

## THE MECHANISMS OF STAGFLATION IN EGYPT :THE ARAB SPRING FIVE YEARS LATER

*This study addresses the economic performance of the Egyptian economy during the periods before and after the 25<sup>th</sup> January upheaval in 2011. It analyses, in particular, the extent to which monetary and fiscal policies contribute to the phenomenon of stagflation in Egypt after 2011. The study adopts Gordon's (1977 & 1985) model in specifying the relationship between inflation, unemployment, and real GDP growth. SVAR model has been employed to determine the factors behind stagflation in Egypt. The results suggest that macroeconomic performance does not significantly change during the periods before and after the 2011 and stagflation occurs in Egypt through the following mechanisms; (i) the existence of excess demand in the commodity market in conjunction with the existence of structural unemployment in the labor market. (ii) An existing mutual relationship between inflation and unemployment where both inflation and unemployment feed each other through the wage-price spiral and the elevation of the cost of production triggered by domestic currency depreciations. (iii) The subordination of monetary policy to fiscal policy which is in line with the fiscal dominance hypothesis and crowding out effect. (iv) Expected higher rates of inflation, through the expectations channel, shifting Phillips curve upwards.*

*JEL: E24, E31, E60*

### I. Introduction

The key statistics that indicate a direction of an economy are inflation, unemployment and GDP growth rates. Following the 25<sup>th</sup> January upheaval in 2011 there were concerns that growth rates in the Egyptian economy have slowed. Before that forecasts were expecting the pace of growth in 2011 to remain robust, meeting the government targets of around 7 percent growth rate, a sustained period of price stability, and a stable volume of unemployment.

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<sup>1</sup> Ibrahim L. Awad is Correspondent & Senior Author. Assistant Professor in Economics, Department of Finance and Economics, College of Business and Economics, Qatar University, Qatar-Senior Lecturer in Economics, Department of Economics, Faculty of Commerce, Zagazig University, Egypt; e-mail: [ibrahim.ibrahim@qu.edu.qa](mailto:ibrahim.ibrahim@qu.edu.qa), [ibrahimphd@yahoo.com](mailto:ibrahimphd@yahoo.com)

<sup>2</sup> Ashraf Galal Eid is from Finance and economics Department, College of Business and Economics, Qatar University.

Figure 1 explores the rates of CPI inflation and unemployment during the periods before and after the 2011. Clearly, the 2007/08 global credit crunch had a notable impact on both inflation and unemployment in Egypt but the upward trend accelerated and gained significant speed after 2011.

Figure 1

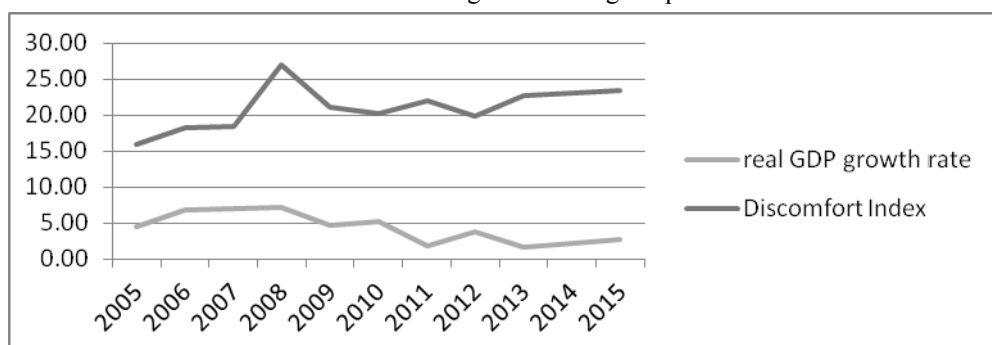
Developments of annual inflation and unemployment during the period of 2005-2014



Source: Data is collected from IMF, IFS. Years 2015 & 2016 from Central Bank of Egypt, available at: <http://www.cbe.org.eg/English/>.

Figure 2

Discomfort Index and Real GDP growth during the period of 2005-2015



Source: Data is collected from IMF, IFS.

The discomfort index in Figure 2 (i.e. the rate of inflation + the rate of unemployment) indicates constant and successive upward movements along with a decline in real GDP growth especially after 2011. The simultaneous upward movements of inflation and unemployment can be described as “Stagflation”.<sup>3</sup>

<sup>3</sup> “Stagflation” is the case in which the price level is rising despite the existence of substantial unemployment, or the unemployment level may be rising at the same time. See Bronfenbrenner, 1976.

This study investigates the factors behind stagflation in the Egyptian economy during the periods before and after 2011. Specifically, the study intends to answer the following questions; did the performance of Egyptian economy change after 2011 compared with other preceding periods? What are the factors leading to stagflation in the Egyptian economy? Did monetary and fiscal policies implemented by the government contribute to stagflation?

The remainder of this paper is as follows; section two highlights the mechanisms of stagflation. Section three discusses the model and variables specifications. Section four explores the methodology and data used in the study. Section five reviews the estimation results. Section six offers concluding remarks.

## **II. The Mechanisms of Stagflation**

In the literature, there are a number of models that explain the existence of stagflation<sup>4</sup>. Monetarists argue that the stagflation occurs because of expansionary fiscal and monetary policies adopted by the government to stimulate the economy. Such policies result in accelerating the inflation rate at the level of long-run unemployment. The intervention by the government afterwards to stabilize the economy will push the economy into recession where unemployment exceeds the natural rate (i.e. NRU) and inflation rate stands at high level (Friedman, 1968).

