificant effects.

Chen et al. (2013) provide similar results; they investigate the volatility of the underlying asset market before and after introducing index futures in China. Using a panel data approach, their results suggest that the Chinese underlying stock market volatility is reduced significantly after introducing index futures. On the other hand, Bae et al. (2009) investigate the volatility of the spot market in Korea after introducing index futures. They examine the effect of KOSPI 200 contracts on the spot price volatility. They report an increase in market efficiency with futures trading. Moreover, their results show an increase in the volatility of the Korean stock market after introducing KOSPI 200 index futures contracts. Singh and Tripathi (2016) examine the volatility of the Indian stock market (SENSEX) before and after the introduction of futures contracts. By using the GARCH (1, 1) model, their results indicate that the introduction of futures contracts led to a significant decrease in the volatility of the Indian stock market, the SENSEX index.

Gürbüz and Şahbaz (2022) investigated the volatility spillover between the derivatives market represented by BIST 30 index futures and the stock index represented by BIST 30 index. They used a multivariate GARCH model and wavelet methods. Their data set incorporates information from Borsa İstanbul (BIST). They report that futures contracts contribute to price discovery in the underlying spot market. They find that the volatility in the derivatives market can impact the volatility of the underlying spot market. The trading of BIST 30 index futures increased the volatility in BIST 30 index. Moreover, they report that the derivatives market does not have a stabilizing influence on prices due to the lack of financial deepening in Turkey. They add that merely the presence of informed traders, such as professional investors in the derivatives market, would help in the financial deepening and contribute to pricing power. They suggest that raising awareness of derivatives among inexperienced investors is a necessity.

Kuo et al. (2015) analyse a unique dataset from the Taiwan futures exchange. The paper studies the effects of individual and institutional investors' futures trading on the market volatility and on the futures returns. Their results show that individual investors lack accuracy in their forecasting and that their trading raises market volatility. However, institutional investors trading reduces the market volatility and can forecast returns more accurately. Their evidence supports the claim that institutional traders are informed while individual traders are merely noise traders.

Due to lower transaction cost and trading restrictions, the derivatives market attract hedgers, speculators, and arbitrageurs, which will enhance the market efficacy. According to Rauterberg et al. (2018), informed traders' activities help stock prices become more accurate and enhance capital allocation. However, informed trading reduces the market liquidity. Regarding liquidity, there is considerable debate in the academic literature as well. Empirical

evidence in several studies shows that introducing a futures market can increase the underlying spot market efficiency and trading volume. Several studies argue that introducing derivatives markets contributes to higher liquidity of the underlying assets and can lower transaction costs. Several studies have indicated a positive impact on liquidity after introducing futures contracts. (Roope and Zurbrugg, 2002; and Chance and Brooks, 2013) Support the argument that derivatives can increase the liquidity of the underlying spot market and lower the transaction costs. On the other hand, other researchers contradict this view. For example, Narasimhan and Kalra (2014), examine derivative trading and investigate its effects on the underlying stock market liquidity in India. The study suggests that the introduction of derivatives influenced the liquidity level negatively. This view is supported by Narasimhan et al. (2012), who suggest that the stock market liquidity declines after introducing the derivatives market.

Regarding price discovery the derivatives market is critical to price discovery since it is an important source of information. Prices of futures and forwards are used to determine the expected spot price of the underlying asset. The prices in the spot market reflect all new information in an efficient way; and they are led by the prices in the derivatives markets. The derivatives market reflects the new information first, and the information flows to the spot market. According to Wahab and Lashgari (1993), several factors play a key part in making the futures market essential to the price discovery process, for example, short selling, high liquidity, low transaction costs, and leverage.

According to Atilgan et al. (2016), the derivative market acts as a vital source of information about future price trends. The market provides a price discovery mechanism since prices of futures and forwards reveal information about the expected future spot price. In turn, this will help in the process of predicting the expected rate of return of the underlying assets. The researcher adds that the implied volatility in options markets delivers information about the risk. On the same topic, Ryu (2015) analyzes information about futures and options trades. They investigate derivatives based on the KOSPI 200 index in Korea. They analyze a unique data set that includes information on types of investors and directions of trade. By using a simple regression model, their results suggest that futures trading has a higher contribution to price discovery when compared to options trading.

Other studies have shown that futures trading contributes to price discovery more than options trading. Hsieh et al. (2008) examine the influence of trading derivatives instruments on price discovery in Taiwan. They compare the rate of price discovery in index futures and index options. Using a put-call parity approach, they find that both futures and options contribute significantly to the price discovery. Yet, futures contracts have a more significant influence. This view is supported by Narasimhan et al. (2012), who suggest that the stock market liquidity declines after introducing the derivatives market.

