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# Causality between Stock Market Development and Economic Growth: Evidence from Emerging Markets

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The stock market is an indicator of an economy's financial health and it indicates the mood of investors in a country. As such, stock market development is an important ingredient for GDP growth. This paper studies the causal relationship between stock market development and GDP growth rate of a small emerging market, namely Amman Stock Exchange (ASE) over the period 2000 - 2018. The results revealed that stock market development affects GDP growth with a unidirectional causality relationship between stock market development and GDP growth in the short run. In addition, we confirmed a bidirectional causality relationship between the interest rate spread and the GDP growth in the short run. Moreover, this paper sheds some light on one of the most important developments taking place in the equities market; that is the initiation of the Over-the-Counter Market in 2016. A causality relationship between ASE liquidity and the OTC-market liquidity was conducted. Our results stress that there is a bi-directional causality between the liquidity of ASE and the OTC-market liquidity.

**Key words:** *Stock market development, GDP growth, Emerging markets, Jordan, ARDL bounds test.*

## Introduction

Since 1999, there have been a large number of reforms introduced to the Amman Stock Exchange (ASE), with which the capital market reached new heights. Ever since, ASE has been undertaking its operations as a non-profit private institution that enjoys administrative and financial independence, and has become the sole party authorised to practice as an official market for trading in securities in Jordan, subject to Jordan Securities Commission (JSC) supervision, and pursuant to the Securities Law for the year 1997, which was created to develop, regulate and monitor Jordan's capital market.

From that date forward, ASE started to fulfil its objectives in accordance with the Securities Law and has introduced a variety of capital market reforms with a vision towards creating a legislative and technical environment that provides an organied, fair and efficient market for trading securities. Some of these important measures includes the approval of the Internal By-Law of ASE, which set out its tasks and membership as comprising financial services companies licensed by JSC to perform financial brokerage activities. The By-Law also set out the authorities of the General Assembly of ASE and how to organise its meetings; how to set up the Board of Directors; the rules for appointing the Chief Executive Officer (CEO); as well as the financial resources and fiscal year of ASE. Other measures include Dematerialisation of Shares, Screen Based Trading, Investor Protection and Rolling Settlement. This was in addition to the establishment of the OTC market, which transformed the capital market and triggered its growth and development.

Hence, this paper aims to examine the impact of capital market development on the rate of GDP growth in Jordan and to determine the direction of this impact (positive or negative) as well as the causal relationship between market development and GDP growth in the short/long run. We also aim to shed some light on the impact of initiating the Over-the-Counter market (OTC) on the liquidity of ASE.

The coming sections are organised as follows: Section Two presents a general view about ASE and its main developments; section Three summarises the literature review and hypothesis development. Section Four identifies the data and methodology. Section Five describes the data and the empirical results. The final section of the paper is a concluding section.

**Overview of Amman Stock Exchange (ASE)**

The Jordanian public started to trade in shares in the early 30's in an unorganised securities market which was in the form of non-specialised offices. The first public shareholding company recognised in Jordan was the Arab Bank, which was established in the early 30's, followed by Jordan Tobacco and Cigarettes and the Jordan company Electric Power. The establishment of these companies prompted the government to set up an organised securities market to regulate the issuance of securities and protect savers by offering better trading conditions based on supply and demand. In March 1999 the Amman Stock Exchange (ASE) was established as a private sector, non-profit organisation with legal and financial independence. It was regulated by the Jordan Securities Commission, based on the provisions of the Securities Law of 1977 before the issuance of the Securities Law of 2002, which allowed for the establishment of more than one securities market in Jordan.

In August 2016, the ASE established its first Over the Counter Market (OTC), with the aim of trading in stocks that are unpublished and delisted from ASE the organised market. The main aim of this market was to provide a place as well as a system that allowed shareholders of unlisted companies that were suspended from trading, or newly established, to buy and sell their securities easily throughout an electronic mechanism. The trading in the OTC market is independent and does not affect the ASE market indices.

In 2017, the ASE was registered as a public shareholding company completely owned by the government under the name 'Amman Stock Exchange'. The ASE was governed by a board of directors consisting of sevenmembers, appointed by the Council of Ministers, with a full-time CEO overseeing day-to-day duties.

**Literature Review & Hypothesis Development**

Although several studies have found a positive relationship between the capital market development and the rate of GDP growth, several studies found weak evidence and negative relationships (Oyejide, 1994; Demirgue-kunt, 1996; Nyong, 1998; Sule and Momoh, 2009; Ewah et al. 2009). A study of 44 countries for the period between 1986-1993 by Demirgue-kunt and Levine (1996) found that nations with well-developed financial markets tend to be more strongly correlated to other indicators of activity levels of financial, banking, non-banking institutions as well as to insurance companies and pension funds. Also, a study by Levine and Zervos (1998), used data from 47 countries from 1976 to 1993 to evaluate the relationship between stock market liquidity and GDP growth, capital accumulation and productivity. They found that the measures of stock market liquidity were strongly related to growth capital accumulation and productivity while stock market size does not correlate to GDP growth. Mamoun etal. (2018) investigated the development of the stock market in Bangladesh for the period between 1993-2016 and found a significant impact on GDP growth. In addition, Oke et al. (2012) used data from the Nigeria Stock Exchange and Central Bank to examine the impact of capital market reforms on GDP growth between 1981 and 2010. Their results showed that capital reforms positively impact GDP growth.

Meanwhile, Goel and Gupta (2011) examined the effect of globalisation and its reforms on the stock market, by using a ratio analysis technique to test the size of the stock market, in addition to its liquidity and volatility. They found that Market Capitalisation Ratio (MCR) and liquidity ratio are increasing, whereas volatility is decreasing annually. James etal. (2015) found that capital market reforms and its association with the Indian capital market is of huge significance from the perspective of growth and development of the economy. A study by Nordin (2016) examined the extent to which the stock market controls and affects the Malaysian Economy utilising Johansen co-integration analysis, and a positive and significant relationship was discovered. Meanwhile, Shahbaz et al. (2008) applied the ARDL method on

the Pakistani capital market to investigate the effect of stock market development on GDP growth for the period 1971-2006, and found a strong relationship between development in the stock market and GDP growth. In addition, Van Nieuwerburgh et al. (2006) used data from the Belgium stock market for the period between 1873 and 1935, and found a strong impact.

