ISSN: 2658-8455
Volume 3, Issue 4-1 (2022), pp.78-93.

IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

The impact of stock market development on economic growth in Morocco: An analysis using the VAR approach

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Disclosure Statement :	Author is not aware of any findings that might be perceived as affecting the objectivity of this study
Conflict of Interest :	The author reports no conflicts of interest.
Journal statement:	This article is published without APC
Cite this article :	EL YAMANI, R. (2022). The impact of stock market development on economic growth in Morocco: An analysis using the VAR approach. International Journal of Accounting, Finance, Auditing, Management and Economics, 3(4-1), 78-93. https://doi.org/10.5281/zenodo.6611955
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Received: May 05, 2022 *Published online: June 06, 2022*

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Abstract :

The determination of the factors that can stimulate economic growth has been important, and given the importance of the stock market in economic development, a serval researches are interested in the analysis of the relationship between stock market development and economic growth. The studies have confirmed that the economic growth, in a nation, is positively impacted by the stock market development.

As a developing country, Morocco is looking for a development model that will allow it to ensure a durable economic growth.

This paper seeks to examine the link between stock market development and economic growth

In Morocco, using time-series data sourced from the Central Bank of Morocco covering the period of 2008-2021, with a quarterly frequency, and using the vector autoregressive (VAR) approach to estimate the results.

The capitalization and liquidity are used as stock market indicators. The results of the study show that the coefficient of the capitalization has a positive sign but for the liquidity it has a negative sign. In the other hand, for the control variables, the coefficient of the inflation rate has a positive sign but that of the real effective exchange has a negative sign.

Keywords: Stock market, Capitalization, Liquidity, Economic growth, VAR, Morocco.
JEL Classification : E44
Paper type : Empirical research

ISSN: 2658-8455
Volume 3, Issue 4-1 (2022), pp.78-93.

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International Journal of Accounting, Finance, Auditing, Management & Economics

1. Introduction

The stock market is a complex concept, it has no precise definition, its development is measured, according to Levine, R. (1997) and Ho, S. Y. (2018), by its size, its volatility and its liquidity and its integration in the international market. However, it has usually been analyzed by the stock market capitalization and liquidity (Levine, R., & Zervos, S. 1996; Hasan, M. A. 2018). The stock market is a very important component in the economy, it has become an indicator of the successful financial policies, for some financial organizations like the International Monetary Fund (IMF).

Nowadays, the stock market has a very important place, in each economy, its role is to create a more liquid and efficient financial market, which can contribute to the economic growth, through its ability to reconcile the financing needs and investment needs of different actors.

One of the channels, through which the stock market impacts the economy, is its capacity to mobilize savings and direct the capital towards the most profitable sectors of activity. The capital optimal allocation is related to the degree of the stock market efficiency.

The modernization of the regulations and the structural conditions are all the factors that can explain the transformation of the economy financing mode, and consequently the financial market development. Therefore, stock market indexes represent a considerable economic and financial stake and they constitute a particularity of statistical indexes, because they synthesize the information and the trends brought by the various economic indicators. The trend of a stock market is analyzed by the trends of its indices.

The analysis of the link between stock market development and economic growth is the subject of intense debate, not only theoretical but also empirical studies. Indeed, if it is generally accepted that the stock market development stimulates economic growth, economic growth can also contribute to the financial markets development.

In Morocco, the stock market has undergone an important modernization movement, with the objective of moving the Moroccan economy from a debt economy to a financial market economy and to reach, consequently, a situation of optimal resource allocation. However, at present, the stock market is suffering from a low-liquidity.

The objective of this paper is to answer the following question: Does the stock market development impacts the Moroccan economic growth?

In this paper, we will study and analyze the relationship between stock market development, measured by the ratio of market capitalization and the ratio of liquidity, and economic growth, measured by GDP per capita. To carry out this stud, in the first time, it is very interesting to explore the literature review that studies the relationship between stock market development and economic growth. Secondly, we will empirically analyze this relationship, using the vector autoregressive (VAR) approach.

2. Literature review

The debate on the link between the financial market and the economic growth goes back to Bagehot (1873) who shows, in his thesis, that the market liquidity contributes to the transformation of innovations into industrial investments in the British revolution.

Also, Schumpeter (1911) supports the importance of the bank credit in the economic development, it can improve the productivity by encouraging technological innovation.

