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Does Stock Market Performance Affect Economic Growth?

Empirical Evidence from Saudi Arabia

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Abstract

The main goal of this research paper is to investigate the impact of real stock prices on real economic activity in the Saudi Arabian economy. To do so, we utilize various econometric techniques consisting of cointegration and Granger (1969) causality tests to assess such relationship by using quarterly observations spanning from 2010:Q1 to 2018:Q4. The empirical analysis that was carried out indicates the presence of a significant cointegrating relationship between these two variables; in other words, stock prices have a significant impact on real economic growth. This was also confirmed by a Granger causality test showing that changes in stock prices are able to predict changes in economic growth.

Keywords: Stock Market; Economic Growth; Causality; Co-integration; ECM; Saudi Arabia.

JEL Classification Code: C01; C22; C58; E00; G00; G10; G11.

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1. Introduction

Stock market prices play an important and necessary role in the economy, and perhaps even be a leading indicator to economic growth according to fundamental studies such as in Fama (1981, 1990), Geske & Roll (1983), Schwert (1990), and Barro (1990). Arguably, traditional theories of finance indicate that higher stock prices are considered to be an incentive or stimulus for firms and households participating in stock markets. Those theories suggest that stock markets can essentially be seen as an indicator of the general state of the economy by which stock performance influences the real economy through a confidence channel. Higher stock prices can lead to higher confidence and possibly reduce the uncertainty of firms and households regarding future economic condition. In addition to that, better stock market performance induces higher expected profits, and ultimately as a result, this increase internal finances that are available for investments.[2] Therefore, economists and financial market experts put much effort in order to understand the transmission channels of stock prices in the real economy from theoretical perspectives. For instance, Tobin (1969) came up with "Tobin's Q", which is a coefficient or ratio illustrating the impact of a share current

[2] Higher internal financing plays an important role when external finance is not available or is only available at a high cost.

market value on the cost of replacement capital. A High Tobin's Q indicates high investment expenditures, which lead to high aggregate economic output, since firms can finance their investment projects more easily with a high share price. Alternatively, Modigliani (1971) initiated a theory illustrating how the stock market influences real economic activity via the consumption channel. According to this theory, stock market performance might influence consumption as one of the key channels affecting real economic activities given that a good performance or higher stock value increases the households' wealth or permanent income, which in turn will lead the households to re-adjust their consumption level. In addition, Gertler & Bernanke (1989), and Kiyotaki & Moore (1997) introduced the financial accelerator theory, which supports the strong linkage between stock markets and real activity. The theory of the financial accelerator focuses on how a firm's stock price affects its balance sheet. Given the presence of asymmetric information in the credit markets, a firm's ability to borrow money will depend highly on the collateral put forth by firms on its obtained loans. The firm's collateral value might appreciate in scenarios where its stock value appreciates. A higher collateral value will lead to higher credits used for investment purposes, which will lead to an expansion of real economic activity.

These fundamental theoretical grounds in turn have encouraged some economists and financial experts to test such theories on various economies across the globe. There is a vast literature assessing empirically, through the application of various econometric techniques, whether changes in overall stock market performance influence real economic activity. The conclusion of the empirical literature tends to have mixed results; while some research (e.g. Fama 1981, 1990; Schwert 1990; Barro 1990; Mauro 2003; Humpe & Macmillan 2005) confirmed the existence of the relationship between stock market returns and future real economic activity, the other strand of the literature (e.g. Binswanger 2000, 2004) does not see such relationship.

With this background in mind, it could be inferred that financial markets play a role in influencing various economic activities through multiple channels as mentioned above. However, none of the existing research investigated the relationship between stock market and economic activity in Saudi Arabia, based in our knowledge[3]. This in turn motivates us to assess such an important relationship for the Saudi economy. In doing so, this study will contribute to the existing literature in several ways. First, given the size of the Saudi economy and the size of the stock market as one of the largest

[3] A recent research paper by Al Rasasi et al. (2019) examines the role of the stock market in affecting the demand for money in Saudi Arabia.

markets in the MENA region, linking the role of stock market in promoting economic growth for the case of Saudi Arabia does not receive an adequate share of the literature. In addition, the recent inclusion of Saudi stock market in emerging market indices such as FTSE Russell and Morgan Stanley Capital International "MSCI" raises the importance of assessing the impact of stock market on the real economy. Therefore, this study aims to fill out the gap in literature focusing on Saudi Arabia. Furthermore, it is crucial to emphasize that the 2008-09 worldwide financial crisis provided an informative case study for policymakers via observing the decline of economic activities due to the crisis in a substantial number of countries. Lastly, this research paper is very essential to drawing attention to the stock market and its important role in achieving the objectives of the Saudi Vision 2030 in developing an advanced capital market, which is one of the three main pillars underpinning the financial sector development program (FSDP).