On the other hand, when Ewah et al. (2009) examined the impact of the capital market efficiency on Nigeria's economic growth from 1963 to 2004, their results revealed that the capital market has no significant impact on economic growth. Similarly, Harris (1997) used data from 49 developing countries through 1980 to 1991 and did not find evidence between stock market activity and the level of GDP growth. In addition, Samargandi et al (2014) used data from Saudi Arabia to investigate the effect of market financial development on oil prices and consequently on economic growth for the period between 1975-2005, and his results revealed a weak impact. Likewise, Naceur and Ghazouni (2007) used data from 11 MENA countries and found no significant relationship between the two variables.

In view of the above research reviews, one can conclude the presence of a bidirectional relationship between market development and the rate of GDP growth. Hence, this paper is the first of its kind to test the causality between stock market development and the rate of GDP growth in Jordan during the period from 2000 to 2018.

The following null hypothesis will be tested:

**$H_{01}$:** Stock market development does not cause GDP growth.
**$H_{02}$:** GDP growth rate does not cause stock market development.

## Data & Methodology

### ❖ *Operational Definitions*

This paper aims to investigate the causal relationship between stock market development and GDP growth in Jordan by using the following explanatory variables; the turnover ratio as a proxy for stock market development, financial depth and interest rate spread to build our general model. Table 1 presents the variables used to achieve the aim of the study. The causal relationship is studied among GDP, stock market capitalisation ratio, turnover ratio will be used as proxy for stock market development, financial depth and interest rate spread. The required annual data was collected from the World Development Indicators published by the World Bank Group during the period 2000-2018.

**Table 1: *Variables***

| Variable | Description |
|---|---|
| **GDP** | Gross Domestic Product in current prices |
| **SMD** | Stock Market Capitalisation Ratio: the value of listed shares divided by GDP |
| **FD** | Financial Depth: Broad Money % of GDP |
| **Turnover Ratio** | Ratio of the value of total shares traded to market capitalisation |
| **IRSpread** | Interest rate spread: the difference between lending and deposit rate (%) |

❖ ***Research Model***

The general model was built depending on the selected explanatory variables; the model will be as follows:

$$GDP = f(Turnover\ Ratio, IR\ spread, Financial\ Depth)$$

The long run co-integration regression model can be presented as follows:

$$lnGDPgrowth_t = \alpha_0 + \alpha_1 lnTurnover_t + \alpha_2 lnFinDept_t + \alpha_3 lnIRspread_t + \varepsilon_t \quad (1)$$

The Augmented Dickey Fuller (ADF) was used to test the stationary of the time series data. Next, the ARDL Bounds test was applied to study the long run co-integration relationship between stock market development and the rate of GDP growth. Then the WaldStatistics was employed to confirm the direction of causality between the two variables.

**Data Description and Empirical Results**

❖ ***Data Description***

Capital market development has been growing in emerging markets and the same is true for the Jordanian equity market. Table 2 represents annual figures for ASE during the period 2000- 2018. Market capitalisation represents the number of subscribed shares times the last closing price of the company, market capitalisation ratio is the market capitalisation divided by GDP, turnover ratio is the value of domestic shares traded divided by their market capitalisation.

**Table 2:** ***ASE Main Indicators***

| Year | | | |
|---|---|---|---|
| | Market Capitalisation in JD's | Market Capitalisation Ratio | Turnover Ratio (%) |
| **2000** | 3,509,600,000 | 57.6980 | 11.251 |
| **2001** | 4,476,400,000 | 69.3700 | 19.867 |
| **2002** | 5,029,000,000 | 72.9977 | 26.476 |
| **2003** | 7,772,800,000 | 106.0386 | 49.1 |
| **2004** | 13,033,800,000 | 158.8686 | 58.193 |
| **2005** | 26,667,100,000 | 294.6465 | 94.068 |
| **2006** | 21,078,200,000 | 194.7169 | 101.135 |
| **2007** | 29,214,200,000 | 235.3731 | 91.2 |
| **2008** | 25,406,300,000 | 161.1079 | 91.546 |
| **2009** | 22,526,900,000 | 131.7655 | 91.333 |
| **2010** | 21,858,200,000 | 115.1834 | 102.177 |
| **2011** | 19,272,700,000 | 92.9504 | 58.17 |
| **2012** | 19,141,500,000 | 85.9629 | 33.886 |
| **2013** | 18,233,491,417 | 75.6334 | 38.001 |
| **2014** | 18,082,617,433 | 70.3423 | 32.814 |
| **2015** | 17,984,673,970 | 66.9035 | 37.298 |
| **2016** | 17,339,384,851 | 62.6940 | 27.206 |
| **2017** | 16,962,550,802 | 58.8779 | 25.742 |
| **2018** | 16,122,694,186 | 53.8464 | 18.832 |
| **Mean** | 16,930,993,173 | 113.9462 | 51.3264 |