Several economists argue that the financial system development, with its main components bank and financial market, has a positive impact on the economic growth. Hicks (1969) emphasizes the role of the financial system in the England industrialization, he shows that, through market liquidity, these innovations were transformed into investments that generated jobs and growth. Goldsmith (1969) confirms the positive effect of financial intermediation on

economic growth, conducting a study of 35 countries, he found that the countries with the highest financial indicators are the rich countries such as Great Britain, Italy and Japan.

The link between financial development and economic growth has undergone important investigations. The financial liberalization theory, which was conceived by Mckinnon (1973) and Shaw (1973), indicates that the effective way to accelerate economic growth in developing countries is the financial system development. Furthermore, Levine (1991), Bencivenga, Smith and Atarr (1996) outline that financial market liquidity is important for economic growth, since strong liquidity will facilitate long-term investment and therefore promotes economic growth.

Empirically, many studies have proven the strong link between financial development and economic growth. King and Levine (1993), in their study using a cross-section panel data, indicate, in addition to the existence of a positive relationship between the two variables, it is possible to predict economic growth on the basis of financial indicators.

Regarding the relationship between the stock market development and the economic growth, Atje and Jovanovic (1993), using panel data for 39 countries, confirm a positive and significant link between stock markets and economic growth. Also, Beck and Levine (2004), using dynamic panel data for a group of countries, support the positive impact of stock markets on economic growth. Adjasi and Biekpe (2006) find a similar result for 14 African countries, using dynamic panel data.

Recently, Kadenge and Tafirei (2014), using ARDL approach, show a long-run relationship between stock market developments and economic growth in Zimbabwe. Azam, Muhammad, et al. (2016), report that there is a long-run relationship between stock market development and economic growth in four Asian countries. Ullah, Zia, and Shahida Wizarat (1016), in their study applied on four South Asian economies, support that economic growth is affected by stock market development in the short and long-run. Murari (2017) proclaim the impact of stock market capitalization and liquidity on economic growth. Coşkun, Yener, et al (2017), show that there is a cointegrating relationship between capital market development and economic growth in Turkey. Ghartey (2018), in his study, confirms the same results. Mamun, Abdullahil, et al (2018), using Granger causality tests, confirm a bidirectional causal relationship between stock market development and economic growth in Bangladesh. Hasan, M. A. (2018), shows that the stock market development impacts the economic growth only in the long run in Bangladesh. Ho, S. Y. (2018), supports that the stock market development contributes to the growth in Hong Kong. Nguyen and Bui (2019) confirm the positive link between stock market and economic growth in Vietnam.

Hamzah, Abdullah and Hamid (2020), show that stock market development has a significant impact on economic growth in Thailand. However, Algaeed (2021), using an ARDL approach in Saudi Arabian context, finds that the capitalization and liquidity had, bout of them, a negative effect on economic growth. Nguyen, Huynh, and TO (2021) admit a co-integration relationship between the stock market and credit market development and economic growth in Asia. Also, Arsad and Khalid (2021) confirm the positive impact of stock market integration on economic growth in Europe high-income countries and Asia. Nevertheless, there is no impact in Asia Middle-Income countries. Afonso and Reimers (2022), using a panel data for 48 Sub-Saharan countries over the period of 1970-2018, show that the introduction of stock exchange markets rises the GDP per capita for around 40% of the Sub-Saharan countries.

The following table (1) summarizes the main empirical studies that have studied the relationship between stock market development and economic growth in the countries under study.

ISSN: 2658-8455
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International Journal of Accounting, Finance, Auditing, Management & Economics

Table 1: The main empirical researchers that have studied the link between stock market development and economic growth

