The Relationship between Inflation and Stock Market Performance in Jordan

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Abstract
The purpose of this study is to investigate the relationship between inflation rate and stock market performance in Jordan through Unit root test, co-integration test and finally error correction model in the time period between 1978 and 2015. This study is one of the first studies to show the relationship between inflation rate measured by GDP deflator and the stock market performance reflected by trading value.The study finds that the variables are non-stationary at their level and they become stationary in their first difference. There are two co-integration equations showing the long run relationship between variables. There is short and long run relationship as indicated by the statistically significant coefficient in the error correction model. Also based on impulse response we find that any positive shock in trading value makes an increase in GDP deflator. On the other hand a positive shock of (GDP deflator) does not create an important impact on trading value..
Keywords: Trading value, VECM, GDP deflator, Granger, Co-integration, Jordan, Impulse response, ASE.

1. Introduction
Jordan occupies a geographical location that imposes a lot of economic and political challenges. These challenges are increasing under what ails the Arab countries around it and in light of the effects of the global financial crisis .Consequently, it is in dire need for take many economic measures to obverse these challenges. The most important of these measures is lift subsidies on goods and services, which will affect inflation.

Inflation is a state in the economy of a country, when there is a persistent rise in aggregate level of price of goods as well as services. Repetitive price increase erodes the purchasing power of money and other financial assets with fixed values creating serious economic distortions and uncertainty. With increase in inflation, every sector of the economy is affected. Ranging from unemployment, interest rates, exchange rates, investment, stock markets. There is an aftermath of inflation in every sector. Inflation is bound to impact all sectors, either directly or indirectly. Inflation and stock market have a very close association. If there is inflation, stock markets are the worst affected (Jepkemei, 2017).

The stock market is a common feature of a modern economy and it is regarded as a very important part of the overall financial system. As they promote the growth and development of the economy by channelizing savings from funds-surplus units of the society to funds deficit units, enables optimum allocation and utilization of scarce capital resources, enables governments and industry to raise long-term capital for financing new projects, and expanding and modernizing industrial and commercial concerns. Thus providing the base for long term sustainable economic growth. The efficient stock market is now considered crucial for economic progress. Investment in the stock market is long term in nature; hence any development that could affect the stability of the polity or economy usually has serious impact on the performance of the stock market and Inflation as one of the major factors that could influence the market performance(Emmanuel and Samuel Sunday,2012),(Tripathi and Kumar,2014).

1.2 Research Importance
The importance of this study can be summarized in that it combines between two variables are considered important indicators to the economy. Meaning changes in any of the variables may lead to different repercussions in the growth of the economy which is why governments take calculated steps in order to make changes in their policies, to adjust to the perceived or expected impact of changes in the given variables. It also can be one of the first studies to show the relationship between inflation rate measured by GDP deflator and the stock market performance reflected by trading value.

1.3 Research Aim
The study aims to:
1. Analysis the relationship between inflation and performance of the Amman Stock Exchange.
2. Show the impact of the price index (GDP deflator) shocks on the performance of the Amman Stock Exchange (Trading value).
3. Statement the relationship type between inflation and performance of the Amman Stock Exchange using Vector error correction model (VECM).

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1.4 Research Hypothesis

The first hypothesis: Assume that there is a Long-term causal equilibrium relationship is trending from inflation to the Amman Stock Exchange Performance (Trading value).

The second hypothesis: Assume that there is a Long-term causal equilibrium relationship is trending from the Amman Stock Exchange Performance (Trading value) to inflation.

1.5 Research Methodology

To achieve the aim of this study and prove the hypothesis. Researchers calculated inflation rates using GDP deflator and then analyze the data of inflation and the Trading value index of the Amman Stock Exchange for the period 1978-2015. Through the use of Vector error correction model (VECM) and testing the hypothesis. The rest of the study is organized as follows: Section 2 presents brief review of related literature; Section 3 discusses the theoretical framework of the relationship between inflation and the performance of the stock market and the relationship between inflation and the performance of the Amman Stock Exchange for the period 1978-2015; while data, methodology and analysis of results are presented in section 4, and finally section 5 provides the study conclusions and recommendation.