Therefore, this research paper is interested in finding out if the traditional finance theory mentioned earlier holds in the Saudi Arabian economy. Specifically, is a higher Saudi stock market performance a leading indicator for faster economic growth? To test this proposition, various econometric procedures are conducted based on the obtained data.

In this paper, there will be five sections organized as follows. Section 2 delivers a summary to related research findings. Section 3 presents the dataset that is utilized, and Section 4 discusses the empirical methodology and analysis. Section 5 summarizes and concludes the main findings of this paper.

2. Empirical Literature Review

Several studies have been put forward supporting the role of stock market performance (i.e. stock prices) as a leading indicator for economic activity. For instance, Choi et al. (1999) examine the significance of real stock returns in explaining current growth rates of industrial production by relying on monthly data of the G-7 countries. The authors apply the popular two-step co-integration test developed by Engle and Granger (1987). Their empirical analysis reveals that stock returns Granger cause growth rates of real economic activity in all other G-7 countries with the exception of Italy.

Similarly, Duca (2007) adopts the Granger (1969) causality technique to examine the relationship between stock market indices and economic growth in the top five stock markets of the world (France, Germany, Japan, the US, and the UK), characterized by market capitalization. He carries his analysis based on quarterly data ranging from 1957 to 2005, in which some countries have shorter sample size based on the data availability. The

empirical analysis confirms the existence of a causal relationship between stock market and economic growth i.e. unidirectional causality in the USA, Japan, France, and UK. One the other hand, his analysis reveals that the causal relationship between stock market and economic growth is not manifested in Germany.

In the case of Turkey, Kaplan (2008) examines the empirical association between stock returns and real economic growth by implementing a Granger (1969) causality test with quarterly data from 1987:01 to 2006:04. The test results show that there is a strong and statistically significant relationship between stock market prices and real economic growth in Turkey based on the implemented cointegration tests of Johansen and Juselius (1990). In addition, the author finds that changes in stock prices are able to capture changes in real economic growth; in other words, there is a unidirectional causality running from stock prices to economic growth. Similarly, Basdas and Soytas (2009) use monthly data for Turkey covering the period from 1997:01 to 2008:06, with the objective of investigating the possible correlation between stock market returns and economic growth, while taking into account interest rates on deposits and inflation. To meet this objective, the author carry out the investigation based on the Granger (1969) causality test that is preformed based on a vector autoregressive model. Their results

indicate that real interest rates and real stock returns Granger cause real growth and not the other way around. Perhaps it is worth noting that their results during the period of 2002 to 2008 indicate that the relationship between real growth and real stock returns is questionable. They argue that the link between the stock market and economic growth is weak and inadequate because of increasing foreign share in the Istanbul Stock Exchange. This argument is somewhat conspicuous in the sense that an increased foreign share in any given stock exchange makes the share price of domestic firms more dependent on foreign sales and the foreign economy.

Furthermore, Tsouma (2009) analyzes the dynamic relationship between stock market returns and economic activity in 22 advanced markets and 19 emerging markets using monthly data spanning from January 1990 to December 2006. The results obtained from the empirical analysis indicates that there is a strong positive unidirectional relationship between stock returns and economic activity. More precisely, the study finds statistically significant coefficients indicating the existence of such a relationship for 18 mature markets and 15 emerging markets.

In line with the studies mentioned above, Tao et al. (2014) find evidence that supports the notion of a positive correlation between stock market returns and real economic activities in China by utilizing monthly

frequencies from January 2001 to December 2013. However, their methodology is somewhat unique in that they utilize different proxies for economic activities – i.e. industrial production, employment, investment and consumption demand, and aggregate income. Their empirical analysis is carried out by implementing Granger (1969) causality tests alongside the Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD) analysis. Their results point out the strong association between China's stock market and real economic activities. Lyocsa et al. (2011) also assess the linkage between the stock markets and real economic activity in the Czech Republic, Hungary, Poland and Slovakia using quarterly data starting from 1996:Q1 to 2009:Q4. To reach an accurate assessment, the authors apply the causality tests developed by Granger (1969) and Toda-Yamamoto (1995). The obtained results from these tests show that three (Czech Republic, Hungary, Poland, and Slovakia) out of the four central European countries are in line with the present value theory of stock prices, which indicates the stock prices in those three countries can be used as leading indicators of the state of the real economic activity. In other words, changes in stock markets can predict changes in real economic activity in these three countries. Using quarterly data spanning from 2000:Q1 to 2012:Q2 for advanced economies, consisting of the Czech Republic, the European Union,