**Data source:** Annual statistical bulletins issued by ASE.

**Figure 1.** ***Annual Movements of Market Capitalisation Ratio 2000 - 2018***

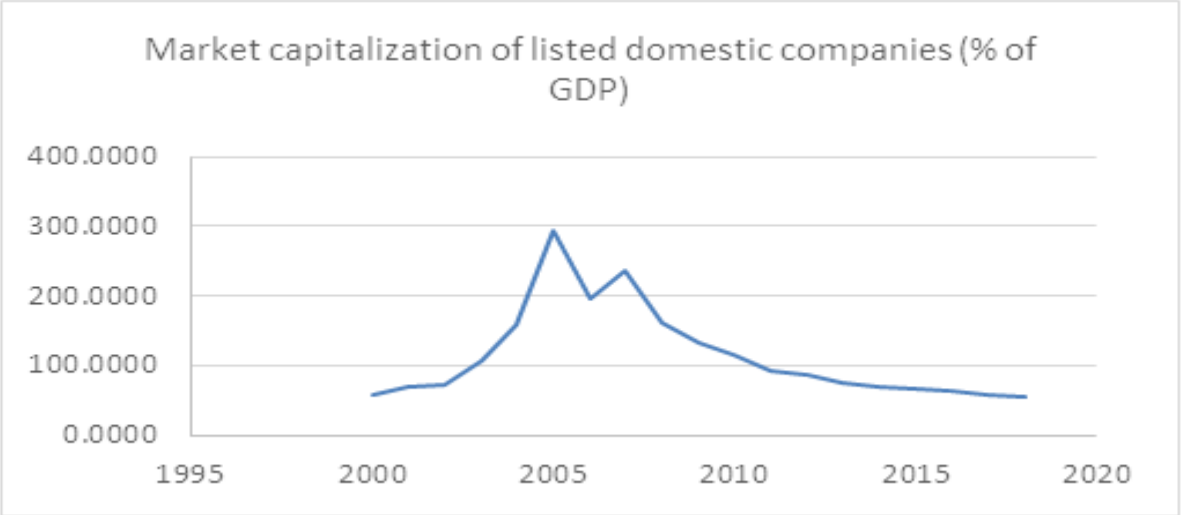
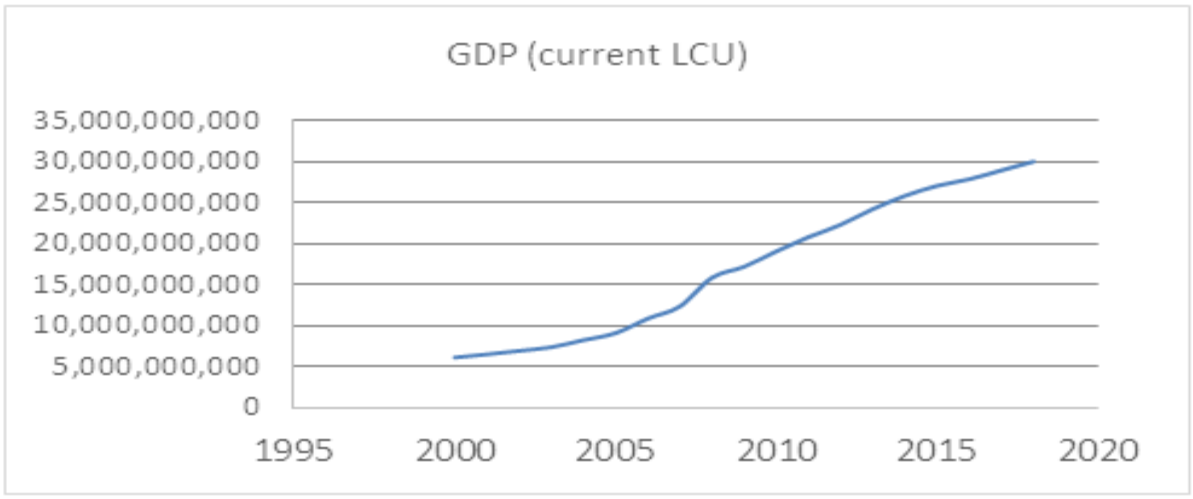


Figure (1) shows that the market capitalisation ratio increased during the period from 2000 until 2007. After that the market capitalisation decreased because of the world financial crises in 2008, and then it shows a near stable trend in market capitalisation and stock prices.

**Figure 2.** ***Annual Movements of GDP during the Period from 2000- 2018***




Financial depth can be defined as the size of the financial sector relative to the economy. In this paper, the financial depth is proxied by dividing the broad money (Money Supply) by GDP.

**Results and Discussion**

To achieve the objective of this study and test the main hypotheses, the following time series will be used: Turnover ratio, Gross Domestic product growth rate, Financial Depth and interest rate spread. Table 3 presents the descriptive statistics for these variables.

**Table 3:** ***Descriptive Statistics***

| Variables | Market capitalisation ratio | Turnover Ratio (%) | GDP growth | Financial Depth | Interest rate spread (%) |
|---|---|---|---|---|---|
| **Mean** | 113.9462 | 53.06816 | 4.583011 | 121.0839 | 4.776360 |
| **Median** | 85.96293 | 38.00100 | 4.161050 | 120.4245 | 4.960000 |
| **Maximum** | 294.6465 | 102.1770 | 8.567298 | 138.0036 | 6.153333 |
| **Minimum** | 53.84642 | 11.25100 | 1.940292 | 106.5906 | 3.230000 |
| **Std. Dev.** | 67.26807 | 31.85874 | 2.432622 | 9.765053 | 0.791609 |
| **Skewness** | 1.367012 | 0.420083 | 0.486332 | 0.325553 | -0.301551 |
| **Kurtosis** | 3.988594 | 1.593900 | 1.687841 | 1.900580 | 2.415455 |
| **Jarque-Bera** | 6.691331 | 2.124037 | 2.112037 | 1.292526 | 0.558462 |
| **Probability** | 0.035237 | 0.345757 | 0.347838 | 0.524000 | 0.756365 |
| **Observations** | 19 | 19 | 19 | 19 | 19 |

Referring to the stock market development; the market capitalisation ratio has a maximum level of (294.6465) while the minimum level was (53.8464) with standard deviation of (67.26807) indicating a volatile level of stock market capitalisation level. Market capitalisation ratio has a long right tail (positive skewness) and leptokurtic (because 3.988 > 3). Stock market development is a peaked curve with long-right tail with higher values than mean. Moreover, the Jarque-Bera test statistics shows that the normality conditions of the market capitalisation ratio series are not satisfied.

Concerning the Turnover Ratio; the maximum level was (102.1770%) while the minimum level was (11.25100%) with standard deviation of (31.85874%) indicating a volatile level of stock market turnover levels. Concerning the measures of normality of this series, Skewness for the turnover ratio series was 0.420083 and the Kurtosis value was 1.593900 indicating that this series has a near normal distribution. The Jarque-Bera test results shows that the normality conditions of the Turnover Ratio series are satisfied.

The maximum GDP growth rate was (8.567) while the minimum growth rate in GDP was (1.940) with standard deviation of (2.432), indicating the volatile nature of the growth rate of GDP. Concerning the measures of normality of this series, Skewness for the GDP growth rate series was 0.486 and the Kurtosis value was 1.687 indicating that this series has a near normal distribution. The Jarque-Bera test statistics reveals that the normality conditions of the GDP growth series are satisfied.

Referring to financial depth, the maximum value was (138.0036) while the minimum value was (106.5906) with standard deviation of (9.765) indicating a law level of volatility of financial depth. Concerning the measures of normality of this series, Skewness for this series was 0.3255 and the Kurtosis value was 1.9005 indicating a near normal distribution. The Jarque-Bera test statistics reveals that the normality conditions of the financial depth series are satisfied.

The maximum interest rate spread was (6.153 %) while the minimum spread was (3.230 %) with standard deviation of (0.3015 %) indicating a law level of volatility of interest rate spread. Concerning the measures of normality of this series, Skewness for the interest rate spread series was -0.3015 and the Kurtosis value was 2.415 indicating that this series has a near normal distribution. The Jarque-Bera test statistics reveals that the normality conditions of the interest rate spread series is satisfied.