2. Previous Research

Numerous studies investigate the link between inflation and the stock market. The most of these studies investigated the impact of inflation on stock prices or stock returns, some of them focused on the link between the macroeconomic factors (included inflation factor) and stocks prices, or stock returns or market index. Few of them studied the impact of inflation on the stock market performance indicators. Many of these studies revealed adversity of conclusions depend on the methodologies, test and variables used .We summarize some of these studies as follows:

Mousa et al., (2012) this study focused on explaining the impact of inflation on stock prices at Amman stock exchange by takes a random sample from the companies that listed in the market. The authors used some statistic programmers to analysis the data such as (E-Views 4). They discovered that there existed negative correlation from some corporate equities while there existed positive correlation in others. The results of the study show that not all companies offer a perfect hedge against inflation. Emmanuel and Samuel Sunday,(2012) used the regression analysis to evaluate the influence of inflation on various measures of stock market performance (market capitalization (MCAGDP), total Trading value ratio (TVMS),percentage change in All-share Index (%ΔASI) and turnover ratio (TOR)) in Nigeria using time series data for twenty years from 1991 - 2010;   It was revealed that these measures were negatively related to inflation in convergence to a priori expectation except for TOR which showed a positive relationship. This seemly low level of influence of inflation ranging between 14.6% and 0.3% revealed that stock market investments are regarded as a good hedge against inflation in Nigeria. The study recommended that the Central Bank of Nigeria (CBN) should formulate and use policy statements that will maintain inflation at low ebb in order not to erode the value of gains by investors on stock.

Ali, (2013) employed a Co. Vector error correction model to state the impact of inflation on the performance of the Iraqi financial market for the period 2005-2011. Through the analysis of the inflation and market index monthly data, the results showed, there is an equilibrium reciprocal long run relationship between inflation and market index. The study of Kimani and Mutuku, (2013) investigated the impact of inflation, Central Depository System (CDS) and other macroeconomic variables (including deposit rate, gross domestic product terms of trade and the net effective exchange rate) on the Nairobi stock market performance using quarterly data for the period December 1998 to June 2010. Unit root test based on the formal ADF test procedure revealed that the set of variables is (1) process while the Johansen-Julius VAR based co integration test procedure revealed more than 4 co integrating relationships. Consequently. An error correction model was estimated revealing that 27 percent of the departure from equilibrium is cleared quarterly. The co integrating model indeed showed that there is a negative relationship between inflation and stock market performance in Kenya. In addition the CDS is shown to have a positive and significant impact on the stock market performance.

In AL-Majali and AL-Assaf (2014) study, an attempt has been made for knowing whether the Amman Stock Exchange (ASE) performance, as measured by the stock price index, is affected by a set of macroeconomic variables. Namely, Real Gross Demotic Product, Consumer Price Index, Credit to Privet Sector. Weighted Average Interest Rate on Time Deposit, and dummy variable explain the global financial crises period. The data used in the study were quarterly data from 1992:Q1-2014:Q1. To examine if the effect exists or not, Johansen co integration test and Vector Error Correction model (VECM), Impulse Response Function (IRF) and Variance Decomposition (VD) were employed. The empirical results indicated that there a long run equilibrium relationship among stock market index and the main macroeconomic variables in Jordan. The findings of the study had showed that the speed of adjustment in the VECM is significant and relatively slow. This implies that long run movements of the variables are determined by one equilibrium relationship. The results also indicate

that there is a bi-directional long run relationship between stock price index and credit to the private sector, weighted average interest rate on time deposits, and consumer price index. The evidence implies that an increase in the weighted average interest rate on time deposits in the banking system has a greater effect on the stock price index than other macroeconomic and financial variables. Banawa et al., (2015) mentioned that the relationship between inflation and stock prices has yet to be estimated using an advanced econometric technique such as the Vector Error Correction Model (VECM). The study made use of CPI and PSEI data for the years 2006-2014. It was able to prove that there exists a strong positive relationship flowing from inflation to stock prices. Both in the short and long run within the context of the Philippine economy, while stock prices seem to have an insignificant effect on the volatility of inflation for both short and long run and it revealed that a 1% appreciation of inflation rate is likely to increase stock prices by 5.947758% especially in the long run.

3. The relationship between inflation and the performance of the stock market
Price stability is essential in determining whether an economy is stable or not. Inflation which is the constant increase in price creates uncertainty in the economy; Well inflation is known to wipe out the savings and investments of people. If Inflation goes out of control and increases too much, people will have to spend too much on the essential stuff, which means they will stop buying things which are not essential. This will make the economy stagnant as demand for various goods will drop (Ibrahim and Agbaje 2013, Choudhary 2015). When there is threat of escalating inflation, the central bank tries to control this by raising interest rates. By increasing interest rate, they hope to attract investors to park their cash in fixed income instruments, there by siphoning off excess liquidity from the system. Theoretically, when there is less liquidity, there is less speculative demand for goods in the economy, hence slowing down the increase in general prices (Ong 2014).