Contemporary economic theory explains how a negative supply shock that increases the cost of production, or causes a decline in the productivity of labor relative to real wages, will eventually cause the short-run aggregate supply to shift leftwards causing both inflation and unemployment to rise. Modigliani (1977) argues that under the supply shock there is no miracle cure since there is no macroeconomic policy that can maintain both stable inflation and unemployment simultaneously. Furthermore, he argues that the suggestion by the monetarists of a constant rate of growth of nominal money supply is not enough to stabilize the economy as long as the economy is exposed to exogenous shocks. Moreover, he argues that the oligopolistic pricing model, instead of the market auction model, dominates the labor market. This implies that firms respond to demand changes by adjusting output and employment without instant changes in prices relative to wages. Hence, the resulting unemployment during the contraction times is involuntary not “voluntary” as propounded by monetarists.

In explaining the stagflation that hit the developed economies during the 1970s, the Neo-Keynesians argue that if a supply shock hits the economy, price level rises, the monetary authority mistakenly adopts a contractionary monetary policy to defeat inflation, unemployment then deepens, whereas inflation does not significantly change (Modigliani, 1977).

Using a dynamic model of aggregate demand and aggregate supply, Gordon (1977) underscored the role of supply shocks in the phenomenon of stagflation as follows:

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<sup>4</sup> For more details see Awad (2002).

$$P_t = Y_t^* + \alpha (U_t - U_{t-1}) \quad (1)$$

Equation 1 comes from identity of nominal GDP and Okun's law. It shows the dynamic aggregate demand which plots a positive relation between  $P_t$  and  $U_t$  given  $Y_t^*$  and  $U_{t-1}$ . All variables in equation 1 are expressed in growth-rate form. Where,  $P_t$  stands for growth rate of GDP deflator,  $U_t$  stands for unemployment rate, and  $Y_t^*$  stands for growth rate in nominal GDP,  $Y_t$ , minus long-term trend real GDP growth rate,  $q^*$ , i.e.,  $Y_t^* = Y_t - q^*$ .

The term  $\alpha (U_t - U_{t-1})$  in equation (1) comes from Okun's law which establishes a negative association between the deviations in the unemployment rate,  $(U_t - U_{t-1})$ , and the difference between real GDP growth rate,  $q_t$ , and long-term trend real GDP growth,  $(q_t - q^*)$ , so that;

$$U_t - U_{t-1} = -\beta (q_t - q^*) \quad (2)$$

Where  $q_t$  stands for actual real GDP growth rate.

Equation 3 outlines the supply side of the economy and it comes from the Phillips curve relation;

$$P_t = P_t^e + g (U_t - U^N) + Z_t \quad (3)$$

Where  $P_t^e$  stands for expected inflation rate,  $U^N$  stands for the natural rate of unemployment, and  $Z_t$  stands for cost-push factors like oil shocks, labor union pressures, depreciation of domestic currency, etc. At equilibrium where there is no supply shocks and actual inflation equals expected inflation ( $P_t = P_t^e$ ), there is a single level of natural rate of unemployment,  $U^N$ . Given  $U^N$ , equation 3 plots a negative relation between inflation,  $P_t$ , and unemployment,  $U_t$ , only when expected inflation,  $P_t^e$ , is fixed and the supply shocks,  $Z_t$ , don't exist. If expected inflation is rising in response to past realizations of  $P_t$ , both inflation and unemployment will rise where the Phillips curve shifts upward. Under the supply shocks, however, the Phillips curve (or equivalently the supply curve) will shift up the fixed demand curve thereby inflation and unemployment will rise simultaneously.

Post Keynesians economics developed the micro foundations underlying the macroeconomic theory, a relationship that Keynes stopped short of arguing that microeconomics should be firmly grounded in macroeconomic theory. In addition, Post-Keynesians concerned with issues that Keynes did not provide an account of such as the theory of distribution of national income and the theory of economic growth. In their analysis of price and output decisions, Post-Keynesians divide the economy to two sectors. The central sector, which includes oligopolistic firms that administer prices and the small sector, which includes small firms in raw materials, agricultural products and small industries whose prices are determined under market clearing basis. In the central sector

each firm sets price, (P), by adding a certain markup ratio, (m), to its average variable cost, (AVC). Thus,  $P = AVC + (m \times AVC)$ . The ratio of markup depends on the demand elasticity of a firm's product. If a firm's AVC is invariant to changes in its output within a certain range, the marginal cost equals AVC (Tarshis, L., 1980). Post-Keynesians argue that prices are sensitive to cost changes but insensitive to demand changes. Because the cost of borrowing exceeds the cost of using retained profits, firms tend to raise their prices to maintain a targeted level of profits necessary to finance future investments.

Another channel of price soaring in the administered section of the economy is the increase of prices in the competitive sectors causing the cost of production of oligopolistic firms to rise. Once the oligopolistic firms raise their prices to maintain targeted profits, the wage-price spiral is activated. Hence, short-term inflation is ratcheting up at the level of real output and employment. Yellen, Janet L.(1980), reported the following IS equation used by Post-Keynesians, where saving equals investment as a condition of short-term equilibrium, such that:

$$I = S_w \left( \frac{WN}{P} \right) + S_p \left( Y - \frac{WN}{P} \right), \quad S_w < S_p \quad (4)$$

Where,  $S_w$  &  $S_p$  denote average saving propensities of workers and capitalists,  $W$  &  $P$  denote nominal wages and prices,  $N$  &  $Y$  denote employment and real output, and  $I$ , denotes real investment. As Post-Keynesians assume a proportional relationship between  $N$  and  $Y$  where,  $N = nY$ , equation (4) can be rearranged such that;

$$I = Y[S_p + n \frac{W}{P} (S_w - S_p)] \quad (5)$$

Equation 5 tells us that a wage-price spiral could happen at the same level of real output and employment.