To determine the optimal lag selection, the unrestricted VAR test was applied. The result reveals that the Akaika Information Criterion (AIC) is the best criterion to use. Lag structure and lag length criteria was studied depending on Akaika Information Criterion (AIC) and table (4) presents the lag order selected by the AIC:

**Table 4:** ***Optimal Lag Selection***

| Variables | Lag Order |
|---|---|
| **lnGDPgrowth** | 1 |
| **LnTurnover** | 1 |
| **LnFinDep** | 0 |
| **LnIRspread** | 2 |

Next, the study used the Augmented Dickey-Fuller (ADF) to test the stationarity of the selected time series, including the stationarity of the market capitalisation Ratio, Turnover Ratio, GDP growth, Financial Depth and interest rate spread series. The two tests run in level and first difference, the equation includes first: no intercept, no trend, second: intercept, third: intercept and trend. The tests critical values provided at 1%, 5%, and 10% levels. *MacKinnon (1996) one-sided p-values.

**Table 5:** ***Unit Root Test Results for Variables***

| Variables | Test In | Augmented Dickey Fuller (ADF) | | | Integration Order |
|---|---|---|---|---|---|
| | | **No Intercept No Trend** | **Intercept** | **Intercept and Trend** | |
| **Market Capitalisation Ratio** | **Level** | **-0.756492 (0.3744)** | **-1.550453 (0.4861)** | **-2.063666 (0.5298)** | **I(1)** |
| | 1% | -2.699769 | -3.857386 | -4.571559 | |
| | 5% | -1.961409 | -3.040391 | -3.690814 | |
| | 10% | -1.606610 | -2.660551 | -3.286909 | |
| | **First Difference** | **-4.892162 (0.0001)** | **-4.737530 (0.0019)** | **-4.967146 (0.0053)** | |
| | 1% | -2.708094 | -3.886751 | -4.616209 | |
| | 5% | -1.962813 | -3.052169 | -3.710482 | |
| | 10% | -1.606129 | -2.666593 | -3.297799 | |
| **GDP Growth** | **Level** | **-0.796538 (0.3568)** | **-1.037455 (0.7161)** | **-5.370519 (0.0035)** | **I(1)** |
| | 1% | -2.699769 | -3.857386 | -4.728363 | |
| | 5% | -1.961409 | -3.040391 | -3.759743 | |
| | 10% | -1.606610 | -2.660551 | -3.324976 | |
| | **First Difference** | **-4.377270 (0.0002)** | **-4.310634 (0.0043)** | **-4.266081 (0.0188)** | |
| | 1% | -2.708094 | -3.886751 | -4.616209 | |
| | 5% | -1.962813 | -3.052169 | -3.710482 | |
| | 10% | -1.606129 | -2.666593 | -3.297799 | |
| **Financial Depth** | **Level** | **-0.169205 (0.6112)** | **-1.640725 (0.4426)** | **-2.124785 (0.4989)** | **I(1)** |
| | 1% | -2.699769 | -3.857386 | -4.571559 | |
| | 5% | -1.961409 | -3.040391 | -3.690814 | |
| | 10% | -1.606610 | -2.660551 | -3.286909 | |
| | **First Difference** | **-5.291984 (0.0000)** | **-5.133191 (0.0009)** | **--5.877139 (0.0011)** | |
| | 1% | -2.708094 | -3.886751 | -4.616209 | |
| | 5% | -1.962813 | -3.052169 | -3.710482 | |
| | 10% | -1.606129 | -2.666593 | -3.297799 | |
| **Interest Rate Spread** | **Level** | **0.714085 (0.8584)** | **-4.218564 (0.0052)** | **-4.2486254 (0.0194)** | **I(0)** |
| | 1% | -2.728252 | -3.886751 | -4.616209 | |

| | | | | | |
|---|---|---|---|---|---|
| | 5% | -1.966270 | -3.052169 | -3.710482 | |
| | 10% | -1.605026 | -2.666593 | -3.297799 | |
| | **First Difference** | **-4.791543 (0.0001)** | **-4.743294 (0.0024)** | **-4.747689 (0.0097)** | |
| | 1% | -2.728252 | -3.959148 | -4.728363 | |
| | 5% | -1.966270 | -3.081002 | -3.759743 | |
| | 10% | -1.605026 | -2.681330 | -3.324976 | |
| **Turnover Ratio** | **Level** | **-1.446003 (0.1337)** | **-1.848439 (0.3470)** | **-2.443827 (0.3478)** | **I(1)** |
| | 1% | -2.699769 | -3.857386 | -4.571559 | |
| | 5% | -1.961409 | -3.040391 | -3.690814 | |
| | 10% | -1.606610 | -2.660551 | -3.286909 | |
| | **First Difference** | **-2.908567 (0.0063)** | **-2.749192 (0.0856)** | **-3.840072 (0.0399)** | |
| | 1% | -2.708094 | -3.886751 | -4.616209 | |
| | 5% | -1.962813 | -3.052169 | -3.710482 | |
| | 10% | -1.606129 | -2.666593 | -3.297799 | |

The ADF test reveals that all series are integrated of order (1) that is stationary after first difference level for both trend and trend with intercept, except the interest rate spread series was integrated of order (0) that is stationary at level for both trend and trend with intercept. Accordingly, the co-integration test must be applied to study the long run co-integration relationship among time series variables.

There are many alternatives approaches for testing co-integration, in this paper we are going to use the ARDL Bounds test because it is appropriate for a small sample size as in this case and for models having a combination of variables with I(0) and I(1) order of integration as our model. The result of the ARDL Bound test is presented in Table (6).

**Table 6:** ***ARDL Bound Test results***

| **Test Statistic** | **Value** | **k** |
|---|---|---|
| **F-statistic** | 1.659159 | 3 |
| **Critical Value Bounds** | | |
| **Significance** | **I(0) Bound** | **I(1) Bound** |
| **10%** | 2.72 | 3.77 |
| **5%** | 3.23 | 4.35 |
| **2.5%** | 3.69 | 4.89 |
| **1%** | 4.29 | 5.61 |

The value of F-statistic is lower than the lower bound I(0) of the critical values, so we accept the null hypothesis that there is no co-integration, hence no long-run relationship. Therefore, we estimate the short-run model, which is the Autoregressive Distributed Lag (ARDL) Model. The ARDL (p, q1, q2, q3) model is specified as:

$$\Delta LnGDPgrowth_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i}\Delta LnGDPgrowth_{t-i} + \sum_{i=1}^{q1} \alpha_{2i}\Delta LnFinDep_{t-i} + \sum_{i=1}^{q2} \alpha_{3i}\Delta LnIRspread_{t-i} + \sum_{i=1}^{q3} \alpha_{4i}\Delta LnTurnover_{t-i} + \varepsilon_t \quad (2)$$

Where i is the number of variables in the model, p is the lags used for the dependent variables, and q1, q2, q3 are lags used for the exogenous variables, while $\varepsilon t$ is the error term. We use the OLS regression model to estimate the coefficient of variables in the short-run model. Table (7) present the results of the OLS regression model.