Authors	Endogenous variable	Exogenous variables	Methodology and sample	Results
Algaeed, A. H. (2021).	Gross domestic product (GDP)	- The ratio of market value of shares to GDP as a proxy of capitalization (MV), -Total number of shares traded (NS), -Share Price Index (INDEX), -Total Volume of Transactions (T) -Value of shares (VS)	Auto regressive distributed lags (ARDL) From 1985 to 2018 In Saudi Arabian	- MV has a negative impact - NS has a positive impact -Index has no impact -T has a positive impact -VS has a negative impact
Nguyen, B. K., Huynh, V. T., & TO, B. C. (2021).	Real gross domestic product (GDP) per capita	-The ratio of domestic credit to the private sector to GDP (LnCM). -The stock market capitalization to GDP ratio (LnSM). -The growth rate of the employed population (LnP)	Using Nonlinear Autoregressive Distributed Lag model (NARDL) CCE method in Asia from 2000 to 2019	-A positive impact of the ratio of domestic credit to the private sector to GDP -A positive and significant long-run impact of stock market development
Hamzah, M. S., Abdullah, H., & Hamid, M. S. A. (2020)	GDP per capita (GDPC)	-Total Value of Traded Stocks (TVS) -Stock Turnover Ratio (STO) -Interest rate (RIR) and -Inflation rate (INF)	Using the autoregressive distributed lag (ARDL) A time-series data from 1985 to 2018 in Thailand	In the long term: - TVS has a negative effect - STO has a positive effect. -RIR and INF have no effect In the short term: all coefficients are not significant.
Nguyen, M. L. T., & Bui, T. N. (2019).	Economic growth GDP	-Stock market efficiency (SME) -Net trading value by foreign investors (FI) -Real estate market (REM) -Global financial crisis (GFC)	Using the Autoregressive Distributed Lag (ARDL) approach For Quarterly data in Vietnam from 2004Q3 to 2018Q3	-SME, FI and REM have a positive impact -GFC has a negative impact
Hasan, M. A. (2018).	Growth of GDP in real terms	-Market Capitalization Ratio (MCR) -Turnover Ratio (TR)	Using Autoregressive Distributed Lag (ARDL) For time series data from 1981 to 2017 in Bangladesh	-MCR and TR have a positive impact in the long term

Ho, S. Y. (2018).	logarithm of real GDP per capita	-Stock market development (SMD) - Inflation rate (INF) -Government expenditure (GOV) -Human capital (HC) -Physical capital (PC) -DUM is the dummy variable that captures the presence of structural breaks	In Hong Kong from 1986Q2 to 2015Q4	-In the short run: SMD; INF, PC and GOV have a positive impact, but DUM has a negative impact, HC has no impact. -In the long run: SMD, HC and GOV have a positive impact, but INF has a negative impact. PC and DUM have no impact.
Mamun, A., Ali, M. H., Hoque, N., Mowla, M. M., & Basher, S. (2018).	Gross Domestic Product GDP	-Stock market capitalization ratio (SMD) - Broad money divided by GDP (FD) -Interest Rate Spread (IRS) -Real Effective Exchange Rate (REER)	Employing ARDL Bounds testing Approach Bangladesh economy for the period 1993-2016	-In the long run: SMD, FD and REER have a positive impact, but IRS has a negative impact -In short run : SMD has a positive impact, FD and REER have a negative impact but IRS has no impact
Coşkun, Y., Seven, Ü., Ertuğrul, H. M., & Ulussever, T. (2017)	Gross Domestic Product (GDP)	-The capital market development(CAPD) -Total value of short and long term government bonds (DIBS), -The employment growth rate (EMPG) - Inflation rate (INF) -The growth rate of the reel effective exchange rate index (REERG)	Using ARDL Over the period of 2006:M1 and 2016:M6 in Turkey	-In the short term: CAPD has a positive effect, Other variables have a negative impact except EMPG that has no impact. -In the long term: CAPD has a positive effect, INF and REERG have a negative impact but DIBS and EMPG have no impact.
Azam, M., Haseeb, M., Samsi, A. B., & Raji, J. O. (2016)	GDP per capita,	-The stock market Capitalization (SMC), -Inflation rate (INF), -Foreign direct investment (FDI)	Using ARDL approach Annual time series cross country data over the period 1991 to 2012 about four Asian countries	-In the long term: SMC and FDI have a positive impact just in China and Singapore Also, INF has a positive impact just in Singapore -In the short term: SMC has a positive impact in India and China, INF has a positive impact in Bangladesh and Singapore, FDI has a positive impact in China and Singapore
Ullah, Z., & Wizarat, S. (2016)	GDP Gross Domestic Product	-Market Capitalization Ratio to GDP (MACP) -Traded Shares Ratio to GDP (VTR)	Using panel data ARDL in case of four South Asian economies, for	-MACP, VTR and TVR have a positive impact -TO has a positive effect -INF has a negative impact

ISSN: 2658-8455
Volume 3, Issue 4-1 (2022), pp.78-93.

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International Journal of Accounting, Finance, Auditing, Management & Economics

		-Traded Shares Ratio to Market Capitalization (TVR) - Trade openness (TO) -Inflation rate (INF)	the period 1990 to 2011. .	