Effect of inflation on stock market is also evident from the fact that if the inflation rate is high, the interest rate is also high. In the wake of both (inflation and interest rates) being high, the creditor will have a tendency to compensate for the rise in interest rates. Therefore, the debtor has to avail of a loan at a higher rate. This plays a significant role in prohibiting funds from being invested in stock markets (Economy watch 2010). Rising inflation can cause the most damage in fixed income securities, because most likely going to lose the real terms if the agreed interest rate is less than the inflation percent; it also encourages investors to lock in their cash from equities to more attractive, less risky securities, like money market funds. The stocks are one of the few assets that can rely on when it comes to beating inflation; the other asset that can consider is real estate which tracks inflation through value appreciation. However, this is not as liquid as stocks. The lower the funds flow into the market, the lower the demand for stocks, hence lower share prices, the price of stocks are directly proportional to the performance of the company. In the event when inflation increases, the company earnings (worth) will also subside. This will adversely affect the stock prices and eventually the returns. If inflation continues to increase, the minimum return on stock investment will also be higher which will push market valuation lower. Share prices will fall until the estimated earnings yield increase to a point enough to offset the expected inflation (Ong 2014).

Stocks can beat inflation over time because companies can raise prices to account for rising costs brought about by inflation. For example, when the cost of sales and wages increases due to inflation, companies can simply pass on the higher cost to consumers by raising prices over time. When companies increase their prices, their revenues and earnings also increase. The higher the earnings, the higher the valuation, which leads to higher share prices ; while some companies can react to inflation by raising their prices, others who compete in a global market may find it difficult to stay competitive with foreign producers who don't have to raise prices due to inflation. More importantly, inflation robs investors (and everyone else) by raising prices with no corresponding increase in value. You pay more for less. This means company's financials are over-stated by inflation because the numbers (revenue and earnings) rise with the rate of inflation in addition to any added value generated by the company (Ong 2014,Little 2014). High interest rates and companies raising prices don't add up to an investment profile most investors enjoy. However, stocks are still a good hedge against inflation over the long term because, in theory, a company's revenue and earnings should grow at the same rate as inflation over the time (Little 2014).

The inflation phenomenon in the Jordanian economy is enforced by three main reasons; the monetary and fiscal policies, the high openness rate toward the regional and international economics and the weak of structural productive base for the Jordanian economy. The last two reasons make the inflation is a sensitive and serious problem and hard to control or put high burden on the government (Mousa et al., 2012). Figure1 shows that the inflation rate as measured by changing in GDP deflator had a fluctuation during the study period. It rose to 27.9 % in 2008 and the lowest rate was -0.5 in 2000.
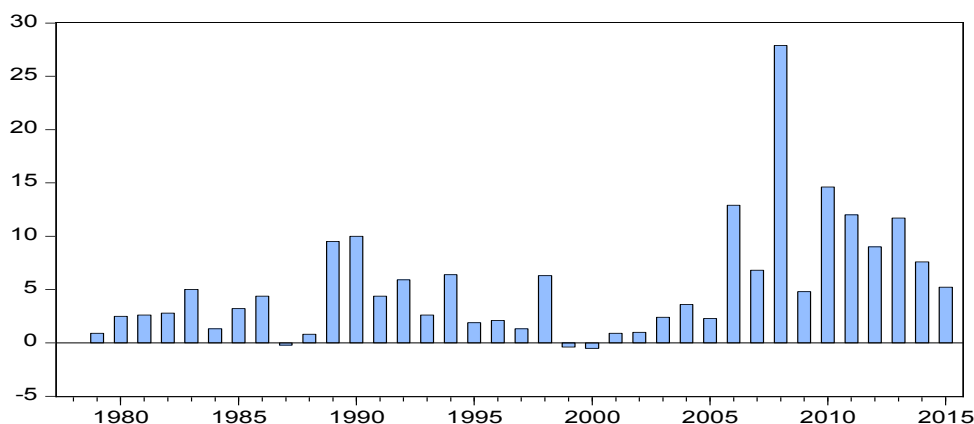
Figure 1: inflation rate as measured by changing in GDP deflator (1978-2015)

On the other hand, the Amman financial market established in 1967. The Amman Stock Exchange (ASE) established on March 1999, after the restructure process of Amman financial market in 1997, as a non-profit institution with administrative, and financial autonomy(Al-Adayleh ,2015), and on February 2017, it has been registered as a public shareholding company completely owned by the government under the name "The Amman Stock Exchange Company (ASE Company)". The ASE Company shall be the legal and factual successor to the ASE. This transformation is expected to enhance the role that the ASE plays in serving the national economy, and will enable it to offer better services, attract new companies and new clients, as well as enter into regional and international agreements with various parties to increase its market share regionally and internationally (Amman Stock Exchange, 2017).