**Table 7:** ***OLS Regression Results***

| Variables | Coefficient | t-Statistic | Prob. |
|---|---|---|---|
| **D(LNGDPGROWTH(-1))** | -0.352308 | -1.247046 | 0.2362 |
| **D(LNTURNOVER(-1))** | 0.459621 | 1.607935 | 0.1338 |
| **D(LNFD(-1))** | -1.762194 | -1.203579 | 0.2520 |
| **D(LNIRSP(-1))** | -0.942333 | -1.516410 | 0.1553 |
| **Constant** | -0.094662 | -1.244343 | 0.2371 |
| **Adjusted R-squared** | 0.051344 | | |
| **F-statistic** | 1.216491 | | |
| **Prob(F-statistic)** | 0.354283 | | |

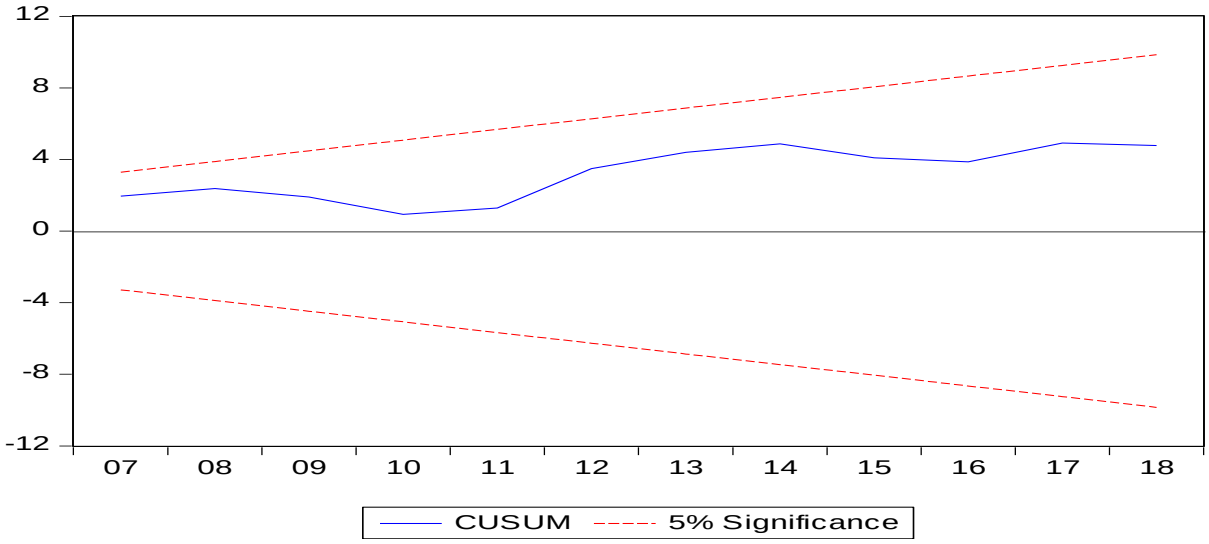
To test the accuracy of our model we have to test for serial correlation and stability of the model. We use the Serial Correlation LM Test, the result is presented in Table (8):

**Table 8:** ***Serial Correlation Test***

| **Breusch-Godfrey Serial Correlation LM Test** | | | |
|---|---|---|---|
| F-statistic | 0.725399 | Prob. F(1,11) | 0.4125 |
| Obs*R-squared | 1.051715 | Prob. Chi-Square(1) | 0.3051 |

The results indicate that our model is not suffering from a serial correlation problem. Then we test for stability of the model using CUSUM Test.

**Figure 3.** ***Stability Diagnosis***




The figures indicate that our results lie between the 5% significance boundaries, so the model is stable. The Wald-Statistics for the short-run test of causality was used to study the direction of causality among variables; results are presented in Table (9).

**Table 9:** ***Wald Test Results***

| Null Hypothesis | Chi-square | p-value |
|---|---|---|
| **Turnover does not cause GDP** | 15.76450 | 0.0004 |
| **GDP does not cause Turnover** | 0.015041 | 0.9024 |
| **Financial Depth does not cause GDP** | 0.617500 | 0.4320 |
| **GDP does not cause Financial Depth** | 0.058841 | 0.8083 |
| **Interest rate spread does not cause GDP** | 5.060527 | 0.0796 |
| **GDP does not cause Interest rate spread** | 0.429197 | 0.5124 |

The result reveals that the GDP growth rate of Jordan is significantly caused by stock market development and interest rate spread in the short run.

**OTC Initiation and Stock Market Liquidity**

This section aims to determine the impact of OTC market initiation on the ASE market and the direction of this impact (positive or negative) on the market's liquidity. To study the impact of OTC-market initiation, monthly data concerning the stock market liquidity for the two markets (OTC and ASE) were collected from monthly issues of ASE during the period from January 1, 2017 to December 31, 2019. Table (11) shows that the average traded value in the OTC market during the study period reached (2,687,366) JD, while the average market capitalisation for the listed companies in this market was (236,745,997) JD. The number of companies listed in this OTC market ranges between a maximum of 31 companies and minimum of 14 companies, an average of 25 companies were listed in this market during the study period.

The table includes monthly figures for the OTC market during the period from January 2017 up to December 2019. Market capitalisation represents the number of subscribed shares times the last closing price of the company, traded value represents the number of traded shares times the last closing price of the company.

