

The Impact of Floating Egyptian Pound on Agricultural Sector in Egypt

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Authors' contributions

This work was carried out in collaboration among all authors. Authors AAEE and MGG designed the research, performed the statistical analysis, collected the data, managed the analyses of the research and wrote the research. Authors MAS and MAS read and approved the final manuscript.

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ABSTRACT

This research aimed to estimate the impact of applying flexible exchange rate on the Egyptian agriculture sector. Egypt applied floating exchange rate regime three times during the period 1991-2018. This research is based on some analytical approaches to achieve its objective such as robust regression and vector error correction model (VECM). It concluded that floating of Egyptian pound was not a good decision and it had a negative impact on Egyptian agricultural sector. The positive relationship between real Egyptian agricultural gross domestic product and real agricultural imports as well as the positive relationship between real agricultural imports and dollar exchange rate in Egypt which are not apply the economic logic, proof that the floating exchange rate regime and the macroeconomic policies applied during the study period were not effective as Egypt imports good and service with high prices due to the devaluation of Egyptian pound. So, the growth in agricultural gross domestic product was not real. The Egyptian government should pay more attention on the agricultural sector.

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1. INTRODUCTION

Egypt is a developing country that depends on imports more than exports. The economists agreed that flexible exchange rate regimes are not helpful for the developing countries. Economic policy is divided into monetary policy and fiscal policy. The exchange rate regimes are one of the monetary policy tools that are used to achieve economic policy goals such as high rates of economic growth and lower rates of inflation and other goals that differ according to the country's economic conditions. Economists agreed that effective economic policy is a combination of fiscal policy and monetary policy. This indicates that the change in exchange rate regimes is accompanied by a change in the other monetary policy tools as well as the fiscal policy tools. The agriculture sector contributes a small percentage in the Egyptian economy and doesn't play a big role in the economy. It means that the macroeconomic policies will do a huge effect on the Egyptian agriculture sector.

The Egyptian economy has followed different exchange rate regimes since the 1960's. According to international monetary fund's (IMF's) classification, fixed exchange rate regime was applied during 1960-1990, and then managed floating exchange rate regime was applied in [1-2]. On January 29, 2003, the central bank of Egypt (CBE) applied floating exchange rate regime. According to the CBE forex statistics chamber, this decision led to the devaluation of the Egyptian pound and the exchange rate became 6.32 L.E/1\$ at the end of June 2003, compared with 4.62 L.E/1\$ at the end of [3]. On November 3, 2016, the central bank of Egypt decided to float the Egyptian exchange rate so that banks would be free to trade the exchange rate. The aim of this decision was to re-circulate foreign exchange to official banking channels and eliminate the parallel market to be able to take the loan from the IMF's (12 billion dollar) within the framework of an economic reform program that enables the Egyptian economy to meet the challenges that exist and achieve growth rates commensurate with the capabilities of Egypt and the full use of human, natural and physical resources. This decision led to the devaluation of the Egyptian pound by 47.7% and the exchange rate became 13 L.E/1\$ (the price before floating 8.88 L.E/1\$) and the price increased and became 17.96 L.E/1\$ in November [4].

2. THE RESEARCH PROBLEM

The Egyptian government applied floating exchange rate three times during the period 1991-2018 which led to the devaluation of Egyptian pound. The agriculture sector in Egypt is under threat as well as Egypt is a developing country and its imports more than its exports.

3. THE RESEARCH OBJECTIVES

The main objective of this research is to estimate the impact of macroeconomic policies (monetary policy and fiscal policy) on the Egyptian agricultural sector in the short-run and long-run during the period 1991-2018. This objective achieved by the following steps:

- Estimating the impact of macroeconomic policies (monetary policy and fiscal policy) on the Egyptian agricultural gross domestic product.
- Estimating the impact of floating exchange rate on agriculture exports and agriculture imports.
- Estimating the impact of agriculture exports and agriculture imports on Egyptian agricultural gross domestic product.

4. LITERATURE REVIEW

4.1 Egypt's Studies

[5] aimed to study the monetary policy transmission mechanisms by using structural vector autoregressive models (SVAR). It used monthly data for the period 1992-2002. The study concluded that nominal interest rate doesn't affect real domestic credit [6] evaluated the developments in the structure of monetary policy and on describing their implications for the Egyptian economy mainly during the period 1990-2005. The study used vector autoregression (VAR). The most important result was the effect of monetary policy on real output Growth in the long-run was limited by its capacity to achieve long-run price stability [7]. analyzed the impact of inflation with the exchange rate during the period of 1990-2008. The most important result was that rising in the inflation rate is due to the Egyptian pound's depreciation [8]. studied both the 2003 devaluation and the 2013 partial devaluation and their impact on