The ASE Company authorized to function on provide an organized, fair, transparent, and efficient market for trading securities in Jordan, and secure a safe environment for trading securities to deepen trust in the stock market therefore to serve the national economy; to achieve the following objectives(Amman Stock Exchange,2017) :

1. Creating an attractive, safe, competitive, transparent and credible investment environment to ensure the interaction of supply and demand forces for trading in securities in a proper and fair trading practices.

2. Developing processes, methods, and systems for trading securities in the stock market according to the latest international standards.

3. Developing and delivering an outstanding service to the related parties.

4. Disseminating trading information to the largest possible number of traders and interested parties.

5. Enhance the public awareness and knowledge of investing in the financial markets and defining the services provided by the ASE Company of all segments of society, while devoting especial attention to traders of securities.

6. Increasing the depth and the transparency of the ASE and diversifying the financial instruments available to investors.

7. Enhancing the cooperation with the Arab, regional and international exchanges, organizations and federations.

From Figure 2 shows us that the Trading value in Amman stock Exchange have risen dramatically. Since the nineties with an average amount of 2823 JD millions and it rose to 20318 JD millions in 2008 and the lowest was 5.6 JD millions in 1978.
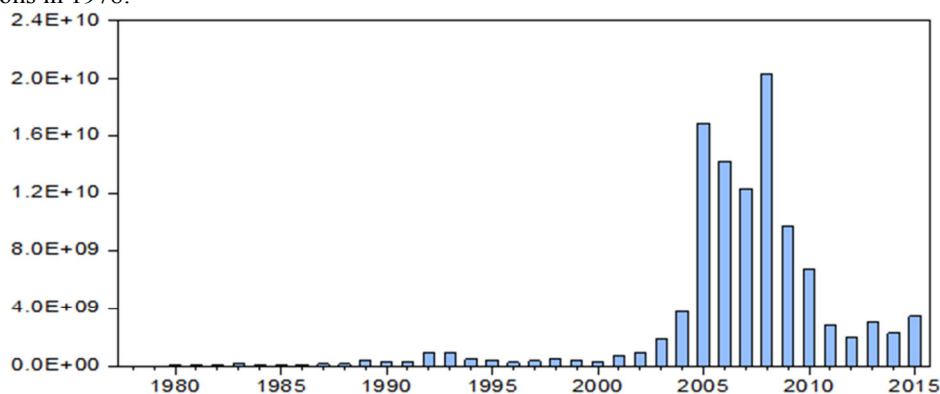

Figure 2: Trading value in Amman stock Exchange (1978-2015)

4. Data and Methodology
4.1 Data
The study is based on yearly data from 1978 to 2015. Inflation rate is represented by changing in GDP deflator, and stock performance is represented by trading value in AES. The principal data source is the annually Bulletins published by The Central Bank of Jordan.

4.2 EMPERICAL RESULTS
We start by presenting the descriptive statistics in Table 1. The table shows that the variables do not far from the normal distribution using the test (Jarque- Bera), and to accept the null hypothesis that the data follow a normal distribution. As shown us from the results of the sprain values and through review of mean and median values, we find its close, so this indicating the absence of sharp fluctuations.

Table (1): Descriptive Analysis

	DDF	VT
Mean	5.283784	2.90E+09
Median	3.600000	4.64E+08
Maximum	27.90000	2.03E+10
Minimum	-0.500000	15843159
Std. Dev.	5.495883	5.11E+09
Skewness	2.106468	2.164747
Kurtosis	8.854451	6.621589
Jarque-Bera	80.20279	49.11816
Probability	0.000000	0.000000
Observations	37	37

4.3 Methodology
In this study we used Time series analysis techniques. First the stationarity of the variables was tested by Unit Root Test. we used the Augmented Dickey Fuller (ADF) test. Second Co integration test was used to identify equilibrium or a long-run relationship among the variables. Finally, we used Vector Error Correction Model (VECM). EVIEWS statistical software was used to perform the analysis.