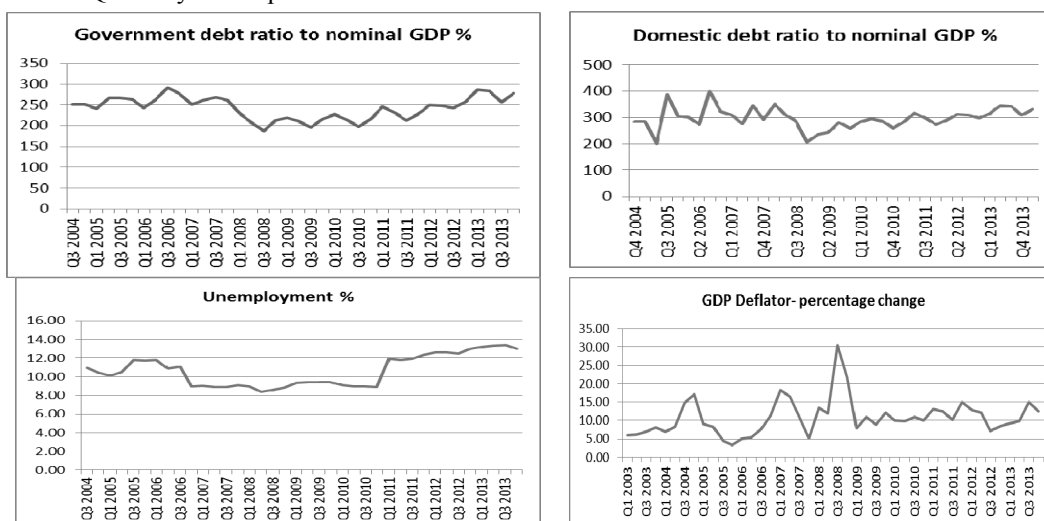
Other possible explanations to the currently existing stagflation in Egypt are the “fiscal dominance” and the “crowding-out” effects. Fiscal dominance indicates the situation in which the central bank partly gives up the primary goal of monetary policy, price stability, and gears monetary policy instruments to serve fiscal policy priorities including preventing the government from default on its public debt. Crowding-out effect, on the other hand, indicates a situation where a massive increase in the government spending, financed by either taxes or debt issuance, displaces a near-equal amount of private spending in the long-term. The crowding-out effect is based on the assumption of a constant money supply accompanying fiscal expansion. Hence, the increase in public and central government debt, caused by fiscal expansion, will result in an increase in nominal interest rate leading to a decline in private spending, and so a decline in the employment levels.

In the case of Egypt, both “fiscal dominance” and “crowding-out” effects are linked to each other where the central bank of Egypt is obliged to finance budget deficit. Under the regulation of the Central Bank of Egypt (CBE), the CBE is committed to finance budget deficits upon the government request with an amount not exceeding 10 % of the average revenues of the state budget during the previous three years. The term of such financing can

be extended to twelve months and the conditions are determined by an agreement between the ministry of finance and the CBE (Awad, 2013)<sup>5</sup>

The obligation to finance budget deficits by CBE, coupled with excessive increase in public and central government debt, could explain the phenomenon of stagflation which currently exists in the Egyptian economy. Whilst the issuance of new money to finance budget deficit maintains inflation rates at a high level, the resultant increase in nominal interest rates minimizes real GDP growth and has continues to worsen unemployment rate. Figure 3 shows the quarterly developments in the government debt ratio and domestic debt ratio to nominal GDP, along with developments in unemployment rate and GDP deflator inflation during the period of 2004-2013. Clearly, central government debt ratio and domestic debt ratio to nominal GDP have increased constantly to unprecedented levels, especially during the periods after 2008. For the whole period of 2004Q3-2013Q3 the average domestic debt ratio and government debt ratio are 296 percent and 243 percent, respectively. The government debt ratio elevated from 236 percent for the period of 2004Q3-2011Q4 to 262 percent for the period of 2012Q1-2013Q4. The upward trend in the debt ratio was in conjunction with rising unemployment rate and inflation rate in terms of quarterly percentage change in GDP deflator.

Figure 3  
Quarterly developments in the debt ratio and some other macroeconomic indicators



Source: Data is collected from IMF, IFS.

<sup>5</sup> Law No. 88 of the year 2003 amended by law No. 162 of the year 2004 and Law No. 93 of the year 2005 is known as the new law of the CBE, the banking sector, and the money. Available at: <http://www.cbe.org.eg/public/Banking%20Laws/Law%2088,%20amendments,%2013-7-2005.pdf>.

### III. Model and Variables Specifications

This study is grounded on Gordon's (1977 and 1985) model which specifies the association between inflation, unemployment, and real GDP growth. The unemployment rate that corresponds to the long-term growth rate of real GDP can be estimated from Okun's law in equation 2. In addition, Gordon (1985) reduced-form inflation, equation 6 (or, equivalently, expectations- augmented Phillips curve), is the baseline model adopted by the study to estimate the inflation rate in Egypt.

$$P_t = P_t^e + m(v_t) + g(X_t) + h(Z_t) \quad (6)$$

Where,  $m(v_t)$  symbolizes to excess demand variable (s) in the commodity market,  $g(X_t)$  stands for excess demand variable (s) in the labor market, and  $h(Z_t)$  stands for cost-push or supply-shift variables. Money supply growth rate minus natural real GDP growth rate can be used to measure the commodity market excess demand,  $m(v_t)$ . Current and lagged values of percentage change in GDP deflator or percentage change in CPI can be used to measure  $P_t$  and  $P_t^e$ , respectively. The adoption of lagged inflation to express expected inflation term can be regarded from two angles. On the one hand, lagged inflation represents the inertia of wage-and price-setting institutions because of the contractual nature of wages. On the other hand, it is a proxy for price expectations which are supposed to be formed adaptively.

Either actual unemployment rate or the difference between real GDP growth rate,  $q_t$ , and long-term trend real GDP growth rate,  $q^*$ , ( $q_t - q^*$ ) can be used to measure excess demand in the labor market,  $g(X_t)$ .