**Table 10:** ***Liquidity Figures for OTC Market***

| **Month** | OTC Liquidity figures | | | | | |
|---|---|---|---|---|---|---|
| | No of traded securities | No of transactions | Value traded in JD | Market capitalisation in JD | Listed Shares | listed companies |
| Jan-17 | 16,936,153 | 4,496 | 3,958,457.03 | 86,312,946 | 681,555,437 | 17 |
| Feb-17 | 5,632,166 | 2,749 | 1,197,351.08 | 82,256,637 | 681,555,437 | 14 |
| Mar-17 | 6,014,123 | 2,899 | 1,397,883.96 | 78,243,717 | 681,555,437 | 17 |
| Apr-17 | 15,637,440 | 3,774 | 3,105,154.84 | 136,108,829 | 887,509,031 | 29 |
| May-17 | 7,867,209 | 2,785 | 1,435,979.62 | 167,742,887 | 881,550,483 | 29 |
| Jun-17 | 3,487,429 | 1,277 | 442,339.23 | 281,268,666 | 915,367,183 | 27 |
| Jul-17 | 8,573,098 | 2,221 | 1,134,553.28 | 270,665,865 | 914,867,183 | 31 |
| Aug-17 | 5,618,567 | 2,086 | 951,682.59 | 274,988,039 | 914,867,183 | 29 |
| Sep-17 | 6,179,413 | 2,595 | 1,888,810.21 | 287,605,374 | 914,867,183 | 27 |
| Oct-17 | 14,162,037 | 5,924 | 4,301,190.71 | 295,082,973 | 914,867,183 | 28 |
| Nov-17 | 9,695,201 | 3,456 | 2,672,613.54 | 286,277,116 | 914,867,183 | 27 |
| Dec-17 | 6,928,625 | 2,289 | 2,351,107.14 | 280,003,960 | 890,999,606 | 27 |
| Jan-18 | 6,611,738 | 2,337 | 1,571,767.64 | 174,495,644 | 836,499,606 | 28 |
| Feb-18 | 14,112,420 | 2,872 | 2,429,931.19 | 172,321,827 | 832,436,799 | 24 |
| Mar-18 | 19,243,178 | 4,105 | 2,956,108.48 | 175,689,360 | 832,436,799 | 26 |
| Apr-18 | 36,277,031 | 5,695 | 4,183,744.45 | 183,094,844 | 835,436,799 | 25 |
| May-18 | 20,031,494 | 4,608 | 4,204,817.14 | 346,583,664 | 878,436,799 | 25 |
| Jun-18 | 5,304,863 | 1,437 | 2,236,161.62 | 356,187,630 | 878,936,799 | 26 |
| Jul-18 | 7,345,741 | 1,721 | 1,485,874.13 | 356,559,419 | 875,384,817 | 28 |
| Aug-18 | 6,345,021 | 1,202 | 1,483,383.96 | 345,442,143 | 880,634,817 | 23 |
| Sep-18 | 9,602,698 | 2,518 | 1,395,542.83 | 236,706,151 | 810,168,755 | 23 |
| Oct-18 | 15,315,635 | 3,683 | 2,594,791.13 | 248,921,415 | 825,141,258 | 27 |
| Nov-18 | 11,228,916 | 3,332 | 2,539,828.89 | 238,318,382 | 810,141,258 | 26 |
| Dec-18 | 9,347,825 | 1,812 | 2,546,640.01 | 239,639,012 | 800,699,030 | 24 |
| Jan-19 | 11,098,800 | 1,821 | 2,121,956.54 | 236,836,645 | 791,483,121 | 24 |
| Feb-19 | 6,976,449 | 1,906 | 1,411,530.21 | 227,091,855 | 628,364,121 | 23 |
| Mar-19 | 10,010,855 | 2,767 | 2,306,682.47 | 227,715,583 | 622,464,121 | 22 |
| Apr-19 | 7,966,615 | 2,777 | 2,311,946.03 | 224,773,660 | 634,464,121 | 26 |
| May-19 | 6,002,833 | 1,062 | 1,632,448.13 | 222,894,352 | 641,214,362 | 22 |
| Jun-19 | 9,318,740 | 1,823 | 2,579,619.30 | 224,038,151 | 641,214,362 | 22 |
| Jul-19 | 12,588,381 | 4,039 | 3,841,638.35 | 226,366,214 | 641,134,805 | 22 |
| Aug-19 | 9,585,630 | 3,134 | 3,998,052.76 | 228,218,330 | 641,134,805 | 21 |
| Sep-19 | 16,220,053 | 4,636 | 11,749,433.18 | 338,932,147 | 653,134,805 | 24 |
| Oct-19 | 10,678,220 | 3,180 | 4,951,429.41 | 291,980,459 | 637,813,496 | 26 |
| Nov-19 | 11,430,869 | 2,597 | 3,482,295 | 292,558,882 | 637,813,496 | 24 |
| Dec-19 | 13,943,670 | 3,025 | 4,156,665 | 307,016,161 | 698,257,956 | 25 |
| **Mean** | 10,925,532 | 2,907 | 2,750,261 | 240,248,304 | 782,202,101 | 25 |

**Data source:** monthly OTC bulletins.

Concerning liquidity figures for the ASE during the period 2017-2019, Table (11) shows that the average traded value in the ASE during the study period was (193,780,498) JD, while the

average market capitalisation for the listed companies in this market was (16,644,440,692) JD. The number of companies listed in the ASE ranges between a maximum of (196) companies and a minimum of (166) companies, an average of (185) companies were listed in this market during the study period.

The table includes monthly figures for the ASE during the period from January 2017 up to December 2019, market capitalisation represents the number of subscribed shares times the last closing price of the company, traded value represents the number of traded shares times the last closing price of the company.