Egyptian balance of payment by using autoregressive distributed lag (ARDL) and vector error correction models (VECM). The study concluded that devaluation exchange rate doesn't affect the trade balance Massoud and Willets [1] analyzed the exchange rate policies in Egypt during the period 2003-2013. The study concluded that the free-floating exchange rate regime was not preserved during the study period [1]. Solieman [9] evaluated the effects of exchange rate liberation on the doubled-increased prices of food commodities and agricultural production needs. The period of research was divided into the pre-liberation and the post-liberation represented by the period from month 1-2016 to 10-2016 and the period from month 11-2016 to 3-2017. The most important result was that the high prices of food commodities in the consumer markets are due to floating exchange rate and other factors like the size of market [9]. Saleh [10] examined the impact of devaluation of the Egyptian pound value on the Egyptian agricultural balance of trade with the Arab countries during the period 1995-2015. The study concluded that the devaluation of Egyptian pound did not improve the agricultural trade balance between Egypt and the Arab countries [11]. Omran and Bilan estimated the unemployment rate responses to fiscal shocks during the period 1976-2018 by using SVAR and IRF. The most important results were that the fiscal policy represents in government spending shock has a negative impact on unemployment rate while the tax revenue has positive impact on unemployment rate [11].

4.2 Foreign Countries' Studies

Salahy [12] estimated the impact of the change in the exchange rate on Algerian economy during 2000-2015 [12]. It concluded that the exchange rate is affected by inflation, interest rate, balance of trade balance. Jacob [13] analyzed relationship between exchange rate regimes and GDP growth. The data was from 74 countries include Egypt for year 2012. It found a positive correlation between fixed regimes and economic growth [14]. Moid and Shamima analyzed the effect of monetary policy on macroeconomic in India during 2011-2014 by using VAR. The Impulse response functions (IRF) concluded that Credit to Cash Reserve Ratio and Repo Rate affects Inflation and Credit till five to ten months and then the effect end [15]. Ben Aza estimated the Impact of government expenditure on economic growth in Algeria 1990-2014. The

study used methods of Descriptive and Quantitative Analysis such as Vector Autoregressive (VAR). The most important results were that the government consumption spending has a negative effect on economic growth, while there was a positive effect from government investment spending to GDP growth [16]. Guellil et al. evaluated the relationship between exchange rate regimes and Economic Growth in developing countries during 1980-2013. The study used the Panel Fully Modified Least Squares (FMOLS). It concluded that fixed exchange rate regimes increased the economic growth rate in developing countries [17]. Sekmen and Madmarovs estimated the effect of exchange rate on GDP and GDP components in Kyrgyz Republic during the period 2000-2016 using the ARDL model. It concluded that there is positive relationship between gross domestic product and exchange rate [17].

5. METHODOLOGY

This research is based on some analytical approaches to achieve its objective. It applied the methods of econometric analysis through an analytical framework of time series such as ordinary least square, robust regression, unit root test according to Augmented Dicky-Fuller (ADF), Johansen cointegration and vector error correction model (VECM). In addition to impulse response function (IRF) and variance decomposition. Also, it used the compound annual growth rate (CAGR) to estimate the general time trend.

This research is based on published and unpublished statistical data during the period 1991-2018, which obtained from The Central Bank of Egypt (CBE), the Central Agency for Public Mobilization and Statistics (CAPMAS), The Ministry of Planning, Monitoring and Administrative Reform (MPMAR), The Ministry of Finance (MOF), The International Monetary Fund (IMF), The World Bank (WB), The Egyptian Cabinet Information and Decision Support Center (IDSC) and The Food and Agriculture Organization of the United Nations (FAO).

5.1 Time Series Stationary Test

The data must be completely static or stationary. Stationary data is the data that its mean, autocorrelation and variance are stable or static. autocorrelation is stable means that the variable in the previous year does not affect itself in the current year "there isn't autocorrelation". While

the non-stationary data is the data that its mean, variance and covariance are not stable. there are certain tests to find out whether the data is stationary or not such as graphical analysis, correlogram and unit root test. the unit root test used to test the stationary of time series data by using Augmented Dicky-Fuller (ADF) that is the first test to estimate the stationary of time series data. Augmented Dicky-Fuller (ADF) test estimates the presence of autocorrelation equal 1 ($\rho=1$), it means that the time series data are non-stationary (accept the $H_0: \rho=1$). while if the autocorrelation laid between 1 and -1 ($1 < \rho < -1$), it means that the time series data are stationary (accept the $H_1: 1 < \rho < -1$) [18-19].

Most of time series data are non-stationary that due to the presence of unit root which leads to instability of mean and variance through time. when estimating regression in the presence of unit root in time series leads to spurious regression. The Dickey-Fuller can be performed in three different forms. first random walk process, it means that the dependent variables in current year affected by the dependent variable in the previous year and the error term ($Y_t = Y_{t-1} + \varepsilon_t$). Second random walk with drift, in this case we add a drift parameter which reflect the trend of dependent variable ($Y_t = \alpha + Y_{t-1} + \varepsilon_t$). Third random walk with drift around deterministic trend, it means that the dependent variable affected by time ($Y_t = \beta_1 + \beta_2 t + \varepsilon_t$) [20-22].