Germany, Hungary, Japan, Poland and the USA, Krchniva (2016) conducts an empirical analysis using both the Granger (1969) causality test and a lung-box portmanteaus test to evaluate the relationship the stock markets and real economic activity. Both of these analyses show the presence of a strong and statistically significant relationship between the two variables in these countries.

However, conversely, some studies have found no relationship between stock market returns and economic growth. For instance, Binswanger (2000) claims that stock market returns, since early 1980s, cannot fundamentally explain economic growth. His results provide evidence that in the US, the relationship between stock prices and economic activities has diminished since the early 1980s. As an extension to his study, Binswanger (2004), puts forth a similar investigation, however, the emphases is on the other G-7 countries (Japan, Canada, France, UK, Germany, and Italy). He obtains equivalent results to his US study indicating that there is no correlation between stock market prices and economic activities. Therefore, he concludes that the debated relationship is thought to be nonexistent, at least between 1980 and 2004. On the same basis, Mao and Wu (2007) finds similar results, using monthly data for Australia starting from January 1974 to July 2004. Their conclusion, based on the Granger causality test, indicates that there is a

bidirectional Granger causality between stock market prices and economic activities; thus, they conclude that there is no clear causal relationship observed in Australia.

Unfortunately, despite the intensive research exploring the effects of stock market developments on economic activity, the research devoted to the Saudi economy is scarce. In fact, to our knowledge, there is only a single study probing the effect of stock market fluctuations on the demand for money in Saudi Arabia conducted by Al Rasasi et al. (2019). Other than this study, most of the existing literature attempts to assess the impact of macroeconomic developments on the stock market, such as Alshogeathri (2011), Kalyanaraman & Al Tuwajri (2014), and Mohanty et al. (2018). This in turn motivates us to explore the causal relationship between stock market and real economic activity in Saudi Arabia.

3. The Dataset

To conduct our empirical analysis addressing the key objective of this research paper, we rely on two variables. The first variable is the real Saudi non-oil gross domestic product (GDP), which is used as a proxy of real economic activity; the second variable is the Tadawul All Share Index (TASI), used as a proxy of the stock market performance. It is also important to

highlight that we deflated the TASI index in order to measure the real stock market performance. Likewise, we use the consumer price index (CPI) with the 2013 base year in order to adjust TASI for inflation. The utilized dataset consists of quarterly observations covering the period from 2010:Q1 to 2018:Q4, and all data are taken from various sources. The data for real non-oil GDP and CPI are downloaded from the General Authority for Statistics (GASTAT) website, while TASI data are downloaded from the Saudi Stock Exchange (Tadawul) website. Both variables are expressed in natural logarithm form.

4. Empirical Methodology and Results

4.1. Stochastic Properties of the Data

Checking the stationarity of the economic variables is one of the key procedures in empirical economic and financial research. This is fundamental in practice since it enables researchers to avoid inaccurate analysis originating from spurious results. Therefore, there has been ongoing research in developing various tests diagnosing the stochastic properties of the data. Due to this requirement, we rely on some of the most popular tests evaluating the stationarity of time series data that are developed by Phillip & Perron (1981). By conducting this test, we can reach a conclusion indicating that both

variables are integrated in order one; in other words, the variables become stationary when the first difference is taken as summarized in Table (1).

Table 1: Phillip & Perron (1981) Unit Root Test

	Level Data		First Difference	
	Constant	Trend	Constant	Trend
TASI	-2.49	-2.45	-7.67	-7.54
GDP	-1.01	-3.38	-6.96	-7.72

Note: The 5% critical values for the Phillips-Perron constant = -2.95, and for trend= -3.54.

4.2. Cointegration Analysis

Engle and Granger (1987) argue that finding integrating variables with the same order implies the possibility for these variables to be cointegrated. Hence, it would be useful to assess whether the variables falling under the scope of this study are cointegrated or not. This can be accomplished by relying on the Trace and Maximum Eigenvalue tests developed by Johansen and Juselius (1990). As presented in Table (2), the results obtained from these tests point out to the presence of a cointegrating relationship between economic growth and stock prices. This finding supports the notion of a relationship between stock market performance and real economic growth.