Supply-shift factors,  $h(Z_t)$ , includes a number of variables; (i) the difference between the rate of growth in real wages and the rate of growth in labor productivity. Obviously, stickiness or inertia in real and nominal wages can aggravate unemployment at the existing level of prices and shift the Phillips curve upward. (ii) the growth rate in the price of imported goods and/or the depreciation of domestic currency. (iii) the ratio of personal tax collections to personal income and/ or the ratio of indirect business tax receipts to private GDP.

Structural VAR technique can be employed to determine the impact of various shocks on inflation, unemployment, and real GDP growth rates through the impulse-response function and the variance decomposition analysis.

To distinguish the impact of a specific shock in the error terms, the nonzero covariance of error terms under unrestricted VAR model is treated by transforming the model into a structural VAR model where the error terms are no longer contemporaneously correlated and structural or orthogonal innovations are determined for the impulse response and variance decomposition analysis purposes.

Zellner and Palm (1974), Cushman and Zha (1995), and Zha (1998), use the following reduced form representation of a structural VAR model:

$$\beta(L)Y(t) = \varepsilon(t) \quad (7)$$

Where,  $Y(t)$  is an  $(m \times 1)$  vector of variables, i.e.  $(P_t, P_t^e, m(v_t), g(X_t), h(Z_t))'$ ,  $\beta(L)$  is an  $(m \times m)$  matrix in the lag operator  $(L)$ , and  $\varepsilon(t)$  is an  $(m \times 1)$  vector of structural disturbances.

A reduced form (7), can be expressed as follows<sup>6</sup>:

$$Y(t) = -A(L)Y(t) + V(t) \quad (8)$$

Where,  $A = \beta_0^{-1} \beta^0$  and  $V(t) = \beta_0^{-1} \varepsilon(t)$ . Because the system in (8) is not identifiable  $\beta_0$  is imposed as a lower triangular matrix to discern structural shocks  $\varepsilon(t)$  from reduced form residuals,  $V(t)$ .

If, instead, variables are nonstationary but co-integrated, ECM can be used accordingly where the existence of a cointegrating vector implies an error correction representation. Since the seminal work of Engle and Granger (1987), ECM has become a dominant econometric framework. If a certain set of conditions about the number of cointegration relations is met, the following ECM can be used to estimate reduced-form inflation, equation 6.

$$\begin{aligned} \Delta P_t = & c_t + \alpha \underbrace{(P_{t-1} - \beta_2 P_{t-1}^e - \beta_3 m(v)_{t-1} - \beta_4 g(x)_{t-1} - \beta_5 h(z)_{t-1})}_{ECT} \\ & + \sum_{i=1}^k \gamma_{1i} \Delta P_{t-i} + \sum_{i=0}^k \gamma_{2i} \Delta P_{t-i}^e + \sum_{i=0}^k \gamma_{3i} \Delta m(v)_{t-i} + \sum_{i=0}^k \gamma_{4i} \Delta g(x)_{t-i} + \sum_{i=0}^k \gamma_{5i} \Delta h(z)_{t-i} \end{aligned} \quad (9)$$

#### IV. Data

Quarterly data covering the period of 2004Q3-2015Q3 is unavailable for some variables reported in equation 6. Data on most variables is collected from IMF-IFS. Data on Real GDP growth for the periods of 2014Q1-2015Q3 is collected from CBE<sup>7</sup>. All variables are seasonally adjusted and are expressed in growth rates form. Excess demand in the commodity market,  $m(v_t)$ , is defined by the difference between  $M_2$  growth rate and the natural real GDP growth rate. The natural real GDP is the trend of actual real GDP estimated by Hodrick-Prescott (HP) filter with smoothing parameter,  $\lambda$ , equals 1600.

<sup>6</sup> For details on the derivation of the reduced form (2), see Awad, 2010.

<sup>7</sup> <http://www.cbe.org.eg/English/>.

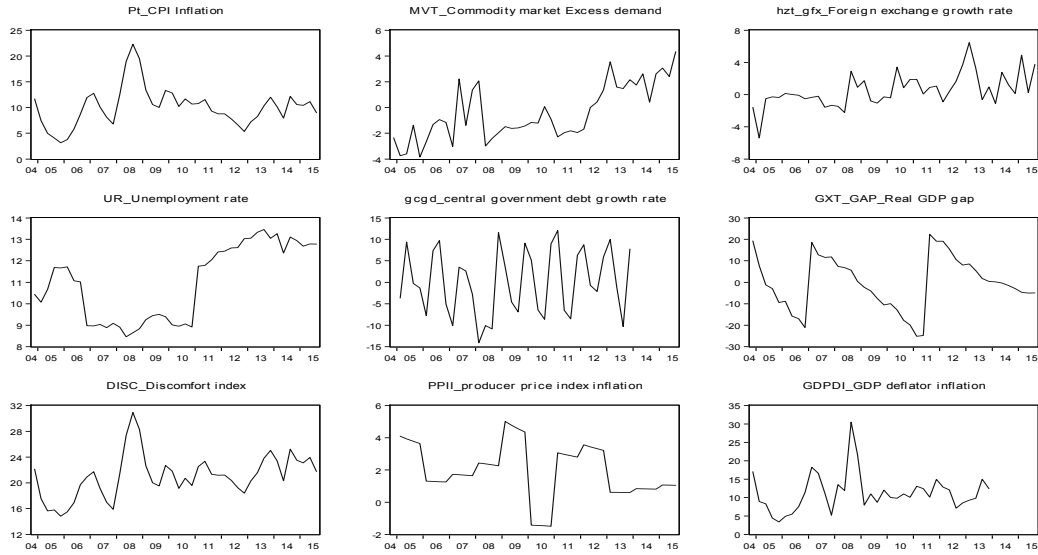
Current and lagged values of percentage change in CPI are used to measure  $P_t$  and  $P_t^e$ , respectively<sup>8</sup>. The difference between actual and natural unemployment rates (the trend of actual unemployment rate estimated by HP filter) is experimented as a proxy for the excess demand in the labor market. Alternatively, the model is estimated using real GDP gap as a proxy for excess demand in the labor market. Real GDP gap,  $g(X_t)_{gap}$ , is calculated from the following formula;

$$g(X_t)_{gap} = \frac{\text{Actual Real GDP} - \text{Natural Real GDP}}{\text{Natural Real GDP}} * 100 \quad (10)$$