If the time series became stationary after taking the first difference that means there is one unit root in the time series, it means that the time series of this variable integrated of order one (I (1)). While, If the time series became stationary after taking the second difference that means there is two-unit root in the time series, it means that the time series of this variable integrated of order two (I (2)). If the time series is stationary at the level, it become integrated at the level (I (0)) and don't have unit root.

5.2 The Cointegration Test

Granger-Engle (1987) noted that non-static variables can form static combinations, which called cointegration equations that is the equilibrium in the long run and the short run. In 1988 Granger noted that we can explain the causal relationships between variables that have cointegration by error correction model (ECM). also, he mentioned two sources to estimate the causal relationship. first is error correction term (ECT), while the second one is lag. The study

used cointegration test to examining the existence of an equilibrium relationship between the variables in the long term [23-24].

5.3 Vector Error Correction Model (VECM)

If there is cointegration between variables that's means, there is a long-run equilibrium relationship between the time series variables. The study used vector error correction model (VECM) to estimate the impact of long-run equilibrium relationship and short-run equilibrium relationship between macroeconomics indicators of the Egyptian economy and the agricultural sector as all the time series variable are cointegration and stationary at I (1).

5.4 Ordinary Least Square

Ordinary Least Square Regression (OLS) is the most efficient linear unbiased estimation with the presence of its hypotheses. OLS minimize the Sum Square Error. $\sum \varepsilon_i = (Y_i - \hat{Y}_i) = 0$. This research estimates the following OLS Hypothesis by using Eviews Program: [25-26].

5.5 Robust Time Series Analysis

The time series contain more than one kind of outliers that make it more complicated. There are three kinds of outliers, isolated outliers, patchy outliers and level shifts in mean value. Isolated outliers, the time series has almost constant mean but suddenly the outlier happen. Patchy outliers, the time series has no constant mean and sometimes a doublet outlier happen. Level shifts in mean value, the time series has two or more means and each mean shift has an isolated outlier. In the presents of outliers in the time series and the estimation is done by least square (LS), the estimates become biased and leads to inflation the variance therefore so the study will used robust regression (M-estimation) as all the hypotheses can be solved. In general, the outliers are undesirable values that do not represent the society because they lead to inefficient statistical tests of samples representing the community. These values are not mistaken but very large or very small values from the rest of the data's values. If the outliers have been deleted, it will lead to inefficiencies in the statistical estimates [27].

5.6 Macroeconomic Policies

Macroeconomic policy consists of two kinds of integrated policies which are monetary policy and

fiscal policy, to formulate the economic strategy of governments and countries. Monetary Policy is being developed by the Central Bank to control the size of the market's monetary supply, with the aim of maintaining a certain level of growth and economic stability and there are two approaches to monetary policy; deflationary monetary policy and expansionary monetary policy. Monetary policy means the set of mechanisms and tools used by the Central Bank to achieve certain goals within a specified period of time. The relative importance of macroeconomic policies differs in schools of economic thought, where classical school owners and monetarists see monetary policy more effective than fiscal policy. While Keynes saw fiscal policy as the most effective. Both policies must be integrated to realize the overall objectives of the economy. Fiscal policy is the government policies that the state applies to try to control the economy. It is based on two elements: state revenues and state expenditure. The Ministry of Finance is developing these policies in the form of a future plan called the State General Budget. It considers the state's plan for a future fiscal year in how revenue is obtained and how it is spent on the state sectors. Government revenues are obtained from taxes in addition to international subsidies and from the return on the sale of natural resources owned by the State. There are two approaches to fiscal policy; contractionary fiscal policy that represents decreasing the government expenditures and expansionary fiscal policy that represents increasing the government expenditures. Fiscal policy aims to achieve the economic stabilization, resource allocation and equitable distribution of wealth and income [28-29].

6. RESULTS AND DISCUSSION

This part of the research contains the development of Egyptian agriculture sector by using compound annual growth rate (CAGR) and estimation of the impact of monetary policy and fiscal policy on the Egyptian agriculture sector. The research based on econometrics methods in analyzing time series data. it used multiple regression model in double logarithmic form to estimate the equations. For this purpose, the study followed those steps:

First: Estimation of the causal relationship as the following:

- The impact of monetary policy and fiscal policy on the real Egyptian agriculture gross domestic product (RAGDP).

- The impact of floating Egyptian pound as a dummy variable on the real Egyptian agriculture gross domestic product (RAGDP) with the effect shown in a graph.
- The impact of floating Egyptian pound on real agricultural exports (RAX).
- The impact of floating Egyptian pound on real agricultural imports (RAM).
- The impact real agricultural exports and real agricultural imports on real Egyptian agriculture gross domestic product.