**Table 11:** ***ASE Liquidity Figures***

| **Month** | | | | | | |
|---|---|---|---|---|---|---|
| | No of traded securities | No of transactions | Value traded in JD | Market capitalisation in JD | Listed Shares | listed companies |
| Jan-17 | 219,805,402 | 69,530 | 443,818,383 | 17,447,146,675 | 6,781,591,357 | 187 |
| Feb-17 | 284,851,465 | 63,346 | 1,035,500,642 | 17,786,195,657 | 6,781,591,357 | 187 |
| Mar-17 | 158,313,527 | 82,092 | 189,503,817 | 18,279,455,137 | 6,780,626,191 | 193 |
| Apr-17 | 158,068,101 | 83,464 | 204,004,060 | 17,471,846,688 | 6,447,394,324 | 184 |
| May-17 | 137,690,802 | 70,646 | 162,492,513 | 17,404,720,408 | 6,564,397,281 | 176 |
| Jun-17 | 97,869,659 | 41,438 | 138,034,669 | 17,286,910,319 | 6,609,366,919 | 169 |
| Jul-17 | 148,708,791 | 70,096 | 180,183,494 | 17,159,281,634 | 6,603,616,919 | 182 |
| Aug-17 | 119,228,357 | 57,227 | 140,098,096 | 17,102,316,348 | 6,597,445,693 | 175 |
| Sep-17 | 85,144,730 | 40,233 | 86,294,732 | 16,904,530,277 | 6,597,445,693 | 174 |
| Oct-17 | 104,128,342 | 54,835 | 110,578,662 | 16,579,974,568 | 6,597,445,693 | 166 |
| Nov-17 | 93,503,618 | 42,937 | 112,845,822 | 16,714,292,230 | 6,604,445,693 | 169 |
| Dec-17 | 109,446,954 | 41,695 | 124,848,900 | 16,962,550,802 | 6,614,445,693 | 172 |
| Jan-18 | 96,242,592 | 47,227 | 114,237,995 | 17,354,544,342 | 6,625,364,434 | 174 |
| Feb-18 | 117,612,704 | 49,478 | 139,307,878 | 17,942,412,442 | 6,725,964,434 | 167 |
| Mar-18 | 107,616,923 | 52,061 | 132,090,343 | 18,050,493,377 | 6,725,964,434 | 176 |
| Apr-18 | 102,011,529 | 51,861 | 114,535,407 | 18,369,152,510 | 6,725,964,434 | 194 |
| May-18 | 120,163,623 | 46,882 | 207,691,753 | 17,475,605,557 | 6,728,971,623 | 194 |
| Jun-18 | 60,359,418 | 26,588 | 74,990,295 | 17,195,865,745 | 6,738,154,123 | 194 |
| Jul-18 | 72,611,725 | 31,409 | 105,799,897 | 16,815,073,847 | 6,737,894,198 | 195 |
| Aug-18 | 74,240,512 | 29,483 | 191,791,722 | 16,595,766,468 | 6,765,394,198 | 195 |
| Sep-18 | 80,731,058 | 36,895 | 84,151,279 | 16,536,324,954 | 6,765,553,750 | 195 |
| Oct-18 | 139,136,902 | 57,978 | 464,245,847 | 16,328,213,990 | 6,765,553,750 | 195 |
| Nov-18 | 87,923,217 | 46,351 | 101,371,839 | 15,751,106,437 | 6,774,553,750 | 196 |
| Dec-18 | 187,263,641 | 35,620 | 592,306,120 | 16,122,694,186 | 6,807,553,750 | 195 |
| Jan-19 | 65,751,014 | 35,923 | 91,135,471 | 16,379,057,402 | 6,832,974,787 | 195 |
| Feb-19 | 80,483,560 | 39,439 | 97,359,463 | 16,543,660,287 | 6,829,474,787 | 193 |
| Mar-19 | 103,192,627 | 44,641 | 166,036,046 | 15,809,915,236 | 6,828,408,709 | 192 |
| Apr-19 | 112,130,943 | 43,829 | 134,103,964 | 14,950,654,424 | 6,817,408,709 | 191 |
| May-19 | 79,878,478 | 35,732 | 82,864,891 | 14,934,002,978 | 6,817,408,709 | 191 |
| Jun-19 | 92,824,754 | 43,895 | 97,235,874 | 15,450,768,860 | 6,844,408,709 | 191 |
| Jul-19 | 154,532,097 | 61,040 | 149,747,021 | 15,439,499,335 | 6,845,263,709 | 189 |
| Aug-19 | 89,077,869 | 35,465 | 108,045,845 | 15,030,870,041 | 6,849,763,709 | 190 |
| Sep-19 | 125,663,713 | 47,405 | 152,001,842 | 14,998,478,651 | 6,846,519,898 | 190 |
| Oct-19 | 118,572,452 | 43,511 | 259,282,341 | 14,737,601,702 | 6,857,013,091 | 166 |
| Nov-19 | 75,160,868 | 34,955 | 74,363,597 | 14,771,348,283 | 6,846,569,617 | 192 |
| Dec-19 | 79,177,987 | 37,176 | 85,811,701 | 14,914,795,135 | 6,846,569,617 | 192 |
| Mean | **114,975,554** | **48,122** | **187,464,228** | **16,544,364,637** | **6,736,902,326** | **185** |

**Data source:** monthly ASE bulletins and monthly statistical bulletins.

**Table 12:** ***Descriptive Statistics for Liquidity Figures in OTC Market and ASE***

| variables | OTC market capitalization | ASE market capitalization |
|---|---|---|
| **Mean** | 240,248,304 | 16,544,364,637 |
| **Median** | 237,577,514 | 16,655,029,349 |
| **Maximum** | 356,559,419 | 18,369,152,510 |
| **Minimum** | 78,243,717 | 14,737,601,702 |
| **Std. Dev.** | 73,808,044 | 1,080,143,247 |
| **Skewness** | -0.4915 | -0.2464 |
| **Kurtosis** | 2.8288 | 1.9598 |
| **Jarque-Bera** | 1.4932 | 1.9873 |
| **Probability** | 0.4740 | 0.3702 |
| **Observations** | 36 | 36 |

The Augmented Dickey Fuller (ADF) and Phillips-Perron (P-P) tests were used to examine the stationary of the time series data, next the ARDL Bounds test was used to study the long-run co-integration relationship between variables. Then the Wald test was used to confirm the direction of causality between OTC-market initiation and ASE liquidity. The unrestricted VAR test was applied to determine the optimal lag selection. Lag structure and lag length criteria was studied depending on Akaika Information Criterion (AIC) and Table (13) presents the lag order selected by the AIC.

**Table 13:** ***Optimal Lag Selection***

| **Part A: VAR Lag Order Selection Criteria** | | | | | | |
|---|---|---|---|---|---|---|
| Lag | LogL | LR | FPE | AIC | SC | HQ |
| 0 | 45.63164 | NA | 0.004161 | -2.644342 | -2.553644 | -2.613825 |
| 1 | 79.74766 | 62.02913* | 0.000559* | -4.651373* | -4.515327* | -4.605598* |
| 2 | 80.10160 | 0.622076 | 0.000582 | -4.612218 | -4.430823 | -4.551184 |
| 3 | 81.32942 | 2.083580 | 0.000575 | -4.626026 | -4.399282 | -4.549733 |

| **Part B:Optimal Lag Selection** | |
|---|---|
| **Variables** | **Lag Order** |
| Logarithm of ASE Market Capitalisation | 1 |
| Logarithm of OTC- Market Capitalisation | 1 |

Next, the study tested the stationarity of the selected time series data using the Augmented Dickey-Fuller test, the results are presented in Table 14. The Augmented Dickey Fuller and Phillips-Perron tests were employed to test for stationarity of market capitalisation series for the OTC market and the ASE. The two tests run in level and first difference, the equation includes first: no intercept, no trend, second: intercept, third: intercept and trend. The tests critical values provided at 1%, 5%, and 10% levels. *MacKinnon (1996) one-sided p-values.

Both the ADF and P-P values for market capitalisation is more than MacKinnon (1996) critical values for rejection of hypothesis of a unit root at 1%, 5% and 10% level of significance. This proves that both the market capitalisation for the OTC market and the ASE series are non-stationary in nature, but they are stationary at the first difference level.