Where, natural real GDP is the trend of actual real GDP estimated by HP filter. The rat of change in nominal exchange rate is used to express the supply shift factors,  $h(Z_t)_{grx}$ , and the growth rate of central government debt, GCGD, is used to reflect the impact of fiscal policy dominance on the stagflation.

Figure 4

Equation 6 seasonally-adjusted variables on the period 2004Q4-2015Q3



Source: Prepared by the author. Data is collected from IMF, IFS.

In light of the above description, the expected signs of explanatory variables included in the equation 6 are positive except for real GDP gap,  $g(X_t)_{gap}$ , which is expected to be

<sup>8</sup> Adaptive expectation hypothesis defines expected inflation ( $\pi_t^*$ ) as follows:  $\pi_t^* = \pi_{t-1}^* + \gamma (\pi_{t-1} - \pi_{t-1}^*)$ . Given the expectations factor ( $\gamma$ ) = 1, the lagged value of inflation,  $\pi_{t-1}$ , is considered as measurement of expected inflation. See, Awad & Soliman, 2016.

positively related to inflation rate under the stagflation phenomena. The rate of change in foreign exchange rate,  $h(Z_t)_{gfr}$ , might be linked positively or negatively to the rate of inflation. In both, the association between change in foreign exchange rate and inflation is positive.

Figure 4 shows seasonally adjusted variables for the period of 2004Q4-2015Q3. Clearly, most variables involve a structural change in 2008 due to 2007/08 global credit crunch. In addition, quarterly data on some variables, such as central government debt, unemployment rate, and GDP deflator are not available beyond 2013. For these reasons, the estimation process of the model is limited to the period between 2008Q4-2013Q3.

## V. Empirical results

The unit root tests in table 1 indicate that the variables  $P_t$ ,  $P_t^e$ ,  $m(v_t)$ ,  $g(X_t)_{gap}$ ,  $h(Z_t)_{gfr}$ , and GCGD are integrated of order zero, or,  $I(0)$ .

Table 1

Augmented Dickey-Fuller (ADF) Test Results for Unit Roots

| Variables      | Constant with Trend | Constant without Trend |
|----------------|---------------------|------------------------|
| $P_t$          | -3.64**             | -3.73**                |
| $m(v_t)$       | -4.28**             | -1.43                  |
| $g(X_t)_{gap}$ | 3.10*               | -3.119**               |
| $h(Z_t)_{gfr}$ | -5.77**             | -4.31**                |
| GCGD           | -2.48               | -2.81*                 |

\* indicates rejection of null hypothesis of existence of unit root at the 10% significance level

\*\* indicates rejection of null hypothesis of existence of unit root at the 5% significance level.

The lags of the dependent variable used to obtain a white-noise residuals are determined automatically using SIC, max-lag =9.

Table 2

Estimation results of equation 6

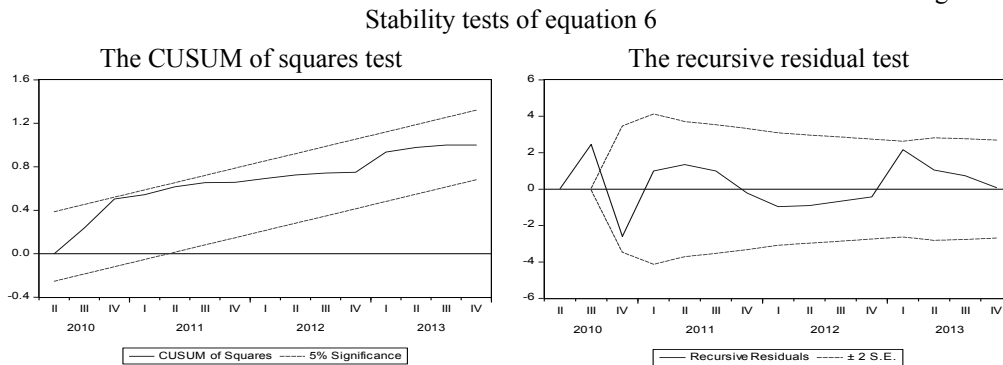
| Dependent Variable: $P_t$ |             |                   |             |          |
|---------------------------|-------------|-------------------|-------------|----------|
| Variables                 | Coefficient | Std. Error        | t-Statistic | Prob.    |
| C                         | 4.243       | 1.009             | 4.204       | 0.0008   |
| $P_{t-1}^e$               | 0.633       | 0.091             | 6.914       | 0.0000   |
| $m(v_t)$                  | 0.534       | 0.256             | 2.089       | 0.0541   |
| $g(X_t)_{gap}$            | -0.055      | 0.021             | -2.630      | 0.0189   |
| $h(Z_t)_{gfr}$            | -0.549      | 0.201             | -2.721      | 0.0158   |
| GCGD                      | 0.082       | 0.040             | 2.027       | 0.0608   |
| R-squared                 | 85.8%       | F-statistic       |             | 18.163   |
| Durbin-Watson stat        | 1.728       | Prob(F-statistic) |             | 0.000007 |

In light of the unit root tests, OLS is used to estimate  $P_t/P_t^e$ ,  $m(v_t)$ ,  $g(X_t)_{gap}$ ,  $h(Z_t)_{gfx}$ , GCGD for the period of 2008Q4-2013Q4. As shown in Table 2, all variables are significant at 5% or 10% significance level. The coefficients' signs are consistent with the above descriptive analysis. The negative sign of output gap,  $g(X_t)_{gap}$ , indicates a positive relation between unemployment and inflation. That is, when output gap is positive (actual real GDP exceeds potential real GDP), or unemployment rate is low, the inflation rate declines. In addition, the positive relation between CPI inflation and unemployment rate is found when  $g(X_t)_{gap}$  is replaced with the unemployment rate, U. However, R-squared in the latter case is lower than the former one expressed by Table 2.