Second: Estimation of long-run and short-run equilibrium relationship of the impact of monetary policy and fiscal policy on the real Egyptian agriculture gross domestic product (RAGDP).

6.1 Estimation of Causal Relationships

6.1.1 The impact of monetary policy and fiscal policy on the real Egyptian agriculture gross domestic product (RAGDP)

Table 1. shows the impact of monetary policy and fiscal policy on macroeconomic indicators of agricultural sector. The results showed that the variables that affects the real agricultural gross domestic product are Egyptian expenditure (LNREEXP), exchange rate (ER), real agricultural credit (LNRAC), real agricultural exports (LNRAX) and dummy variable represents in floating Egyptian pound in January, 2003 (D1). Those variables are representing about 68.2% of the changes that happened in real agricultural gross domestic product (LNRAEGDP).

The previous table shows that there are positive relationships between real Egyptian expenditure (LNREExp), real agricultural credit (LNRAC), real agricultural exports (LNRAX) and real agricultural gross domestic product (LNRAEGDP), as if those variables increased by 1%, real agricultural gross domestic product will increase by 51 million L.E, 21 million L.E and 3 million L.E respectively. While there are negative relationships between real agricultural gross domestic product (LNRAEGDP) and dollar exchange rate (ER) as if ER increased by 1%, LNRAEGDP will decrease by 0.3%. There is negative relationship between real agricultural gross domestic product (LNRAEGDP) and dummy variable represents in floating Egyptian pound in January, 2003 (D1) with statistically significant. That means the floating of Egyptian pound in January, 2003 wasn't having good effect on agricultural sector.

Table 1. The Impact of macroeconomic policies on the Egyptian real agriculture gross domestic product

Dependent Variable: LNRAGDP				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
LNREEXP	0.515	0.021	24.114	0.000
ER	-0.003	0.001	-3.428	0.000
LNRAC	0.214	0.014	15.113	0.000
LNRAX	0.035	0.001	3.624	0.000
D1	-0.032	0.012	-2.581	0.009
C	1.590	0.190	8.357	0.000
Robust Statistics				
R-squared	0.741	Adjusted R-squared		0.682

Source: Calculated by the authors by using Eviews 12 programs

6.1.2 The Impact of floating Egyptian pound on real agricultural exports (RAX)

$$R^2 = 0.468$$

The following equation showed that there is positive relationship between real agricultural exports (LNRAX) and dollar exchange rate (ER); as if the exchange rate increases with 1% the agricultural exports will increase by 17% and vice versa. The equation showed that 45.3% of the increasing of RAX was due to the increasing of dollar exchange rate and the devaluation of Egyptian pound. This applies with the economic logic.

Equation:

$$LNRAX = 8.127 + 0.170 ER$$

(4.326)^{***} (29.769)^{***}

$$R^2 = 0.453$$

Where:

LnRAX: Real Agricultural Exports.

ER: Dollar Exchange Rate per Egyptian Pound.

6.1.3 The impact of floating Egyptian pound on real agricultural imports (RAM)

The previous equation showed that there is positive relationship between real agricultural imports (LNRAM) and dollar exchange rate (ER), as if the exchange rate increase with 1% the agricultural exports will increase by 9% and vice versa. The equation showed that 46.8% of the increasing of real agricultural imports (RAM) was due to the increasing of dollar exchange rate and the devaluation of Egyptian pound. This doesn't apply with the economic logic.

Equation:

$$LNRAM = 10.101 + 0.093 ER$$

(4.996)^{***} (78.221)^{***}

Where:

LnRAM: Real Agricultural Imports.

ER: Dollar Exchange Rate per Egyptian Pound.

6.1.4 The impact real agricultural exports and real agricultural imports on real Egyptian agriculture gross domestic product

The following equation showed that there is positive relationship between real agricultural imports (LNRAM) and Real Egyptian Agriculture Gross Domestic Product, as if the RAM increase with 1% the RAGDP will increase by 22.5% and vice versa. This doesn't apply with the economic logic. As well as there is positive relationship between real agricultural exports (LNRAX) and Real Egyptian Agriculture Gross Domestic Product, as if the real agricultural exports (RAX) increase with 1% the real agricultural gross domestic product (RAGDP) will increase by 13.5% and vice versa. This applies with the economic logic. The equation showed that 68% of the increasing of real agricultural gross domestic product (RAGDP) was due to the increasing of both real agricultural imports (RAM) and real agricultural exports (RAX).

Equation:

$$LNRAGDP = 8.113 + 0.135LNRAX + 0.225 LNRAM$$

(7.938)^{***} (1.697)^{*} (1.438)^{*}

$$R^2 = 0.679$$

Where:

LnRAGDP: Real Egyptian Agriculture Gross Domestic Product.

LnRAX: Real Agricultural Exports.

LnRAM: Real Agricultural Imports.