Source: Author

3. Methodology

The relationship between the stock market development and the economic growth has become a subject of debate among economists. While the majority of the research confirm a positive link between the stock market development and the economic growth.
This study examines the impact of the stock market development on the economic growth in Morocco through the VAR model over the period from 2008Q1 to 2021Q4.

3.1. Data description

The study covers the period between 2008-2021, with a quarterly frequency.
The following equation describes the relationship between GDP per capita and stock market development indicators and control variables:

$$\boldsymbol{GDP_t = \alpha + \beta_1 SMC_t + \beta_2 Liquidity_t + \beta_3 INF_t + \beta_4 REER_t + \varepsilon_t}$$

GDP: Gross Domestic Product per capita
SMC: Stock Market Capitalization Ratio to GDP
Liquidity: Stock Market Liquidity Ratio to GDP
INF: Inflation rate
REER: Real Effective Exchange Rate
$\boldsymbol{\alpha}$: the constant term
$\boldsymbol{\beta_i}$: the coefficients to be estimated; *i*= 1, 2, 3,4.
$\boldsymbol{\varepsilon_t}$: The error term
t: refers to the time dimension.
In this study, we use the stock market capitalization (SMC) and the stock market liquidity (Liquidity) as stock market development indicators, we include the inflation rate (INF) and the real effective exchange rate (REER) as a control variable.

3.2.Analytical Techniques

The use of VAR modeling goes back to Sims (1980). It makes it possible to explain a variable by its lags and the information contained in other variables. It allows you to have a really great information. In this modeling, all variables are initially considered as potentially endogenous.
In general, VAR modeling consists to estimate a vector of stationary variables from and each variable is, therefore, explained by the history of all the variables.
Our study is based on the vector autoregressive (VAR) model to understand the relationship between our variables. To do this, we will follow these steps:

3.2.1. Augmented-Dickey Fuller and Phillips-Perron tests

Augmented Dickey Fuller (ADF) test is used to analyze the stationarity, because it allows, not only to detect the existence of a non-stationarity but also, to determine which type of non-stationarity it is (Trend Stationary (TS) or Difference Stationary (DS) process) and thus the right method to make the series stationary. Also, we applied Phillips-Perron (PP) unit root test. The results, presented in table 2, show that all variables are stationary after the first difference. Since, all the variables have the same integration order I (1), it is necessary to test the existing of the cointegration among all variables.

In fact, before the cointegration test, it is necessary to determine the lag length.

3.2.2. Determination of the Optimal Lag order

The determination of the optimum lag is done by estimating the VAR model for several values of the lag p, the optimal lag is the one that minimizes the Akaike and Schwarz information criteria. According to table 3, the most of the selection criteria selected the 1 lag length. Hence, the 1 lag length will be used in Johansen co-integration test, causality test and in estimating VAR model.

3.2.3. Co-integration Test

This test allows us to determine the existence or no of a long-run relationship. Using Johansen co-integration trace test, the output, in table 4, we accept that there is no co-integration relationship among the five variables; in this case, the use of VAR model is appropriate.

3.2.4. Causality Test

The results of the Granger causality test are given in table 5. The result suggests that SMC, Liquidity and REER cause GDP but INF does not cause GDP. In the other hand, the results show the existing of bidirectional causalities between INF and REER. For the other variables, this test eliminates all causal relationships (the probabilities are greater than 0.05).

3.2.5. Model Estimation and Validation

The results of the VAR (1) estimation (table 6) provide a 0.995 for the R-squeared determination coefficient, which means that 99,5% of the variation in the economic growth is explained by the variation of the explanatory variables. This involves that the model is good.
However, the individual variables significance cannot be interpreted, because of the absence of the p-values in the estimate VAR. As a consequence, it has become relevant to make system equation and estimate the first equation with coefficients, t-statistic and p-value for each variable (table 7). According to the results, as summarized in table 7, at 5% level, the coefficient of the capitalization has a positive and significant impact on the economic growth, however, that for the liquidity has a negative and significant impact at 10% level. For the control variables, the coefficient of the inflation has a positive and significant impact, but that of the real effective exchange has a negative sign at 10% level.
We can use a series of tests to validate the VAR (1) estimates. The results of the robustness test, as summarized in table 8, indicate that the errors are not autocorrelated, they are also homoscedastic and normally distributed. Then, the estimated VAR (1) is overall good and explains 99,5% of the GDP per capita dynamics in Morocco, from Q1-2008 to Q4-2021.