The negative sign of the rate of change in nominal exchange rate,  $h(Z_t)_{gfx}$ , indicates the pace of movements between the change in the rate of change in nominal exchange rate and the change in the rate of inflation. That does not contradict the positive relation between foreign exchange rate movements (price of US dollars in terms of EGY pounds) and the inflation rate movements.

Recursive least squares tests are used to check the stability of the estimated parameters reported in Table 2. According to the CUSUM residuals test and the recursive residuals test, Figure 5, the estimated parameters are stable.

Figure 5



Since the vector of variables  $[GCGD, m(v_t), g(X_t)_{gap}, P_t, h(Z_t)_{gfx}, P_t^e]$  is found stationary according to the unit root tests reported in Table 1, the reduced form of structural VAR model (8) is estimated by imposing  $\beta_0$  as a lower triangular matrix under the following benchmark identification scheme;

$$\begin{pmatrix} e_t^{GCGD} \\ e_t^{m(v)_t} \\ e_t^{g(X)_t, gap} \\ e_t^{P_t} \\ e_t^{h(Z)_t, gfx} \\ e_t^{P_t^E} \end{pmatrix} = \begin{pmatrix} \delta_{11} & 0 & 0 & 0 & 0 & 0 \\ \delta_{21} & \delta_{22} & 0 & 0 & 0 & 0 \\ \delta_{31} & \delta_{32} & \delta_{33} & 0 & 0 & 0 \\ \delta_{41} & \delta_{42} & \delta_{43} & \delta_{44} & 0 & 0 \\ \delta_{51} & \delta_{52} & \delta_{53} & \delta_{54} & \delta_{55} & 0 \\ \delta_{61} & \delta_{62} & \delta_{63} & \delta_{64} & \delta_{65} & \delta_{66} \end{pmatrix} \begin{pmatrix} V_t^{GCGD} \\ V_t^{m(v)_t} \\ V_t^{g(X)_t, gap} \\ V_t^{P_t} \\ V_t^{h(Z)_t, gfx} \\ V_t^{P_t^E} \end{pmatrix} \quad (11)$$

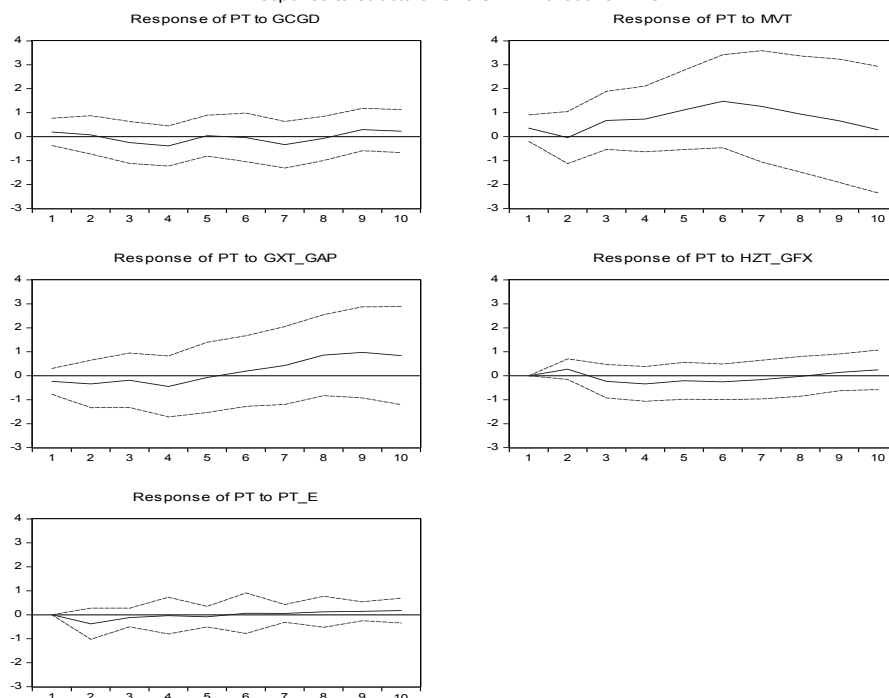
Zero block(s) corresponding to a variable shock means that the variable responds contemporaneously to changes in the preceding variables' shocks. A shock in a variable itself, however, does have a contemporaneous impact on the following variables, but affects the preceding variables after one lag (or, one quarter).

Figure 6

#### Response of CPI inflation

Scheme 11: [GCGD,  $m(v)_t$ ,  $g(X)_t, gap$ ,  $P_t$ ,  $h(Z)_t, gfx$ ,  $P_t^E$ ]

Response to Structural One S.D. Innovations  $\pm 2$  S.E.



Responses to structural innovations ordered as in 11 have been estimated. Figures 6 and 7 depict responses of CPI inflation,  $P_t$ , and real GDP gap,  $g(X_t)_{gap}$ , to structural innovation of other variables during the period of 2008Q4-2013Q4.

Response of CPI inflation, Figure 6, to structural innovation of other variables comes consistent with the aforementioned description and the results reported in Table 6 except for the response to expected inflation,  $P_t^e$  where CPI inflation goes down in response to a positive structural shock in the past (or expected) inflation.