Table 2: Johansen and Juselius (1990) Cointegration Tests

Null Hypothesis	Alternative Hypothesis	Test Statistics	5% Critical Value
Panel A: **Trace Test**			
$r = 0$	$r = 1$	29.51	25.87
$r \leq 1$	$r = 2$	8.16	12.15
Panel B: **Maximum Eigenvalue Test**			
$r = 0$	$r = 1$	21.35	19.39
$r \leq 1$	$r = 2$	8.16	12.52
Note: r denotes the number of cointegration vectors.			

4.2.1. Interpretation of Cointegrating Relationship

Once the cointegration relationship between real stock prices and real economic growth is confirmed, it then becomes crucial to comprehend the dynamics of this relationship over both the short and long run. To do so, the long run relationship, as specified in equation (1), is estimated by the Maximum Likelihood Estimation (MLE) approach.

$$GDP_t = \beta_0 + \beta_1 TASI_t + \varepsilon_t \qquad (1)$$

where $GDP_{t,} TASI_{t,} and\ \varepsilon_t$ represent the real non-oil GDP at time t, stock price index at time t, and the error term at time t, respectively. Likewise, β_0 denotes the constant term while β_1 is the coefficient measuring how stock prices influence economic growth.

The estimated coefficients of equation (1), as shown in table (3), reveal the important and significant role of stock market variation on economic

growth. For further illustration, real Saudi economy tends to grow by 3.2 percent due to the increase of stock prices by 10 percent.

Table 3: Parameter Estimates of Long Run Relationship

	β_0	β_1
Parameter estimates	9.85*	0.32*
t-value[4]		-3.79

Note: the estimated model $GDP_t = \beta_0 + \beta_1 TASI_t + \varepsilon_t$
* denotes significance level of 5 percent.

Following the interpretation of the long run relationship between economic growth and stock market, it would be very informative for policymakers to get some insight regarding the short run dynamics between these variables. To provide such valuable analysis, we need to estimate the following error correction model, specified by equation (2), based on the Maximum Likelihood Estimation (MLE) procedure.

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{s} \delta_{1i} \Delta GDP_{t-i} + \sum_{i=1}^{s} \delta_{2i} \Delta TASI_{t-i} + \lambda ECM_{t-1} + \varepsilon_t \qquad (2)$$

where, ΔGDP_t, $\Delta TASI_t$ and ε_t are the changes in real economic growth (real non-oil GDP), changes in real stock market index, and the error term at time t-1 respectively. We rely on the Akaike information criteria "AIC" in order to

[4] The Eviews software only does not display the significant level of the constant for the estimated cointegration relationship based on MLE. However, OLS estimates indicate the significance of the constant term.

determine the suitable lag length. It is also important to highlight that the error correction term is calculated from specification (1) as follows.

$$ECM_{t-1} = GDP_{t-1} - \beta_0 - \beta_1 TASI_{t-1} \qquad (3)$$

Once we derive the error correction term as specified in equation (3), we proceed estimating the error correction model as specified in equation (2). The estimated parameters of the error correction model are presented in table (4). The error correction term ($\lambda = -0.17$) is negative and statistically significant with t-value equals to -2.79 confirming the presence of a long run relationship and the essential role of the stock market in explaining the variation in real economic activity. It also implies that it takes the real economy about 6 quarters to adjust to its equilibrium condition, in case it deviates from its steady state.

The estimated coefficients for the other variables suggest that only changes in real stock prices (only with one lag) have significant and negative impact on real economic activity during the short run, however, the impact turns to be positive with four lags although is not statistically significant. It seems that changes in real stock prices have positive impact on real economic activity over long run rather than short run.

Table 4: Parameter Estimates of Error Correction Model

Variables	Parameter estimates	t-values
Constant	0.02**	3.16
ΔGDP_{t-1}	-0.41	-1.97
ΔGDP_{t-2}	-0.82**	-3.85
ΔGDP_{t-3}	-0.48**	-2.08
ΔGDP_{t-4}	0.07	0.03
ΔSP_{t-1}	-0.05**	-2.19
ΔSP_{t-2}	-0.03	1.32
ΔSP_{t-3}	-0.002	-0.09
ΔSP_{t-4}	0.01	0.52
λ	-0.17	-2.8**