3. SAUDI ARABIA'S EXPERIENCE

Table 1 shows trading statistics in the Saudi derivatives market between 2021 and 2022. Table 2 shows the trading statistics in the

Saudi stock market during the years 2021 and 2022. Table 1 shows that the current derivatives market liquidity increased. However, despite the increase, the liquidity level is still very low, particularly when compared to similar markets. Usually, the trading value in the derivatives market matches the equity trading value. Based on Tadawul statistical reports, the total value of instruments traded in 2022 reached SAR 91,612,030.00 compared to SAR 44,908,650.00 for the previous year, 2021. While in the equity market, the total trading value of shares reached SAR 1,708.04 billion in 2022 compared to SAR 2,235.90 billion in the previous year, 2021. When we look at the volume traded in the equity market, it is evident that in 2022, it reached 45.11 billion shares traded compared to 68.51 billion shares traded during the year 2021.

Moreover, one can notice that the volume traded, value traded, and the number of trades increased over time in the derivatives market, yet it is still low. Such a low level of liquidity is expected since the market launch was just in 2020. The market participants need time until they gain knowledge and learn about the new instruments introduced.

The success in the derivatives market is driven by many factors, such as price volatility, the need to hedge, contract design, lower trading costs, and most importantly, liquidity. As for the contract design, the Saudi Exchange launched small-size contracts that are based on stocks with large market size, higher volatility, and higher liquidity.

Regarding derivatives market liquidity, it is a crucial element to the success of the derivatives market. There are many factors that influence exchange-traded derivatives market liquidity. Derivatives

Table 1: Derivatives trading statistics

Fiscal quarters	Volume traded	Value traded (SAR)	No. of trades
1 st Quarter 2021	84	SAR 10,128,200.00	7
2 nd Quarter 2021	81	SAR 11,153,600.00	4
3 rd Quarter 2021	87	SAR 13,058,850.00	7
4 th Quarter 2021	65	SAR 10,568,000.00	4
Total	317	SAR 44,908,650.00	22
1 st Quarter 2022	265	SAR 45,314,750.00	17
2 nd Quarter 2022	187	SAR 32,607,000.00	16
3 rd Quarter 2022	301	SAR 4,548,430.00	25
4 th Quarter 2022	225	SAR 9,141,850.00	7
Total	978	SAR 91,612,030.00	65

Source: Tadawul annual statistical report

Table 2: Equity trading statistics

Fiscal quarters	Volume traded	Value traded (SAR)	No. of trades
1 st Quarter 2021	22,307,764,345.00	SAR 697,255,144,341.54	27,594,834
2 nd Quarter 2021	20,810,846,490.00	SAR 642,004,625,024.89	24,598,767
3 rd Quarter 2021	12,533,801,705.00	SAR 446,819,006,910.61	18,666,368
4 th Quarter 2021	11,882,350,513.00	SAR 449,821,464,399.68	21,006,437
Total	67,534,763,053.00	SAR 2,235,900,240,676.72	91,866,406
1 st Quarter 2022	13,640,989,829.00	SAR 542,812,901,670.04	23,639,508
2 nd Quarter 2022	12,202,411,812.00	SAR 494,966,473,991.19	23,333,654
3 rd Quarter 2022	9,684,918,553.00	SAR 363,097,395,917.11	20,875,349
4 th Quarter 2022	9,582,068,890.00	SAR 307,163,446,346.05	20,050,511
Total	45,110,389,084.00	SAR 1,708,040,217,924.39	87,899,022

Source: Tadawul annual statistical report

market liquidity is affected by factors such as spot market volatility, spot market liquidity, size, and investors' knowledge. As for spot market liquidity and size, the Saudi stock exchange, Tadawul, is the largest and most liquid stock market in the MENA region (Mensi et al., 2015). According to Tadawul annual statistical report, the total market capitalization in 2022 reached SAR 9,878.10 billion, compared to SAR 10,009.15 billion in 2021.

When we look at the spot market volatility, emerging markets generally can be highly volatile. It is assumed that markets with higher volatility exhibit more active trading in derivatives markets. According to Hung et al. (2011), a larger spot market with higher volatility contributes to the success of the futures contract, which will ultimately contribute to the success of the derivatives market.