According to all the pervious equations that estimate the impact of macroeconomic policies on Egyptian agricultural sector especially the impact of floating of the Egyptian currency, the rising in dollar exchange rate led to the devaluation of Egyptian pound. The exchange rate (ER) has indirect relationship with agricultural gross domestic product as exchange rate effects agriculture imports and exports. the Egyptian economy depends on imports most of necessary goods, it means that the increasing of gross domestic product is not real it was due to the increasing of agricultural imports that used in the production process more than the agricultural exports. The positive relationship between RAGDP and RAM as well as the positive relationship between real agricultural imports (RAM) and dollar exchange rate (ER) which are not apply the economic logic, proof that the floating exchange rate regime and the macroeconomic policies applied during the study period were not effective as Egypt imports good and service with high prices due to the devaluation of Egyptian pound. so, the growth in agricultural gross domestic product was not real.

6.2 Estimation of Long-Run and Short-Run Equilibrium Relationship

6.2.1 Stationary test

The study used the Augmented Dickey Fuller unit root test (ADF) to check for the stationary. If the p. value is ≤ 0.05 , reject the null hypothesis and accept the alternative hypothesis as the variables has no unit root and the time series is

stationary. The hypothesis can be formulated as the following:

H0: Time series is non-stationary.

H1: Time series is stationary.

The results showed that all the variables are stationary at the 1st differences I (1) except real Agricultural credit (RAC) are stationary at the level I (0). The following Table shows the results of augmented Dickey Fuller unit root test (ADF).

6.2.2 Lag Selection criteria

The Johansen cointegration test and VECM are sensitive to lag. The study depended on unrestricted VAR. The following tables shows the lag structure criteria for each equation. The results showed that both equations must take one lag while estimating VECM and Cointegration test.

6.2.3 Johansen cointegration test

The study used Johansen cointegration test to determine the long-run equilibrium relationship between variables for each equation. The results showed that Trace test and Max Egin value test indicated that there are 2 cointegration equations ($r = 2$) at 0.05 level between the variables Real Egyptian Expenditure (LNREEXP), Dollar Exchange Rate (ER), Real Agriculture Credit (LNRAC), Real Agriculture Exports (LNRAX), Dummy variable represents in floating Egyptian pound in January, 2003 (D1). Table 4. shows the results of Johansen cointegration test for both equations.

Table 2. Stationary test according to augmented dickey fuller unit root test (ADF)

Variables	Level	1st Difference	Results
RAGDP	-0.279 ^{ns}	-5.473 ^{***}	I (1)
RAGDPlag	-0.877 ^{ns}	-5.553 ^{***}	I (1)
RAINV	-1.442 ^{ns}	-5.554 ^{***}	I (1)
RAX	-0.033 ^{ns}	-4.410 ^{***}	I (1)
RAM	1.056 ^{ns}	-5.657 ^{***}	I (1)
RAExp	-2.293 ^{ns}	-3.844 ^{***}	I (1)
RAT	-2.181 ^{ns}	-5.195 ^{***}	I (1)
RAC	-3.032 ^{***}	-	I (0)
ER	0.248 ^{ns}	-3.631 ^{***}	I (1)

Source: Calculated by the authors by using EViews 12 program

Table 3. Lag order selection criteria for Egyptian agricultural sector equation

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-11.699	NA	1.57e-07	1.3615	1.652	1.445
1	150.246	236.690*	1.06e-11*	-8.327	-6.294*	-7.741*
2	189.707	39.460	1.35e-11	-8.593*	-4.818	-7.506

* indicates lag order selected by the criterion:
 LR: sequential modified LR test statistic (each test at 5% level).
 FPE: Final prediction error. AIC: Akaike information criterion.
 SC: Schwarz information criterion. HQ: Hannan-Quinn information criterion.
 Source: Calculated by the authors by using Eviews 12 programs

Table 4. Johansen cointegration test for Egyptian agricultural sector equation

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized	Trace		0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.905	138.179	95.754	0.000
At most 1 *	0.778	76.955	69.819	0.012
At most 2	0.534	37.852	47.856	0.308
At most 3	0.338	18.019	29.797	0.564
At most 4	0.232	7.283	15.494	0.545
At most 5	0.015	0.399	3.841	0.527

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized	Max-Eigen		0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.905	61.224	40.077	0.000
At most 1 *	0.778	39.103	33.877	0.010
At most 2	0.534	19.832	27.584	0.352
At most 3	0.338	10.736	21.132	0.673
At most 4	0.232	6.883	14.265	0.503
At most 5	0.015	0.399	3.841	0.527

Source: Calculated by the authors by using Eviews 12 programs

6.2.4 Analyzing of VECM

- Dependent Variable: Real Gross Domestic Product (LNRAGDP).
- Endogenous Variables: Egyptian Expenditure (LNREEXP), Exchange Rate (ER), Real Agriculture Credit (LNRAC), Real Agriculture Exports (LNRAX) and Dummy variable represents in floating Egyptian pound in January, 2003 (D1).
- Exogenous Variables: Real Egyptian Tax (LNRET).