** denotes 5% significance level.

4.3. Causality Analysis

The estimated coefficients of the error correction model, particularly the error term coefficient, suggest that stock market has predictive power in capturing changes in economic activity. For further assessment of such finding, we apply the most popular causality test, known as Granger (1969) causality test that is built on the vector error correction model (VECM) since the variables are cointegrated. The basic intuition of this test is to gauge if the lagged values of certain variables could capture the movement of these variables. For further illustration, we need to estimate a bivariate VCEM model consisting of real GDP and real TASI as following.

$$\Delta GDP_t = \delta_0 + \sum_{i=1}^{s} \delta_{1i}\, \Delta GDP_{t-i} + \sum_{i=1}^{s} \delta_{2i}\, \Delta TASI_{t-i} + \lambda_1 ECM_{t-1} + \epsilon_{1t}$$

(4)

$$\Delta TASI_t = \varphi_0 + \sum_{i=1}^{s} \varphi_{1i}\, \Delta GDP_{t-i} + \sum_{i=1}^{s} \varphi_{2i}\, \Delta TASI_{t-i} + \lambda_2 ECM_{t-1} + \epsilon_{2t}$$

(5)

where Δ denotes the change, while $GDP_t,\ and\ TASI_t$ are the real GDP and stock market price index of Saudi Arabia at time t, respectively. The error term ϵ_{1t} is associated with equation (4) and ϵ_{2t} is associated with equation (5). The lag length S is chosen based on the AIC criteria. The coefficients $\delta_0, \delta_{1i}, \delta_{2i}, \varphi_0, \varphi_{1i},\ and\ \varphi_{2i}$ are the estimates of the constants and the multiplicative factors for lagged economic growth and the stock price index. The estimated coefficients $\lambda_1\ and\ \lambda_2$ represent the deviation of the dependent variables from the long run equilibrium.

In order to test if changes in real stock prices could capture changes in economic growth, we need to test if this hypothesis $\delta_{1i} = \delta_{2i} = 0$ holds; in other words, we test the null hypothesis that changes in real economic activity does not Granger cause changes in the stock price index. Conversely, we test the null hypothesis that changes in the stock price index do not Granger cause changes in economic activity; that to say, we test $\varphi_{1i} = \varphi_{2i} = 0$. The obtained results Granger causality test, as shown in table (5), suggest that changes in stock market index does Granger cause changes in economic activity. In other

words, the stock market plays an essential role in predicting economic cycles, which is in line with various empirical studies on advanced and emerging countries. On the other hand, we fail to find empirical evidence in support of the notion that changes in real economic activity do predict movements in the stock market. This might be attributed to the behavior of investors who might choose alternative investment opportunities such as real estate investments or money market rather than the stock market; in sum, some investors prefer less risky financial assets.

Table 5: Results of Granger Causality Test based on VECM

Dependent variable GDP				
Null Hypothesis	χ^2	p-value	ECM	
$\Delta TASI$ does not Granger Cause ΔGDP	11.9	0.02	-0.17*	Reject null Hypothesis
Dependent variable TASI				
ΔGDP does not Granger Cause $\Delta TASI$	3.84	0.43	0.78	Fail to reject null hypothesis

5. Conclusion

This paper examines the causal relationship between stock market returns and economic activities in Saudi Arabia using various econometric techniques consisting of stationarity, cointegration, and causality analysis. This study is carried out using quarterly data of the Tadawul All Share Index (TASI) and Saudi Non-oil Gross Domestic Product (GDP) from 2010:Q1 to 2018:Q4. By

using one of the most known diagnostic tests developed by Phillip and Perron (1981) to ensure stationarity, it becomes apparent that the variables are stationary at first difference. Subsequently, the cointegration test used implies that there is significant long run relationship at 5% critical value between the two variables, as can be observed from the Trace Test as well as the Maximum Eigenvalue Test in table (2). The results obtained indicates that the tested relationship holds in the long run as well as in the short run, and there is in fact a unidirectional causality between TASI and economic growth in Saudi Arabia.

This study contributed to the existing literature by testing stock market performance and economic activities in Saudi Arabia. Nevertheless, there is a noticeable shortage of literature regarding this topic, and there is room to improve existing literature. This study could lead to other hypotheses that can be taken into consideration, such as conducting a disaggregated analysis of the impact of stock market sub-indices on the corresponding disaggregated economic activities. Furthermore, we could not find any literature on the impact of stock market volatility on economic growth in Saudi Arabia. In addition, future studies could look at the impact of other indicators such as inflation, money supply, fiscal and monetary policies on stock market performance and vice versa.

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