4.4 Stationary Test
We used The Unit Root test to examine the stationary for the variables. Table 2 shows results of Augmented Dickey Fuller (ADF) test. The ADF for the levels of Trading value in stock market, and changing GDP deflator do not exceed the critical values in absolute terms So, we take the first difference of variables due to the ADF statistics are higher than their critical values in absolute terms. Since the computed absolute values are greater than the critical absolute values at a 5% level of significance, the null hypothesis of nonstationary variable can be rejected.

Table (2): Augmented Dickey-Fuller Test

Variable			Level	First difference
	Critical values 1%	Critical values %5	ADF	ADF
deflator	-2.6	-1.95	-1.1	-13.2
Trading value	-2.6	-1.95	-1.7	-6.8

4.5 Co integration test
The results of stationary analysis in the Table 2 showed that all variables were integrated of same order, so the study applied the Johansen and Juselius (1990) technique to explore the long-run relationships among the variables. The Johansen co integration test is used and the results are as presented below.

Table 3: Johnson Co integration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.303148	17.46860	15.49471	0.0249
At most 1 *	0.128832	4.827227	3.841466	0.0280

Trace test indicates 2 co integrating eqn(s) at the 0.05 level

The results from Table 3 show that there is two (2) co integrating equation at 0.05 level of significance.

This result shows that the Trading value in stock market, and inflation rate are related in the long run.

4.6 Vector Error Correction

The Vector Error Correction Model (VECM) restricts the long-run behavior of endogenous variables so that their long run relationship converges by allowing short run adjustment dynamics. The estimation result of the vector error correction (VEC) model is given in Table 4. In the model the lag we used two lags depended on the Akaike Information Criteria (AIC) and Schwarz Information Criteria (SIC).

The Vector Error Correction model depends on following equations:

$$\Delta DF_t = \alpha_0 + \rho_1 e_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta DF_{t-i} + \sum_{j=1}^{n} \alpha_j \Delta TV_{t-j} + U_t$$

$$\Delta TV_t = \beta_0 + \rho_2 u_{t-1} + \sum_{i=1}^{m} \beta_i \Delta TV_{t-i} + \sum_{j=1}^{n} \beta_j \Delta DF_{t-j} + V_t$$

Our model contains co integration relationship among the variables, then we can proceed to VECM . The Co-integrating equation (CointEq1) which is considered as the error correction term has a negative significant adjusted effect on d (DDF) and d (TV) based on the t-statistic of -4.96. And -1.6 respectively. This means that Trading value in stock market in Jordan moderate somewhat in the longer-term response to changes in GDP deflator.

The estimation of long term relationship of inflation and trading value are shown in equations

D(DDF) = C(7)*(VT(-1) - 1275065363.32*DDF(-1) + 3955808127.89) + C(8)*D(TV (-1)) + C(9)*D(TV (-2)) + C(10)*D(DDF(-1)) + C(11)*D(DDF(-2)) + C(12)

D(TV) = C(1)*(TV (-1) - 1275065363.32*DDF(-1) + 3955808127.89) + C(2)*D(TV (-1)) + C(3)*D(TV (-2)) + C(4)*D(DDF(-1)) + C(5)*D(DDF(-2)) + C(6)

Table 4: Vector Error Correction Estimates
Included observations: 34 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Co integrating Eq:	CointEq1	
DDF(-1)	1.000000	
TV (-1)	-7.84E-10	
	(1.2E-10)	
	[-6.70065]	
C	-3.102436	

Error Correction:	D(DDF)	D(VT)
CointEq1	-1.236315	-3.52E+08
	(0.24904)	(2.2E+08)
	[-4.96434]	[-1.62126]
D(DDF(-1))	-0.062916	90663058
	(0.22095)	(1.9E+08)
	[-0.28475]	[0.47098]
D(DDF(-2))	0.173317	1.45E+08
	(0.16881)	(1.5E+08)
	[1.02667]	[0.98361]
D(TV (-1))	-6.34E-10	-0.271819
	(3.0E-10)	(0.25718)
	[-2.14857]	[-1.05693]
D(TV (-2))	-8.38E-10	-0.324142
	(2.7E-10)	(0.23945)
	[-3.04889]	[-1.35370]
C	0.146520	85204795
	(0.66562)	(5.8E+08)
	[0.22012]	[0.14693]
R-squared	0.730017	0.188659
Adj. R-squared	0.681806	0.043776
Sum sq. resides	418.0423	3.17E+20
S.E. equation	3.863947	3.37E+09
F-statistic	15.14203	1.302149
Log likelihood	-90.90069	-790.8053
Akaike AIC	5.700040	46.87090
Schwarz SC	5.969398	47.14025
Mean dependent	0.076471	98284177
S.D. dependent	6.849909	3.44E+09

