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Effect of Unemployment and Inflation on Capricious Behavior of Stock Exchange: Empirical Study of Saudi Stock Exchange TADAWUL

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ABSTRACT

We examined the relationship between Saudi Arabian stock exchange returns (TADAWUL) and macroeconomic variables of the Saudi economy in this study. Our analysis employs descriptive and regression methods on quarterly data set of five-year to determine the relationship between TADAWUL and two macroeconomic variables, the unemployment rate and the inflation rate. Stock markets play a crucial role in economic growth and development. It is extremely important to look for factors that determine stock market development and effect significantly on its volatility. It proves to be helpful for policy makers and investors to make wise decisions during situations that usually create market turbulence. Most of the studies elaborate that there is no worldwide consensus regarding the factors that determine stock market development and its fluctuations. Therefore, it is extremely important to look for factors that affect significantly on its volatility. We also recommended that researchers must forecast the leftover macroeconomic variables too in the future studies.

KEYWORDS: stock market volatility, inflation rate, unemployment rate, time series models.

JEL Codes: E02, E24, E31, E32, E44,

1. INTRODUCTION

Stock markets provide investors with the opportunity to purchase and sell shares, bonds, and debt instruments. Economic development depends on it, and it plays an influential role in the economy. The volatility of a security or Market Index, however, is a measurement of how dispersed the returns are over time. There is typically a higher risk associated with a security that has higher volatility. (Yadav, 2017) International markets have become more turbulent over the past 3 decades as a result of financial liberalization and economic opening, and this phenomenon has increased interest in the study of market volatility and the factors that influence more to it, directly or indirectly. A well-developed stock market increases capital accumulation and facilitates better distribution of resources, contributing to economic growth. A majority of empirical research indicates that equity markets play a key role in economic growth and development. There has been much discussion of the importance of developing stock markets among scholars and scientists. In most academic studies, stock markets play a crucial role in economic growth and development. However, there is no worldwide consensus regarding the factors that determine stock market development and its fluctuations. Therefore, it is extremely important to look for factors that determine stock market development and effect significantly on its volatility.

In this study we are trying to establish a relationship between Stock Market Volatility and two macro-Economic variables like Inflation rate and Unemployment rate with relation to Saudi Arabia Stock Exchange (TADAWUL), as Saudi Arabia's sole stock exchange is the largest stock exchange in the Middle East. Some of the major players of the Saudi Arabian Stock Exchange are Saudi Arabian Oil Company (Saudi Aramco), Al Rajhi Banking and Investment Corporation, Saudi Basic Industries Corporation (Sabic), National Commercial Bank, Saudi Telecom Company (Stc), Saudi Electricity Company, Saudi Arabian Mining Company (Ma'aden), Riyad Bank Etc. Due to the Federal Reserve's involvement in preserving the stock market, the unemployment rate affects stock prices. When unemployment is high, the Federal Reserve lowers interest rates and purchases markets assets. Fed decreases interest rates in order to lower the unemployment rate for borrowers and businesses. People spend more money when interest rates are low. This situation simply leads to increase in demand for goods and services, which in turn creates more jobs. Resultant lower unemployment indicates a healthy and vibrant economy. Investors purchase assets in a healthy economy because they assume demand will

increase. So long as the economy continues to grow at a steady pace, the Federal Reserve will remain hands-off. In case of Saudi Arabia, according to the Saudi Arabian Monetary Authority, the Saudi Riyal remains fixed at a rate of 3.75 SAR versus the US dollar. For a reasonable spread, SAMA keeps its interest rate above the Fed's target rate. Saudi Arabia has enjoyed the peg for more than three decades, since the economy is driven by government expenditures, which are primarily financed by oil revenue. Saudi Arabia's monetary policy aims to preserve fixed exchange rates and monetary stability by controlling short-term interest rates, managing liquidity, and using macro prudential tools. Having high inflation on the other hand, may be beneficial for job growth, since it can encourage some job creation. As a result of high inflation, corporations often fear the future and cease hiring, reducing standard of living for individuals, particularly those on fixed incomes. This leads to a reduction in corporate profits and a decrease in profits for individuals. The inflation rate seems to impact the economy and stock prices differently, which can be confusing for investors. It is difficult for individual investors to make wise decisions about how to invest in periods of inflation since there is no one right answer. It is common for certain types of stocks to perform better during periods of high inflation. These are the reasons due to which macroeconomic players like unemployment rate or inflation rate become small influencers for the stock market volatility in Saudi Arabia.