3.2.6. Inverse Roots of AR

According to the graph of AR inverse root of the VAR (1), in Fig.1, all the polynomial roots are inside the unit circle. Thus, the stability condition is verified. The VAR (1) model is stable, since, the analysis of the impulse response functions will be relevant.

3.2.7. Impulse Response

Impulse response functions measure the consequence of an innovation on the variables. It is one of the main uses of VAR processes. This response represents the effect of an innovation on the present and future values of endogenous variables. It shows the impact of an innovation in a variable on the response of another variable, this in the short, medium and long run.
According to the fig,2 one percent innovation in the stock market capitalization guarantee a positive response by GDP per capita in both the short and long run. However, the response of GDP per capita to an innovation in the stock market liquidity is almost zero in both the short

ISSN: 2658-8455
Volume 3, Issue 4-1 (2022), pp.78-93.

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International Journal of Accounting, Finance, Auditing, Management & Economics

and long run. An innovation in the inflation rate leads to a short and positive response of GDP in the short run. In the medium and long term, its effect gradually fades and disappears. Finally, the response of GDP to an innovation in the real effective exchange rate is positive in the short run, in the medium and long term, its effect becomes negative.

3.2.8. Variance Decomposition

The objective of the analysis of the variance decomposition is to obtain information about the relative importance of innovations in the variations of each of the model's variables. When an innovation explains a large part of the variance of the error, we deduce that the economy studied is very sensitive to the innovations affecting this series. Ultimately, it allows us to determine the direction in which the innovation has more impact.

As shown in table 9, 47.45% of the variance of the forecast error of the GDP is due to its own innovations; 38.60% to innovations in the liquidity; 12.75% to innovations in the real exchange rate; 0,91% to innovations in the inflation rate and 0,46% to innovations in the capitalization. The results show that capitalization impacts GDP but the response of GDP to innovations on this indicator is very weak.

4. Results and Discussion

Based on the availability of secondary data of Morocco for the period from 2008 to 2021, with a quarterly frequency, a vector autoregressive (VAR) approach has been estimated to analyze the impact of stock market development on economic growth in Morocco. The stock market capitalization, the stock market liquidity, the inflation rate and the real effective exchange rate are included as independent variables and GDP per capita as a dependent variable.

The finding, in table 7, illustrates that the capitalization (SMC) has a positive and significant coefficient. Notably, a 1% increase in the capitalization will contribute to Moroccan GDP, in average, by 3,19%, that means the size of the stock market impact positively economic growth in Morocco. This result is consistent with previous studies, according to the results found by Nguyen, B. K., Huynh, V. T., & TO, B. C. (2021), for Asian countries, the authors find that the stock market capitalization has a positive impact on GDP per capita, also, Hasan, M. A. (2018) found a positive and significant impact, in long run, of market capitalization ratio on economic development in Bangladesh. A similar result is found by Mamun, A., Ali, M. H., Hoque, N., Mowla, M. M., & Basher, S. (2018), in the short and long run, in Bangladesh. However, the result found by Algaeed, A. H. (2021) shows a negative and significant impact of stock market capitalization on economic development in Saudi Arabian, but Hamzah, M. S., Abdullah, H., & Hamid, M. S. A. (2020) found no impact in the short run in Thailand.

Levine (1991) shows that financial market liquidity is important for economic growth, in our case the stock market liquidity ratio to GDP (Liquidity) had the unexpected sign it came up with the negative and significant coefficient indicating the negative impact of the market liquidity on Moroccan economic growth. Particularly, a 1% increase in the stock market liquidity ratio cause a reduction in Moroccan GDP, in average, by 1,56%. Contrary to the results found by Hamzah, M. S., Abdullah, H., & Hamid, M. S. A. (2020), the authors found a positive and significant impact in the long run but no impact in the short run in Thailand. Hasan, M. A. (2018) shows that a highly significant long-run causality between the stock market liquidity and real economic growth in Bangladesh.

For the control variables, in accordance with previous studies, the coefficient of the inflation had a positive and significant impact, that means a 1% increase in the inflation rate lead to increase the Moroccan GDP, in average, by 0,44%. Ho, S. Y. (2018) found the same result in Hong Kong. Also, Azam, M., Haseeb, M., Samsi, A. B., & Raji, J. O. (2016), in the short run, found that the inflation had a positive impact in Bangladesh and Singapore and no impact for

India and China, in the long run, it had a positive impact just in Singapore and no impact in the other countries. However, Hamzah, M. S., Abdullah, H., & Hamid, M. S. A. (2020) found no impact for the inflation rate on the economic growth in Thailand. Coşkun, Y., Seven, Ü., Ertuğrul, H. M., & Ulussever, T. (2017) found that the inflation rate had a negative impact in Turkey in the short and long run, a similar result is found by Ullah, Z., & Wizarat, S. (2016) for four South Asian economies, India, Bangladesh, Pakistan and Sri Lanka.