Real GDP gap responses to structural innovation of CPI inflation, Figure 7, comes to underscore the mutual relation between inflation and unemployment, where both of them affect each other in the same direction, i.e. the higher the unemployment rate the higher the inflation rate, *vice-versa*. The initial response of real GDP gap to structural shock of expected inflation is positive. Also, real GDP gap, or unemployment, decreases in response to both positive shocks of the foreign exchange rate (or a depreciation of domestic currency) and central government debt. Moreover, the negative response of real GDP gap to a positive structural shock of excess demand in the commodity market indicates one of the most important features of unemployment in Egypt. That is, unemployment is “structural” where, unemployment in the labor market and excess demand in the commodity market co-exist.

Figure 7

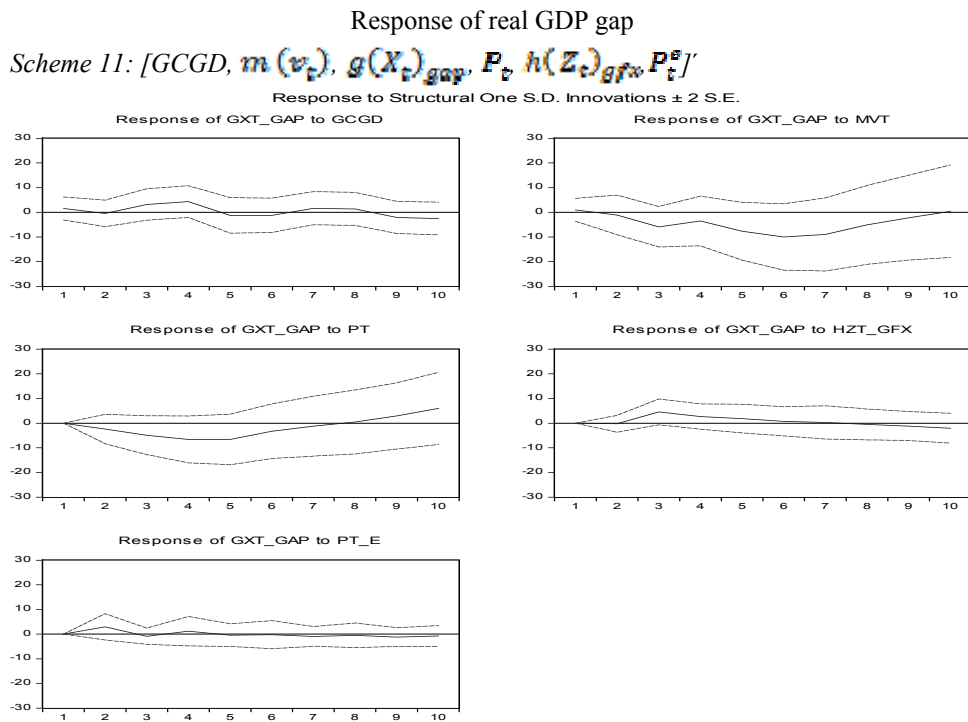


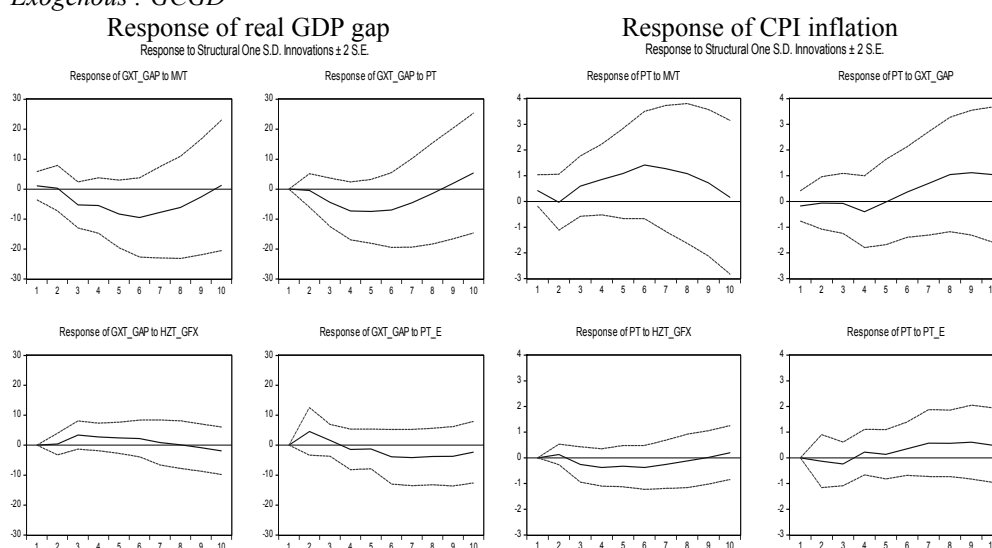
Figure 8 depicts responses of CPI inflation,  $P_t$ , and real GDP gap,  $g(X_t)_{gap}$ , to structural innovation of other variables under the identification scheme 12. Clearly, the direction of responses of CPI inflation and real GDP gap to other variables' shocks does not change compared with Figures 6 and 7 but the level of responses is higher under the latter case.

Figure 8

### Response of real GDP gap and CPI inflation

Scheme 12:  $[m(v_t), g(X_t)_{gap}, P_t, h(Z_t)_{gfx}, P_t^e]$

Exogenous : GCGD



Under the fiscal dominance hypothesis and the obligation of CBE to finance budget deficit, the identification scheme 11 is adjusted to take account of this issue. Identification scheme 12 treats central government debt, GCGD, as exogenous. The order of variables does not change to make comparisons valid.

$$[m(v_t), g(X_t)_{gap}, P_t, h(Z_t)_{gfx}, P_t^e] \quad \text{Exogenous: GCGD} \quad (12)$$

In light of the results of the above analysis, the mechanisms of stagflation in Egypt during the period of 2008Q4-2013Q4 can be explained as follows;

(i) The existence of excess demand in the commodity market coupled with a negative real GDP gap, or an increase in the unemployment rate, would support the hypothesis of the existence of a structural unemployment in the Egyptian economy. Hassan, M. & Sassanpour, C. (2008) and Awad (2002) attributed the high level of unemployment along

with the widespread of educated youth unemployment to the skills gap, or the mismatch between skills offered by labor and skills demanded by the labor market<sup>9</sup>.