2. LITERATURE REVIEW

Numerous academics have looked at the connection between stock market volatility and the volatility of macroeconomic variables from various angles. There has been a significant amount of work put into monitoring and modelling stock market volatility. Finance literature is continually improved by in-depth discussions about market volatility, which illustrates how emerging and developed stock markets respond to macroeconomic updates and how market participants are likely to adhere to the significance of any announcement of changes in policy and economic data. These studies, it is stated, were carried out in many societies and economies. There is still disagreement on how macroeconomic variables' volatility affects stock market volatility. However general issues covered by several research are taken into consideration here, including the impact of various variables like Inflation, Risk, National holidays, Unemployment etc on Stock returns of TADAWUL and Vice Versa.

In a study Fahad Sayyaf Alsharari investigated the Tadawul-led Saudi stock market's seasonality and volatility. It was noticed that Predictive models and frameworks have a limited degree of validity due to low market efficiency. Saudi Arabia is not an exception to the seasonality and volatility caused by Islamic holidays that are prevalent in other Islamic countries. The Tadawul trade day closure (Wednesday) has a definite impact on volatility. These impacts are typically heavily influenced by other variables. Research still has a lot to learn about the seasonality and volatility of the Saudi stock market.(Alsharari, 2022)

During the Saudi Arabia stock market returns study, Jumah Ahmad Alzyadat, Ala'a Adden Abuhommous & Huthaifa Alqaralleh investigated the presence of conditional volatility. These indices cover the Saudi stock exchange (Tadawul) from September 2017 to September 2020. Before the COVID-19 pandemic, there was evidence of an inverted asymmetric effect. While the health crisis began, there was strong evidence of news effect. (Alzyadat et al., 2021)

Mohamed Sayed Abou Elseoud &Ali Abdulla Haji conducted a study about the stock markets of the Gulf Cooperation Council, the study attempts to investigate the characteristics of conditional volatility. The research was conducted between January 5, 2010, and December 31, 2019. The leverage effect, which states that negative shocks or bad news have a bigger impact on subsequent period volatility than positive shocks or good news, is strongly supported by asymmetrical GARCH models (Elseoud & Haji, 2021).

Further, Tariq S. ALSHAMMARI, Mohd T. ISMAIL, Sadam AL-WADI, Mohammad H. SALEH & Jamil J. JABER by analysing the Saudi Arabian stock market (Tadawul) and daily closing price index data from October 2011 to December 2019, in an empirical study attempts to model and improve the predicting accuracy of the volatility pattern. The study's main findings indicate that a new forecasting model will be offered along with an explanation of every prior event that occurred during the time period under consideration. (Alshammari et al., 2020)

In their study whether there is interaction and volatility between the stock return variances in the Saudi market Alotaibi, Abdullah R and Mishra& Anil V examined the sample comprising daily stock prices for five industries from 2011 to 2016: transportation, banking, basic commodities, and services (SABIC, Al Rajhi, Etisalat, Almarai). The analysis's findings indicate that although there are extremely modest variations in stock returns as a result of their interaction, internal factors are more likely to account for variations in stock market outcomes.(Eltahir et al., 2019)

Added to that Murya Habbash & Lara Haddad have found that Middle East and Arab region's first empirical proof of a favorable relationship between EM and CSR is originated in Saudi Arabia. The authors discover that CSR is positively and substantially connected to EM practices as proxied by discretionary accruals using panel data from all Saudi public enterprises listed on the Saudi Stock Exchange. It follows that Saudi companies that engage in CSR initiatives are more likely to manipulate their profits. (Habbash & Haddad, 2019)