The real effective exchange rate came with a negative and significant coefficient, in particular, a 1% increase in the real effective exchange rate leads to decline in economic growth by 8,46%. A similar result is found by Coşkun, Y., Seven, Ü., Ertuğrul, H. M., & Ulussever, T. (2017), the authors confirmed a negative impact in the short and long run in Turkey. Also, Mamun, A., Ali, M. H., Hoque, N., Mowla, M. M., & Basher, S. (2018) found that the real effective exchange rate impacts positively in long-run, the economic growth bat its impact is negative in the short run.

5. Conclusion

We assessed the impact of the stock market development, measured by the stock market capitalization and liquidity, on the economic growth in Morocco, using time-series data over the period of 2008-2021, with a quarterly frequency. To estimate the results, we apply a vector autoregressive (VAR) approach. Our model is different in the sense that it includes relevant variables, that used in the most of research's studies, analyzing the link between the stock market development and economic growth. More importantly, our results show that the capitalization has a little positive impact on the economic growth, on the other hand the liquidity has a little negative impact.

According to the explanations provided by the report on financial stability published in 2017, prepared jointly with Supervisory Authority of Insurance and Social Welfare (ACAPS) and Bank Al-Maghrib. The report argues that the Moroccan market suffers from a low liquidity, this situation is explained by the weakness of the free float factor (the portion of shares really traded on the stock market) on the Moroccan market, as well as the structure of the Moroccan stock market that does not encourage small and medium-sized enterprises to integrate it, what's more, there is no stock market dedicated to SMEs, knowing that 90% of Moroccan companies are SMEs (the Chamber of Commerce and Industry). Thus, according to the platform of the Casablanca stock exchange, it has only 76 traded companies.

The Moroccan stock market remains important for our economy. Today, it is important to encourage the introduction of SMEs on the stock exchange, in order to help them find financing solutions. Attention must be paid to the attractiveness of new investors, both local and foreign, and the diversification of savings managers.

Structural reforms can be implemented, such as progressive legislation, the creation of a compartment dedicated to SMEs, the creation of new products with adapted costs, all of which can revitalize the Moroccan stock market.

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Appendices

Table 2: Augmented-Dickey Fuller and Phillips-Perron tests result

Variables	Test in	Includes	Augmented-Dickey Fuller		Phillips-Perron	
			t-statistic	p-value	t-statistic	p-value
GDP	Level	Trend, Intercept	-1.500063	0.2500	-1.498056	0.2503
		Intercept	-1.374719	0.5870	-1.077852	0.7177
		None	1.525198	0.9671	2.815671	0.9985
	1st Difference	None	-2.245038	0.0253**	-8.351856	0.0000***
SMC	Level	Trend, Intercept	-2.859369	0.1840	-2.854920	0.1854
		Intercept	-2.649282	0.0900	-2.684854	0.0836*
		None	-0.670577	0.4217	-0.672944	0.4206
	1st Difference	None	-6.899274	0.0000***	-6.892582	0.0000***
Liquidity	Level	Trend, Intercept	-1.328888	0.1961	-1.762921	0.1218
		Intercept	-1.599117	0.1205	-1.728209	0.1030
		None	-1.720622	0.2375	-1.822047	0.1257
	1st Difference	None	-8.357319	0.0000***	-8.389613	0.0000***
INF	Level	Trend, Intercept	-1.398806	0.2203	-1.451418	0.1431
		Intercept	-1.154451	0.1035	-1.151827	0.2107
		None	-1.124807	0.2407	-1.388878	0.1709
	1st Difference	None	-5.913434	0.0000***	-7.22777	0.0000***
REER	Level	Trend, Intercept	-1.207194	0.8991	-1.248104	0.8900
		Intercept	-1.718228	0.4166	-1.772374	0.3901
		None	-0.408552	0.5318	-0.398963	0.5355
	1st Difference	None	-7.202885	0.0000***	-7.206130	0.0000***

Note. Figures in brackets show the lag length.
***, ** and * denote statistical significance at 1%, 5% and 10% level respectively.