(ii) A mutual relationship between inflation and unemployment does exist, where both of them feed each other. High inflation causes a negative real GDP gap, or high unemployment, and inflation declines in response to a positive output gap, or low unemployment rate. In the literature, inflation causes unemployment either under the mechanisms of price-wage spiral or under the production cost hike where aggregate supply curve shifts leftward. The depreciation of the Egyptian pound increases import costs and puts pressures on domestic cost of production thereby aggregate supply curve shifts leftward. According to the empirical results, domestic inflation rises in response to domestic currency depreciation.

(iii) The contribution of the CBE in financing budget deficit along with a constant and excessive increase in public and central government debts explain the high inflation level in Egypt. According to the empirical results in Figures 6 and 8, a positive shock to central government debt and excess demand in the commodity market causes a rise in inflation. However, the nominal interest rate elevation, caused by either the crowding out effect or inflation hike, negatively affects aggregate demand and so real GDP growth and unemployment rate deteriorate as a result. The empirical results in Figures 7 and 8 show that the response of real GDP gap to both structural shocks of central government debt and excess demand was initially positive but then turned negative during the successive periods.

(iv) As mentioned in equation 3, if expected inflation is rising in response to past realizations of price level, both inflation and unemployment will rise where the Phillips curve shifts upwards. Figure 8 captures this association where inflation and unemployment pick up after three quarters, in response to a positive structural shock of expected inflation.

## **VI. Conclusion**

This study analyses the macroeconomic performance of Egyptian economy during the periods before and after 2011 to answer the following questions; (1) is there significant change in macroeconomic performance during the periods after 2011 compared with other preceding periods? (2) What are the reasons behind stagflation in the Egyptian economy? (3) To what extent did monetary and fiscal policies contribute to the phenomenon of stagflation?

To examine the association between inflation, unemployment, and real GDP growth the study adopted Gordon's (1977 and 1985) model and estimated Gordon's (1985) reduced form by both OLS and SVAR model.

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<sup>9</sup> Some studies indicate that the official unemployment rate in Egypt is underestimated or, at best, it represents the lower bound of actual unemployment rate. For details on the nature and reasons for unemployment in Egypt see; Hassan, M. & Sassanpour, C. (2008), Awad (2002), and Willem Van Eekelen, et al. (2004).

In light of the descriptive and empirical analysis results, the study concludes that; (1) macroeconomic performance did not significantly change during the periods before and after 2011. (2) Stagflation occurs in the Egyptian economy through the following mechanisms; (i) the existence of excess demand in the commodity market in conjunction with the existence of structural unemployment in the labor market. (ii) A mutual relation between inflation and unemployment exists, where both of them feed each other through the wage-price spiral and the elevation of the cost of production triggered by the depreciation of domestic currency. ((iii) The subordination of monetary policy to fiscal policy priorities through the fiscal dominance and the crowding out effect. (iv) The expected higher rates of inflation shift Phillips curve upwards.

The results of the present study underscore the fact that the 25<sup>th</sup> January upheaval in 2011 did not contribute to stagflation in Egypt but the opposite might be correct. Expansionary policies before and after 2011 led to consistently increasing inflation rate without effectively reducing structural unemployment. Concisely, the adoption of demand-side policies to stimulate the economy in the short-term coupled with the fragility of supply-side policies that promote productivity growth in the long-term represent the main reasons behind stagflation in Egypt<sup>10</sup>.

Policy implications of stagflation mechanisms revealed by this study suggest that the CBE has nothing to do with the unemployment since it is structural in nature. Yet, the coordination between monetary policy and fiscal policy is quite important to defeat stagflation.

To successfully avoid stagflation in Egypt, the CBE needs to gradually withdraw money out of circulation to maintain consistency between the growth of money supply and the expected performance of the economy in the short and long-term. In this regard, the instrument independence granted to the CBE under the latest legislations in 2003 and 2005 should be factual so that the CBE can independently use monetary policy tools to maintain the goal of price stability without any interference from any side<sup>11</sup>.

In addition, to avoid persistent inflation in the economy, the growth in money wages should be linked to the growth in productivity within an anti-inflation income policy supported by the government.

Importantly, the monetization of public debt will jeopardize economic stability, push up interest rate, and adversely affect economic growth and employment. To reduce the debt burden the government has to shrink budget deficit as much as possible. As higher taxes

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<sup>10</sup> Productivity growth in the long-term hinges on many factors including the growth of fixed capital formation, the growth of labor force, the growth of human capital, and the technological change.

<sup>11</sup> Following Fry's methodology, which assumes that the level of independence of the central bank is determined by fiscal attributes, Awad (2008) assesses the factual independence of the central bank based on the ability of central bank to fulfill its money supply target without squeezing the private sector. Applying this criterion to the case of the CBE, the author found that the legal independence granted to the CBE by the latest legislations is not factual.

will have negative effects on economic growth, the government spending has to be reduced or reallocated to boost productive capacity of the economy.

Reducing money in circulation may put downwards pressure on inflation but unemployment would still rise unless the underlying causes of structural unemployment are addressed. Improving labor skills through vocational training, on-the-job training, and upgrading the educational system to make consistency between labors' skills and labor market conditions should be given a top priority.

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