Also Rahman Shaika & Abdul Malik Syeda studied the relationship between risk and return and found that is a crucial idea in finance. Risk and stock market volatility are closely related. Because of this, it is easy to accurately represent the volatility of the Saudi stock market using intraday data. The asymmetric results imply that negative shocks may not necessarily predict future volatility.(Shaik & Syed, 2019)

In the context of petrochemical industries, Naseem Al Rahahleh & Robert Kao argue that the Asymmetric Power of ARCH (APARCH) model is the most accurate method for forecasting TASI and TIPISI volatility. Traders, policymakers, and international investors can use the results of this model to forecast the risks associated with investing in the Saudi stock market. (Al Rahahleh & Kao, 2018)

Gabriel Chodorow-Reich & Loukas Karabarbounis Studied about the Public benefits and lost non-working time consumption value make up the flow opportunity cost of switching from unemployed to employment. They observed that, Over the course of the business cycle, the opportunity cost is procyclical and fluctuating. In comparison to what is seen in the statistics, top models of the labor market are predicted to have far lower unemployment volatility. (Chodorow-Reich & Karabarbounis, 2016)

Dr. Sahar & M. Mahran examined several trader types and their activities on the Saudi stock exchange. According to the results, there are significant differences in how traders act when prices go up or down and when they lose money. 86% of traders encounter losses, compared to 14% of traders who do not. (Mahran, 2014)

Lakshmi Kalyanaraman states that Financial economics has mostly focused on the study of stock market volatility. It shows that the volatility of the nation's stock market may be estimated using a linear symmetric GARCH (1, 1) model. The findings offer important guidance for investors and treasury managers making decisions on asset allocation and risk management strategies on the stock market of Saudi Arabia. (Kalyanaraman, 2014)

Jamel & Jouini investigated the relationships between the price of crude and the Saudi stock markets between 2007 and 2011. They observed for returns, the spill over effects from oil to some sectors are unidirectional, while they are bidirectional for volatility patterns. The results are highly interesting and have significant policy-related ramifications for investors, market players, and investors. (Jouini, 2013)

Bashar Abu Zarour & Costas P Siriopoulos investigates the existence of a volatility decomposition in daily index returns data for nine emerging Middle Eastern markets using Engle and Lee's permanent-transitory component variance model (1993). The presence of a transitory component to volatility supports the existence of a component structure to volatility. According to residual testing, Saudi Arabia, Jordan, and Oman were able to totally capture all structure within the data, however Oman and Jordan still have some structure. (Zarour & Siriopoulos, 2008)

The above discussion suggests that different macroeconomic variables behave differently, and the nature of their relationships varies from one element to another. Despite extensive research on Tadawul's volatility, there is still more to learn about many of these elements. Through our research objectives, we tried to focus more on two macro-economic variables ‘Unemployment rate’ and ‘Inflation Rate’ to examine their influence on Tadawul.

OBJECTIVES OF THE STUDY

1. To investigate the general behavior and volatility of Stock market of Saudi Arabia.
2. To investigate the relationship of unemployment rate with stock returns in Saudi Arabia.
3. To investigate the relationship of inflation with stock returns in Saudi Arabia.
4. To open new vista for further research.

DATA AND METHODOLOGICAL ISSUES

To formulate our working methodology, we combined time series analysis and literature analysis. This paper examines the behavior of Saudi stock market (TADAWUL) from a statistical perspective in relation to country’s

rate of unemployment and rate of inflation. Here we are using quarterly data from 2017 to 2022 published by General Authority for Statistics (GASTAT), Saudi Arabia (Annexure 1). First, we checked the distributional properties of our dataset with the help of descriptive analysis, using E-View software. As part of the descriptive analysis, we calculate Mean, Median, Mini-Max, Standard Deviation, Skewness, Kurtosis, Jarque-Bera, and Probability, etc.(Khan, 2021). Then after assuring the normality of data we applied Regression analysis to investigate how much dependent variable "TASI" (TADAWUL all share Index) is can be affected by the independent variables "Unemployment rate" and "Inflation Rate".

$$X = \alpha_0 + \beta_1 Y_1 + \beta_2 Y_2$$

Where X is dependent variable TASI

Y_1 is independent variable Unemployment Rate

Y_2 is independent variable Inflation Rate

α is the value of intercept

β_1 and β_2 are the slopes of independent variables

Hypothesis

In this study, there are two null hypotheses (H0):

1. There is no relationship between returns in Saudi Arabia Stock Exchange (TADAWUL) and unemployment rate in the country. Increase or decrease in unemployment rate of the country has nothing to do with TASI.
2. There is no relationship between returns in Saudi Arabia Stock Exchange (TADAWUL) and inflation rate in the country. Increase or decrease in inflation rate have no impact on TASI.