The Vector Error Correction Model (VECM):

$$D(LNRAGDP) = C (1) LNRAGDP_{(t-1)} + 0.0903 LNREEXP_{(t-1)} + 0.0824 ER_{(t-1)} - 0.812 LNRAC_{(t-1)} - 0.352 LNRAX_{(t-1)} - 0.135 D1_{(t-1)} + 0.3748 + C (2) D(LNRAGDP_{(t-1)}) + C (3) D(LNREEXP_{(t-1)}) + C (4) D(ER_{(t-1)}) + C (5) D(LNRAC_{(t-1)}) + C (6) D(LNRAX_{(t-1)}) + C (7) D(D1_{(t-1)}) + C (8) + C (9) LNRET$$

The coefficient of error correction term (ECT) in the previous equation is equal (-0.2409) and it is

statistically significant at 0.10 level. That means it will take approximately 4.5 years to correct the deviation that happened in Real Gross Domestic Product of the Agricultural sector (LNRAGDP) as it will be correct 24% per year depends on the deviation correction in Real Egyptian Expenditure (LNREEXP), Exchange Rate (ER), Real Agriculture Credit (LNRAC), Real Agriculture Exports (LNRAX), Dummy variable represents in floating Egyptian pound in January, 2003 (D1).

The results showed that according to Wald test. There is a positive short-run relationship between Real Gross Domestic Product of Agricultural sector and Real Gross Domestic Product of Agricultural sector of the previous year (LNRAGDP_(t-1)) as it is statistically significant at 0.05 level. In addition to a positive short-run relationship between both Real Agricultural Credit (LNRAC) and the exogenous variables Real Egyptian Tax (LNRET) of the current year. While there are no short-run relationships between Real Gross Domestic Product of Agricultural sector and rest of variables.

Table 5. VECM Long-run representations for agricultural sector equation

	Coefficient	Std. Error	t-Statistic	Prob.
C (1)	-0.240	0.139	-1.750	0.1016

Source: Calculated by the authors by using Eviews 12 programs

Table 6. VECM short-run representations for agricultural sector equation

Variables	Chi-Square	Prob.
DLNEGDP _(t-1)	2.557	*
DLNEExp _(t-1)	0.063	ns
DER _(t-1)	1.031	ns
DLNRAC _(t-1)	4.091	*
DLNRAX _(t-1)	1.062	ns
C (8)	2.034	*
LNRET	1.860	*

Source: Calculated by the authors by using Eviews 12 programs

6.2.5 Inverse roots of AR characteristic polynomial

The study examined the stationary of the model by using Roots of Characteristic Polynomial. If the modulus is smaller than 1 that means all the roots lay inside the unit circle. The results showed that all the roots of the Egyptian agricultural sector model are lay inside the circle that means it can depend on the impulse responses function (IRF) results.

6.2.6 Variance decomposition

Table 8. shows the variance decomposition of agricultural sector for 10 years. The results showed that the shocks which happened in agricultural real gross domestic product (LNRAGDP) explains about 84% from the changes in real Egyptian expenditure (LNREEXP) in the second period, this percentage decreases to 31.5% during the 10th period. the shocks which happened in agricultural real gross domestic product (LNRAGDP) explains about 87% from the changes in dollar Exchange rate (ER) in the second period, this percentage decreases to 43% during the 10th period. The shocks that happened in agricultural real gross domestic product (LNRAGDP) explains about 89% from the changes in real agricultural credit (LNRAC) in the second period, this percentage decreases to 8.3% during the 10th period. The shocks that happened in agricultural real gross domestic product (LNRAGDP) explains about 60% from the changes in real agricultural exports (LNRAX) in the second period, this percentage decreases

to 27% during the 10th period. The shocks that happened in agricultural real gross domestic product (LNRAGDP) explains about 70% from the changes in Dummy variable represents in floating Egyptian pound in January, 2003 (D1) in the second period, this percentage decreases to 28% during the 10th period.

6.2.7 Impulse response function (IRF)

The impulse response functions were estimated by VAR model. The study depended on it to estimate the present and future actions of a variable due to a temporary shock of two standard deviations in another variable. In addition to, estimate the causal relationship between variables by following the effect of this shock.