Table 3 reports the stock price volatility between 2000 and 2021. According to the data obtained from the World Bank, the stock price volatility in Saudi Arabia in the year 2021 equals 17.71%. Saudi Arabia yielded an average of 22.09% between 2000 and 2021, reaching as high as 46.06% in 2007. Individual and inexperienced investors dominate the Saudi stock market. Alenezy (2021) states that the Saudi stock market exhibits high volatility due to a "lack of information, stochastic trading, and unprofessional financial analysis." According to Alshammari et al. (2020), Tadawul all share index TASI had a high level of fluctuation between 2011 and 2019.

Moreover, Saudi Arabia initiated a series of economic reforms; for example, international investors were allowed to trade in 2015, while in 2018, the market started implementing the law of foreign investors. In 2019, foreign investors trading in the market climbed by 163.7%. The Saudi derivatives market is still small, and the path is still far, and continued development is crucial. Currently, the futures market in Saudi Arabia is dominated by institutional investors because individual investors do not have adequate knowledge to participate in the market. Increasing awareness among individual investors about the market and its products is vital.

Since we have analysed the liquidity of the derivatives market and compared it against the stock market, it is useful to analyze GDP growth in Saudi Arabia in the years after introducing the derivatives market.

Table 4 shows growth in GDP, % change in stock market capitalization, and % change in trading value of futures in Saudi

Table 3: Stock price volatility between 2000 and 2021

Year	Price volatility	Year	Price volatility
2000	12.90	2011	20.30
2001	11.58	2012	19.23
2002	12.81	2013	13.80
2003	16.68	2014	11.76
2004	22.41	2015	21.81
2005	23.36	2016	24.60
2006	37.25	2017	17.89
2007	46.06	2018	12.94
2008	34.98	2019	14.47
2009	40.98	2020	20.66
2010	31.84	2021	17.71

Source: World bank

Table 4: Growth in GDP, stock market capitalization, and derivatives

Year	GDP growth	% change in market cap	% change derivatives
2021	3.92%	9.97%	59.48%
2022	8.74%	-1.31%	104.00%

Source: World bank

Arabia. The table shows that derivatives have experienced an enormous change in Saudi Arabia since its inception. The value traded increased by 104% in the year 2022. As for GDP growth, Saudi Arabia's GDP growth rate reached its highest on record during 2022, recording an 8.4% growth rate. Factors such as new policies adopted, financial reforms, and the Saudi Vision program, including the financial sector development program, have all contributed to such a high growth rate in GDP.

4. CONCLUSION

The derivatives market is an essential part of the global financial market. It is crucial in enhancing capital flow, risk management, effective capital allocation, price discovery, and price stability. Introducing the market in Saudi Arabia will contribute to the development of capital markets and promote Saudi Arabia's economic growth. Saudi Arabia's economy depended mainly on oil exports between 1995 and 2015, which left the country vulnerable to fluctuations in energy prices. However, the "Vision 2030" launch made Saudi Arabia less dependent on oil prices. However, the path is still far. Introducing the derivatives market is part of the Vision 2030 financial sector development program to promote an advanced capital market.

Saudi Arabia's derivatives market exhibits a low level of liquidity. However, this is not a big concern since the market launch was just in 2020. Based on Tadawul statistical reports, the total value of instruments traded in 2022 reached SAR 91,612,030.00 compared to SAR 44,908,650.00 for the previous year, 2021. Institutional investors dominate the derivatives market in Saudi Arabia, while individual investor lacks sufficient knowledge to participate effectively and successfully. Individual investors need time until they gain experience. Increasing awareness about the market and its products is vital.

The literature on the impact of introducing the derivatives market in Saudi Arabia is scarce. However, we review the existing literature

that explores the derivative markets' impact on the underlying stock market. Derivatives are used by financial institutions, non-financial institutions, professional investors, and individuals. These parties use derivatives markets for different purposes. The main reason for using derivatives is risk management, for example, to hedge the risk of an exposed position, and they can also be involved in speculating and arbitraging if the opportunity arises.

The finance literature on the impact of derivative trading shows mixed results. In terms of the volatility of the underlying spot market, there is no consensus among researchers. In countries such as the United States and Japan, derivative trading led to increased volatility. However, in other countries, such as China, derivatives trading has led to decreased volatility. As for price discovery, the derivative market is a vital source of information about future price trends. The derivatives market attracts hedgers, speculators, and arbitragers, which will enhance the market efficacy. As for liquidity, empirical evidence in several studies shows that introducing a futures market can increase the underlying spot market efficiency and trading volume. Introducing derivatives markets contributes to higher liquidity of the underlying assets and lower transaction costs.

We conclude that it is evident that the Saudi derivatives market has all the elements that support the market's success. This survey is helpful to policymakers and investors as well.

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