**Table 14:** ***Unit Root Test Results for Market Capitalisation for the OTC Market and the ASE***

| Variables | Test In | Augmented Dickey Fuller (ADF) | | | Phillips-Perron (PP) | | | Integration Order |
|---|---|---|---|---|---|---|---|---|
| | | No Intercept No Trend | Intercept | Intercept and Trend | No Intercept No Trend | Intercept | Intercept and Trend | |
| **OTC-Market Capitalisation** | Level | 0.234704 (0.7477) | -4.31236 (0.0019) | -4.314611 (0.0091) | -0.032707 (0.6650) | -2.674041 (0.0886) | -2.616719 (0.2757) | **I(1)** |
| | 1% | -2.641672 | -3.65373 | -4.273277 | -2.632688 | -3.632900 | -4.243644 | |
| | 5% | -1.952066 | -2.95711 | -3.557759 | -1.950687 | -2.948404 | -3.544284 | |
| | 10% | -1.610400 | -2.61743 | -3.212361 | -1.611059 | -2.612874 | -3.204699 | |
| | **First Difference** | -4.553884 (0.0000) | -4.54512 (0.0010) | -4.603908 (0.0047) | -5.569660 (0.0000) | -5.570405 (0.0001) | -5.564742 (0.0003) | |
| | 1% | -2.641672 | -3.66166 | -4.284580 | -2.634731 | -3.639407 | -4.252879 | |
| | 5% | -1.952066 | -2.96041 | -3.562882 | -1.951000 | -2.951125 | -3.548490 | |
| | 10% | -1.610400 | -2.61916 | -3.215267 | -1.610907 | -2.614300 | -3.207094 | |
| | | | | | | | | |
| **ASE-Market Capitalisation** | **Level** | -1.212087 (0.2023) | -0.545527 (0.8700) | -2.607564 (0.2795) | -1.718856 (0.0810) | -0.344545 (0.9079) | -2.328467 (0.4085) | **I(1)** |
| | 1% | -2.632688 | -3.632900 | -4.252879 | -2.632688 | -3.632900 | -4.243644 | |
| | 5% | -1.950687 | -2.948404 | -3.548490 | -1.950687 | -2.948404 | -3.544284 | |
| | 10% | -1.611059 | -2.612874 | -3.207094 | -1.611059 | -2.612874 | -3.204699 | |
| | **First Difference** | -4.711950 (0.0000) | -4.859952 (0.0004) | -4.780498 (0.0027) | -4.622504 (0.00000) | -5.278551 (0.0001) | -5.447732 (0.0005) | |
| | 1% | -2.634731 | -3.639407 | -4.252879 | -2.634731 | -3.639407 | -4.252879 | |
| | 5% | -1.951000 | -2.951125 | -3.548490 | -1.951000 | -2.951125 | -3.548490 | |
| | 10% | -1.610907 | -2.614300 | -3.207094 | -1.610907 | -2.614300 | -3.207094 | |

The ARDL Bounds test was used to study the long run co-integration relationship among time series variables. The result of the ARDL Bound test is presented in Table (15). The value of F-statistic is lower than the lower bound I(0) of the critical values, this indicates that there is no co-integration, hence no long-run relationship. Therefore, we estimate the short-run model, which is the Autoregressive Distributed Lag (ARDL) Model. The ARDL (p,q) model is specified as:

$$\Delta LnASEMC_{t} = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta LnASEMC_{t-i} + \sum_{i=1}^{q1} \alpha_{2i} \Delta LnOTCMC_{t-i} + \varepsilon_t \qquad (3)$$

Where i is the number of variables in the model, p is the lags used for the dependent variables, and q is lag used for the exogenous variable, while $\varepsilon t$ is the error term.

**Table 15:** ***ARDL Bound Test Results***

| **Test Statistic** | **Value** | **k** |
|---|---|---|
| F-statistic | 0.508266 | 1 |
| **Critical Value Bounds** | | |
| **Significance** | **I(0) Bound** | **I(1) Bound** |
| 10% | 4.04 | 4.78 |
| 5% | 4.94 | 5.73 |
| 2.5% | 5.77 | 6.68 |
| 1% | 6.84 | 7.84 |

The OLS regression model is used to estimate the coefficient of variables in the short-run model. Table (16) presents the results of the OLS regression model. The results in Table (17) assure that the market capitalisation in the OTC markets were negatively affecting the market capitalisation of the ASE, indicating that the liquidity transformed from the ASE to the newly initiated OTC market. So, the liquidity of ASE decreased by the initiation of the OTC-market.

**Table 16:** ***OLS Regression Results***

| Variable | Coefficient | t-Statistic | Prob. |
|---|---|---|---|
| D(LNASEMC(-1)) | 0.200824 | 1.251045 | 0.2203 |
| D(LNOTCMC) | -0.042378 | -2.416555 | 0.0217 |
| C | -0.002616 | -0.675359 | 0.5045 |
| Adjusted R-squared | 0.134246 | | |
| F-statistic | 3.558524 | | |

## Conclusion

The primary aim of this paper was to investigate the causality relationship between stock market development and GDP growth rate in Jordan during the period 2000-2018. Our findings support studies arguing that GDP growth and financial development evolve independently. As a result, caution must be exercised in making general conclusions about the causal relationship between financial development and GDP growth rate. This study found a positive relationship between stock market development proxied by turnover ratio and economic growth in the short-run, with a unidirectional causality relationship from market development to economic growth, hence we recommend that financial regulation is required in an effort to reduce the role on the banking sector, in line with Basel III. We suggest that stock market development must be encouraged, yet constraints are advised to

stop stock markets becoming too big and too liquid. Otherwise, the returns of stock market development would become smaller than the cost of instability (de la Torre et al. (2011)), thereby resulting in the non-monotone relationship even stronger as we obtained.

The interest rate spread -as expected- has a negative impact on the GDP growth rate, since the higher interest rate spread badly affects savers and investors; the potential savers were discouraged, and the potential investors find that as a barrier for investment. A bidirectional causality relationship is predicted between the interest rate spread and the GDP growth rate. However, the causality relationship between financial depth and GDP growth rate is absent. Given the short-run significance of stock market development on GDP growth rate, authorities and stakeholders should safeguard the stability of the stock market and its development.

On the stationary data series, OLS regression was conducted, the results reveal that the market liquidity for OTC-market negatively affects ASE liquidity. This means that the initiation of the OTC-market attracts some of the liquidity from the ASE since stock prices in the OTC-market are exceptionally low because of bad financial positions of the listed companies in the OTC-market. In addition, our results suggest that some investors are interested in increasing the stock price for companies listed at the OTC-market in order to improve the financial conditions of these companies and to move them to the second or the first market. Next, the Wald test for testing Causality between ASE liquidity and the OTC-market liquidity was conducted. The test revealed that there is a bi-directional causality between the liquidity of the ASE and the OTC-market liquidity. This proves that when investors trade actively in the ASE as a secondary market, there is a negative influence on the liquidity of the OTC - market and vice - versa.

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