In light of the null hypothesis we may frame our below alternative hypotheses (H1):

1. Saudi Stock exchange is too much integrated with rate of unemployment in the country.
2. Saudi Stock exchange is also strongly integrated with rate of inflation.

3. FINDINGS AND ANALYSIS

Descriptive Analysis

Based on our dependent and independent variables, Table 1 provides descriptive statistics. As of this point, we have used our collected data in its original form. Positive skewness is present in all independent variables. A high value of Kurtosis indicates that unemployment is leptokurtic (long tail or higher) based on kurtosis statistics (greater than 3). As TASI and Inflation have a lower value of Kurtosis (less than 3), they are platykurtic (short tailed). According to the Jarque-Bera test, the variables are normally distributed. Probability results also support this claim as all variables have P values greater than 5%

Table 1

Descriptive Statistics

	TASI	Inflation	Unemployment
Mean	9226.740	1.545455	12.318180
Median	8568.000	1.100000	12.550000
Maximum	13162.300	6.000000	15.400000
Minimum	6599.100	-2.100000	9.700000
Std. Dev.	1835.909	2.388609	1.283832
Skewness	0.619729	0.554535	0.316891
Kurtosis	2.199659	2.366939	3.888214
Jarque-Bera	1.813999	1.494902	1.091387
Probability	0.403734	0.473572	0.579440
Sum	184534.8	34.00000	271.0000
Sum Sq. Dev.	64040665	119.8145	34.61273

Note: E-View calculation

Regression Analysis

(H0: No correlation between dependent and independent variables)

As seen in Table 2, the standard error provides us with a measure of the variability in the estimation of slope coefficients. T-statistics calculates the standard deviation of a coefficient from zero. In this scenario, H0 is

rejected for the dependent variable TASI and the independent variable unemployment as t-statistics are greater than 2 and the p-value is less than 0.05. When it comes to TASI and inflation, H0 is accepted as the t-statistic is less than 2. If the p-value is greater than 0.05, it indicates less confidence in rejecting the null hypothesis for that variable. The R-square value for independent variables is 57.5%, and the adjusted R-square is 52.2%, proving that the model possesses high predictive accuracy. It is evident from the F-statistic (10.83849) and its p-value (0.001058) that the explanatory variables are indispensable for explaining the variable. Additionally, the Durbin-Watson statistic (1.580806) confirms a positive autocorrelation.(Khan, n.d.)

Table 2

Regression Analysis

**Dependent Variable: TASI*

*** Included observations: 19 AFTER ADJUSTMENT*

Variables	Co-efficient	Std. Error	t-Statistic	Prob.
C	20865.68	2637.796	7.910270	0.0000
UNEMPLOYMENT	-985.1181	215.3493	-4.574512	0.0003
INFLATION	165.4828	121.2113	1.365242	0.1911

R-squared	0.575338	Mean dependent var	9106.279
Adjusted R-squared	0.522255	S.D. dependent var	1803.184
S.E. of regression	1246.345	Akaike info criterion	17.23776
Sum squared resid	24854023	Schwarz criterion	17.38688
Log likelihood	-160.7587	Hannan-Quinn criter.	17.26300
F-statistic	10.83849	Durbin-Watson stat	1.580806
Prob(F-statistic)	0.001058		