Fig. 2. shows the impulse response functions that estimate the effect of the independent variables' shocks on real agricultural gross domestic product (LNREGDP). The results showed that the responses of LNRAGDP to the impulse of real Egyptian expenditure (LNREExp) were going upwards from the first period to the third one then it became stable from the third period to the fourth one. From the fourth period to the sixth one, the response of real agricultural gross domestic product (LNREGDP) was going downward but still positive, then it was going upwards from the sixth period till the end. The responses of real agricultural gross domestic product (LNRAGDP) to the impulse of dollar exchange rate (ER) were going upwards with strong and big effect especially from the third period till the end. The responses of real

agricultural gross domestic product (LNRAGDP) to the impulse of real agricultural credit (LNRAC) were going upwards from first period to second one then it became stable till the third one. From the third period to the seventh one, the responses were going downwards and became negative then the effect increased negatively and ends in the tenth period. The responses of real agricultural gross domestic product (LNRAGDP) to the impulse of real agricultural exports (LNRAX) were stable from the first period to the second one then it was going downward and became negative from the second period to the

fourth one. From the fourth period to the sixth one, the response was stable then increased negatively till the end. The responses of real agricultural gross domestic product (LNRAGDP) to the impulse of dummy variable that represents floating of Egyptian pound in 2003 (D1) were going downwards and negative from the first period to the second one then it is going upwards from the second period to the third one. From the third period to the tenth one, it was going upwards but negative and the effect became weak till it ends at the tenth period.

Table 7. Inverse Roots of AR Characteristic Polynomial for Agricultural Sector Equation:

Root	Modulus
1.000	1.0000000
0.494	0.6600000
0.136	0.565
-0.558	0.558
-0.147	0.251

*No root lies outside the unit circle.
*VAR satisfies the stability condition

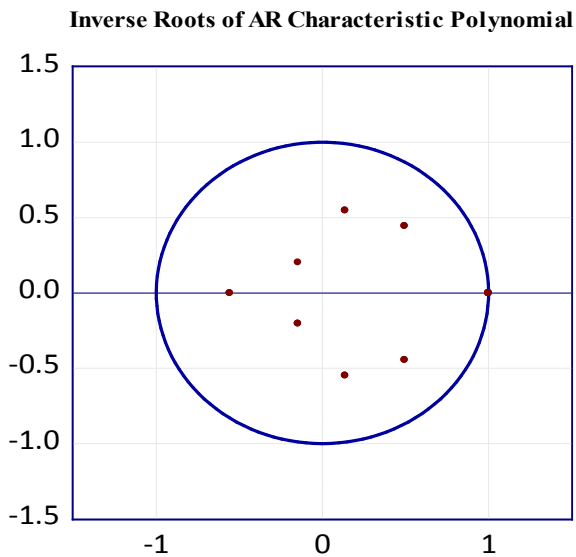


Fig. 1. Inverse roots of AR characteristic polynomial for agricultural sector equation

Source: Calculated by the authors by using Eviews 12 programs

Tables 8. Variance decomposition for Egyptian agricultural sector equation

Variance Decomposition of D1:							
Period	S.E.	LNRAGDP	LNREEXP	ER	LNRAC	LNRAX	D1
1	0.041	100	83.806	87.947	89.119	59.847	70.371
2	0.050	87.735	63.518	80.797	66.315	55.926	47.101
3	0.060	81.289	50.884	74.045	46.325	49.682	36.583
4	0.069	76.391	44.041	66.108	32.442	44.098	31.442
5	0.079	72.891	40.215	59.012	23.453	39.573	28.997
6	0.089	70.383	37.786	53.538	17.675	35.947	27.950
7	0.098	68.448	35.949	49.591	13.892	32.995	27.628
8	0.106	66.779	34.356	46.820	11.351	30.565	27.677
9	0.114	65.187	32.888	44.875	9.595	28.538	27.905
10	0.121	63.559	31.523	43.483	8.3406	26.835	28.197