Table 3 : VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	12.57146	NA	4.77e-06	-0.902259	-0.703430	-0.868609
1	77.39769	95.53340*	2.94e-08	-6.447363*	-5.047716*	-6.144515*
2	97.24995	20.89711	2.59e-08*	-6.041862	-4.657900	-5.873613

ISSN: 2658-8455
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IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

Table 4: Johansen Cointegration Trace Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.724976	38.44409	47.85613	0.1440
At most 1	0.531209	23.91704	29.79707	0.2040
At most 2	0.394091	9.522692	15.49471	0.3192

Table 5: VAR Granger Causality Test

Dependent variable: GDP			
Excluded	Chi-sq	df	Prob.
SMC	4.714010	1	**0.0299**
LIQUIDITY	3.951658	1	**0.0468**
INF	0.828109	1	0.3628
REER	3.537574	1	**0.0600**
All	4.831766	4	0.3050
Dependent variable: SMC			
Excluded	Chi-sq	df	Prob.
GDP	1.012682	1	0.3143
LIQUIDITY	0.283461	1	0.5944
INF	0.068864	1	0.7930
REER	0.341161	1	0.5592
All	5.896712	4	0.2070
Dependent variable: LIQUIDITY			
Excluded	Chi-sq	df	Prob.
GDP	0.188646	1	0.6640
SMC	0.437046	1	0.5086
INF	0.058597	1	0.8087
REER	0.162327	1	0.6870
All	0.864435	4	0.9296
Dependent variable: INF			
Excluded	Chi-sq	df	Prob.
GDP	0.158412	1	0.6906
SMC	0.145535	1	0.7028
LIQUIDITY	0.478998	1	0.4889
REER	2.224138	1	**0.0359**
All	2.899958	4	0.5747
Dependent variable: REER			
Excluded	Chi-sq	df	Prob.

GDP	0.669562	1	0.4132
SMC	0.523205	1	0.4695
LIQUIDITY	0.272709	1	0.6015
INF	2.042876	1	**0.0360**
All	1.364538	4	0.8503

Table 6: VAR Estimates

Standard errors in ( ) & t-statistics in [ ]

	DGDP	DSMC	DLIQUIDITY	DINF	DREER
DGDP(-1)	0.798096	0.402626	-0.695809	2.396986	-0.063308
	(0.09467)	(0.40010)	(1.60201)	(6.02243)	(0.07737)
	[8.43055]	[1.00632]	[-0.43433]	[0.39801]	[-0.81827]
DSMC(-1)	0.164257	0.560945	0.846370	-1.836056	0.044723
	(0.07565)	(0.31974)	(1.28025)	(4.81284)	(0.06183)
	[2.17118]	[2.75439]	[0.66109]	[-0.38149]	[0.72333]
DLIQUIDITY(-1)	-0.062998	0.071310	0.393513	1.395325	-0.013525
	(0.03169)	(0.13394)	(0.53629)	(2.01608)	(0.02590)
	[-1.98788]	[0.53241]	[0.73376]	[0.69210]	[-0.52222]
DINF(-1)	0.003159	-0.003850	0.014219	-0.102654	-0.000587
	(0.00347)	(0.01467)	(0.05874)	(0.22081)	(0.00284)
	[1.97000]	[-0.26242]	[0.24207]	[-0.46489]	[-0.20706]
DREER(-1)	-0.646854	0.848983	-2.344855	10.35820	0.669874
	(0.34392)	(1.45351)	(5.81997)	(21.8789)	(0.28107)
	[-0.98084]	[0.58409]	[-0.40290]	[0.47343]	[2.38330]
C	3.170230	-2.928548	6.861990	-50.63086	1.678713
	(1.68374)	(7.11608)	(28.4933)	(107.114)	(1.37606)
	[1.88285]	[-0.41154]	[0.24083]	[-0.47268]	[1.21995]
R-squared	0.995008	0.813880	0.595024	0.139692	0.895861
Adj. R-squared	0.993622	0.762180	0.482531	-0.099282	0.866934
Sum sq. resids	0.002871	0.051275	0.822068	11.61765	0.001917
S.E. equation	0.012628	0.053372	0.213706	0.803384	0.010321
F-statistic	717.5753	15.74235	5.289419	0.584550	30.96928
Log likelihood	74.32093	39.72877	6.433311	-25.34819	79.16402
Akaike AIC	-5.693410	-2.810731	-0.036109	2.612349	-6.097002
Schwarz SC	-5.398897	-2.516217	0.258404	2.906863	-5.802488
Mean dependent	12.35644	13.16716	-2.227849	-0.692033	4.589157
S.D. dependent	0.158122	0.109444	0.297081	0.766246	0.028293

Determinant resid covariance (dof adj.)	6.68E-13
Determinant resid covariance	1.59E-13
Log likelihood	183.3932
Akaike information criterion	-12.78277
Schwarz criterion	-11.31020
Number of coefficients	30

ISSN: 2658-8455
Volume 3, Issue 4-1 (2022), pp.78-93.