Note: E-View calculation

Hypothesis Results

	Hypothesis of the study	Dependent Variable	Independent Variable	Result	Evidence
H0	1. There is no relationship between returns in Saudi Arabia Stock Exchange (TADAWUL) and unemployment rate in the country. Increase or decrease in unemployment rate of the country has nothing to do with TASI.	TASI	Unemployment	Rejected	Value of t-Statistic is greater than 2 i.e. **4.574512** Value of probability is lesser than 0.05 i.e **0.0003**
	2. There is no relationship between returns in Saudi Arabia Stock Exchange (TADAWUL) and inflation rate in the country. Increase or decrease in inflation rate have no impact on TASI.	TASI	Inflation	Accepted	Value of t-Statistic is lesser than 2 Value of probability is greater than 0.05
H1	1. Saudi Stock exchange is too much integrated with rate of unemployment in the country.	TASI	Unemployment	Accepted	Value of t-Statistic is greater than 2 i.e. **4.574512** Value of probability is lesser than 0.05 i.e **0.0003**
	2. Saudi Stock exchange is also strongly integrated with rate of inflation.	TASI	Inflation	Rejected	Value of t-Statistic is lesser than 2 Value of probability is greater than 0.05

4. CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

Overall, the unemployment rate is important as a measure of the economy's health and has a substantial impact on the stock market. Increasing unemployment will result in lower stock prices, as well as goods and services, as there will be less demand for them. Investors should pay close attention to fluctuations in unemployment rates and take action as necessary. The findings of this paper reveal that Rate of unemployment is a significant reason for the fluctions in stock exchange of Saudi Arabia. Rate of Inflation is not found as such a good regressor.

It is possible to expand this study to include a number of distinct areas and reach more comprehensive conclusions. Studies of foreign exchange reserves and oil prices can provide insight into the factors affecting the stock market. Researchers can also test the relationship of various variables and performance of stock market by conducting a regional study on the MENA region, OPEC countries, EU countries, etc. It may also be possible to study in depth the reasons why the stock market does not seem to have any causal relationship with macroeconomic variables. According to many previous studies, the stock market is related to economic growth. This relationship should lead to changes in macroeconomic variables. However, the absence of this causal relationship leaves a huge question mark. There will be much interest in the research findings on this topic among practitioners and decision makers, especially in developing countries, since these findings can improve their economies.

As no research is completely flawless or comprehensive, even our study confined itself to two macroeconomic variables namely unemployment rates and inflation rates. Due to time constraints and limited access to data, it could not approach other variables like GDP, Interest rates, Economic Growth rate, and national income, especially oil prices and oil revenues in Saudi Arabia. Tadawul is also a relatively new stock market, so the developed frameworks seem to be limited in their applicability.

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ANNEXTURE I

Time Period	TASI Index (A)	Unemployment Rate (B)	Inflation Rate (C)
Q1, 2017	NA	12.7	-0.3
Q2, 2017	NA	12.8	-0.6
Q3, 2017	NA	12.8	-0.2
Q4, 2017	7195.7	12.8	0.1
Q1, 2018	7887.8	12.9	2.9
Q2, 2018	8341.3	12.9	2.3
Q3, 2018	8054.9	12.8	2.2
Q4, 2018	7816.2	12.7	2.4
Q1, 2019	8794.8	12.5	-2.1
Q2, 2019	8866.4	12.3	-1.6
Q3, 2019	8031	12	-1.1
Q4, 2019	8412.9	12	-0.1
Q1, 2020	6599.1	11.8	1.1
Q2, 2020	7338.9	15.4	1
Q3, 2020	8341.3	14.9	6
Q4, 2020	8723.1	12.6	5.6
Q1, 2021	9916.5	11.7	5.3
Q2, 2021	11038.2	11.3	5.7
Q3, 2021	11563.3	11.3	0.4
Q4, 2021	11276.9	11	1.1
Q1, 2022	13162.3	10.1	1.6
Q2, 2022	11658.7	9.7	2.3
Q3, 2022	11515.5	NA	NA
Q4, 2022	NA	NA	NA
Source A: Trading economics.com, Central Department of Statistics and Information, Saudi Arabia Source B, D: Estimated data from Labor force statistics (LFS)- General Authority for Statistics (GASTAT) Source C: Inflation Reports SAMA, General Authority for Statistics (GASTAT)			