Cholesky Ordering: LNRAGDP LNREEXP ER LNRAC LNRAX D1

Source: Calculated by the authors by using Eviews 12 programs

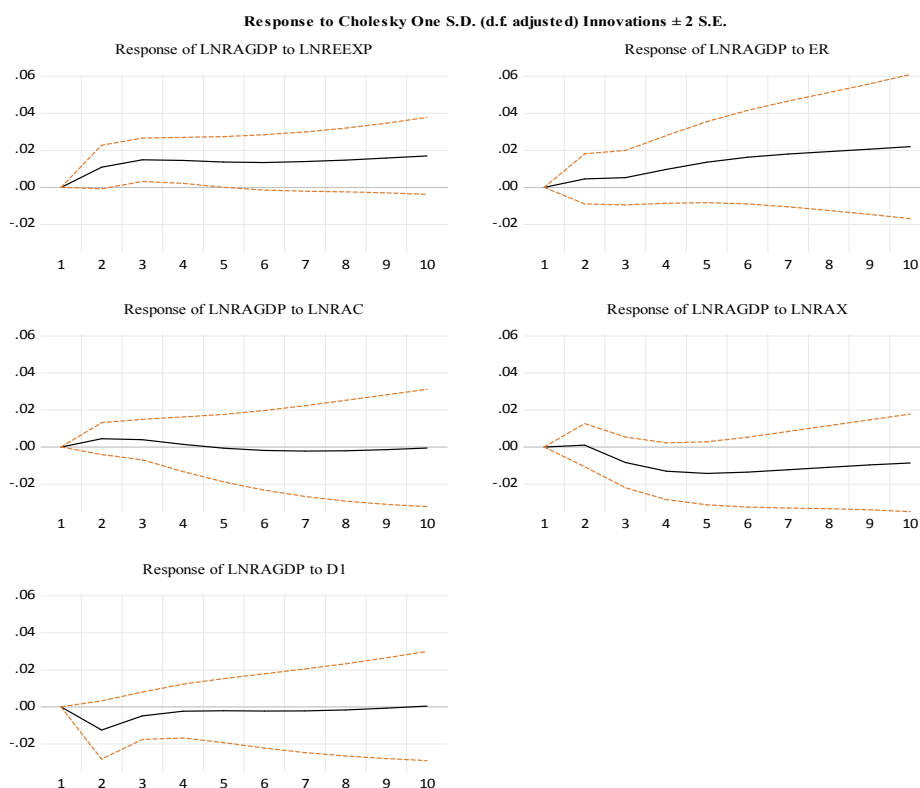


Fig. 2. Impulse response function (IRF) for agricultural sector equation
 Source: Calculated by the authors by using Eviews 12 programs

7. CONCLUSION

This research is based on published and unpublished statistical data during the period 1991-2018. It estimated the impact of monetary policy and fiscal policy on Egyptian agricultural sector especially the impact of floating Egyptian pound by using robust regression and vector error correction model (VECM). The results showed that the rising in dollar exchange rate led to the devaluation of Egyptian pound. According to robust regression, There are positive relationships between real Egyptian expenditure (LNREExp), real agricultural credit (LNRAC), real agricultural exports (LNRAX) and real agricultural gross domestic product (LNRAEGDP). In addition to a negative relationship between real agricultural gross domestic product and dummy variable represents in floating Egyptian pound in January 2003 (D1) with statistically significant. It means the floating of Egyptian pound wasn't having good effect on agricultural sector. The dollar exchange rate (ER) has indirect relationship with agricultural gross domestic product as exchange rate effects agriculture imports and exports. the Egyptian economy

depends on imports most of necessary goods, it means that the increasing of gross domestic product is not real it was due to the increasing of agricultural imports that used in the production process more than the agricultural exports. The positive relationship between real agricultural gross domestic product (RAGDP) and real agricultural imports(RAM) as well as the positive relationship between agricultural imports(RAM) and dollar exchange rate (ER) which are not apply the economic logic, proof that the floating exchange rate regime and the macroeconomic policies applied during the study period were not effective as Egypt imports good and service with high prices due to the devaluation of Egyptian pound. so, the growth in agricultural gross domestic product was not real. According to vector error correction model, the results showed that it will take approximately 4.5 years to correct the deviation that happened in Real Gross Domestic Product of the Agricultural sector (LNRAGDP) as it will be correct 24% per year depends on the deviation correction in Real Egyptian Expenditure (LNREEXP), Dollar Exchange Rate (ER), Real Agriculture Credit (LNRAC), Real Agriculture Exports (LNRAX),

Dummy variable represents in floating Egyptian pound in January, 2003 (D1).

According to the comparison between the research conclusions and literatures review's conclusions, this research confirms the ineffectiveness of flexible exchange rate regimes on the development countries economy. As the floating of Egyptian pound decision didn't have a positive effect on the agriculture sector in Egypt. This conclusions agreed with the Egyptian previous studies. Hassan [5]. concluded that nominal interest rate doesn't affect real domestic credit [6]. Moursi et al concluded that the effect of monetary policy on real output Growth in the long-run was limited by its capacity to achieve long-run price stability [7]. Khodeir concluded that rising in the inflation rate is due to the Egyptian pound's depreciation [8]. Amer found that devaluation exchange rate doesn't affect the trade balance [1] Massoud and Willets concluded that the free-floating exchange rate regime was not preserved during the study period [9]. Solieman concluded that the high prices of food commodities in the consumer markets are due to floating exchange rate and other factors like the size of market Saleh [10] concluded that the devaluation of Egyptian pound did not improve the agricultural trade balance between Egypt and the Arab countries Omran and Bilan [11] found that the fiscal policy represents in government spending shock has a negative impact on unemployment rate while the tax revenue has positive impact on unemployment rate [11].

8. RECOMMENDATIONS

Based on the study results, the following can be suggested:

- The central bank of Egypt (CBE) must apply fixed exchange rate regimes as the flexible exchange rate regimes doesn't work with the developing countries due to the increasing of imports more than exports.
- The ministry of finance must put a plan to increase the spending on investments and production to push forward the Egyptian agricultural sector and the Egyptian economy.
- The government must focus on increasing the agricultural production and agricultural investments as the agriculture is the bases of any developed economy and without it there is no industry and trade.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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