Determinant resid covariance (dof adj.)	1.57E+20
Determinant resid covariance	1.06E+20
Log likelihood	-880.4163
Akaike information criterion	52.61272
Schwarz criterion	53.24122

4.7 Impulse Response Function

This test traces the timeline of sudden changes that could be exposed to a different model variables and how

other variables in response to any sudden change in any variable of the study variables.

On the other hand, Figure 3 below shows the impulse response functions. It shows the response of trading value due to a shock inflation rate. The first graph, response of changing in GDP deflator (DDF) to (DDF). The second graph shows that any positive shock in trading value makes an increase in (DDF). According to the third graph, a positive shock of (DDF) does not create an important impact on trading value.
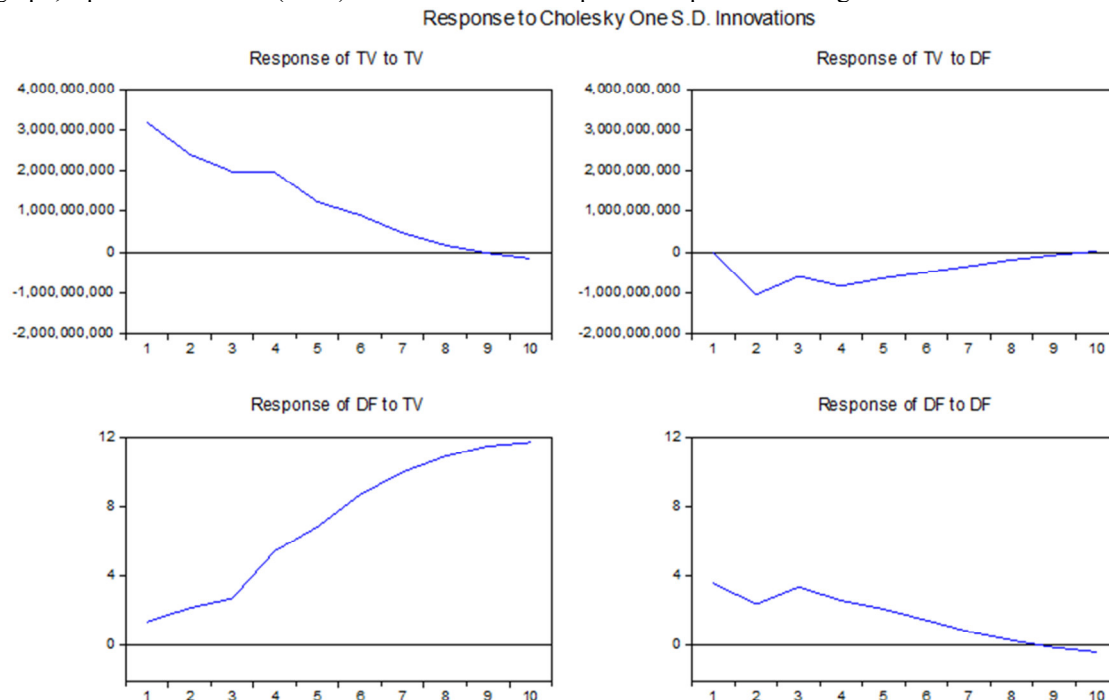

Figure 3: Impulse Response Function

Conclusion

The objective of the paper is to examine the relationship between trading value in stock market and inflation rate measured by changing in GDP deflator over the period 1978 to 2015.

The study finds that the variables are non-stationary at their level and they become stationary in their first difference. There are two co-integration equations showing the long run relationship between trading value in stock market and inflation rate.

There is short and long run relationship as indicated by the statistically significant coefficient in the error correction model. Also based on impulse response we find that any positive shock in trading value makes an increase in GDP deflator. On the other hand a positive shock of (GDP deflator) does not create an important impact on trading value

Several policy implications can be drawn from the findings of this study. One of them is maintaining a stable price level of the increase to stock market performance

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