IJAFAME
International Journal of Accounting, Finance, Auditing, Management & Economics

Table 7: Least Squares Estimation

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.967808	0.060027	16.12284	**0.0000**
C(2)	0.031872	0.065313	2.487982	**0.0264**
C(3)	-0.015679	0.051940	-1.974633	**0.0761**
C(4)	0.004396	0.005070	1.967135	**0.0874**
C(5)	-0.084614	0.289003	-2.292779	**0.0702**
C(6)	0.346028	1.300326	0.266108	0.7906
Determinant residual covariance		1.76E-12		

Equation: DGDP = C(1)*DGDP(-1) + C(2)*DSMC(-1) + C(3)DLLIQUIDITY(-1) + C(4)*DINF(-1) + C(5)*DREER(-1) + C(6)
Observations: 34

R-squared	0.983769	Mean dependent var	12.35862
Adjusted R-squared	0.980870	S.D. dependent var	0.155661
S.E. of regression	0.021529	Sum squared resid	0.012978
Durbin-Watson stat	1.099089		

Table 8 : Diagnostic Analysis

Diagnostic test	p-values	Result
Autocorrelation LM Test	0.6259	No evidence of serial correlations
White Heteroskedasticity Test	0.4986	No evidence of heteroscedasticity
Normality Test	0.5680	The errors are normally distributed

Table 9: Variance Decomposition of DGDP

Variance Decomposition of LGDP: Period	S.E.	DGDP	DSMC	DLIQUIDITY	DINF	DREER
1	0.012628	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.021743	60.54893	0.071783	33.96982	0.000141	5.409320
3	0.026894	55.63168	0.049101	37.09934	0.333587	6.886292
4	0.031155	52.65047	0.046918	38.69411	0.452879	8.155619
5	0.034658	51.04095	0.076615	39.13956	0.568589	9.174286
6	0.037692	49.92042	0.131476	39.23713	0.659015	10.05195
7	0.040366	49.09298	0.203592	39.15440	0.737149	10.81188
8	0.042760	48.43840	0.286134	38.99531	0.804368	11.47579
9	0.044927	47.90132	0.373904	38.80374	0.863010	12.05802
10	0.046902	**47.44854**	**0.463134**	**38.60348**	**0.914406**	**12.57044**

Fig 1: Graph of AR Inverse Root

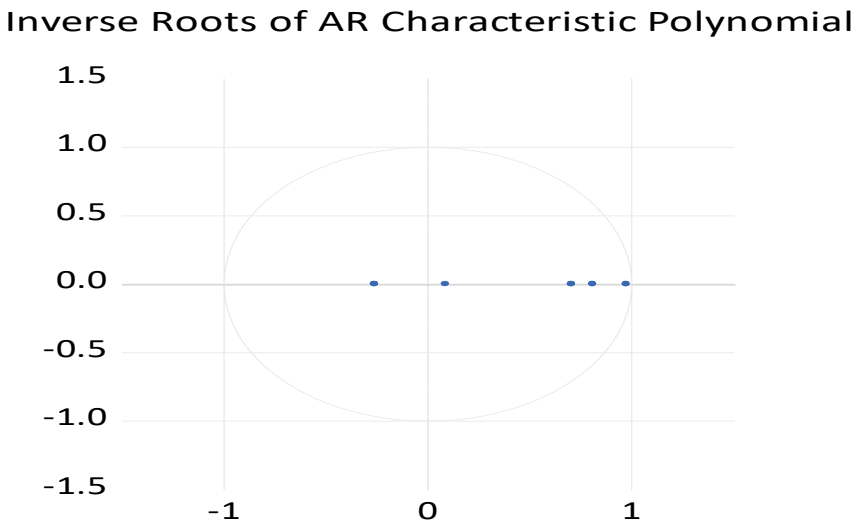

Fig.2 : Impulse Response Function Graph