Growth of the Shadow Banking System and Effectiveness of the Monetary Policy in Egypt: An Empirical Analysis

Yasmine Mohie El Din Gharieb, Samy El Sayed and Fakhry El Din Ali Alfiky
Faculty of Economics and Political Science, Cairo University, Giza, Egypt

Abstract: The 2008 global financial crisis has raised concerns about potential impact of the shadow banking system on monetary system of a country. By utilizing Prais-Winsten regression and regression with Newey-West standard error, the study examines the possible impact of the shadow banking system on inflation and effectiveness of the monetary policy in Egypt using a quarterly data during the period 2008-2014. Based on the five shadow banking functions classified in the Financial Stability Board report of the International Monetary Fund in 2015, the study contributes to the existent literature by introducing a new composite measure of activities of the shadow banking system in Egypt. The study found a positive and statistically significant impact of activities of the shadow banking system on inflation but a negative and statistically significant impact on effectiveness of the monetary policy measured by the inflation gap. The study concluded that coordination between the monetary authority and financial supervisory authority which supervises and regulates shadow banking activities in Egypt is necessary. Moreover, the monetary authority should consider the shadow banking activities when planning and conducting the monetary policy.

Key words: Shadow banks, monetary policy effectiveness, inflation, Egypt, JEL Codes: E31, E52, G21, G22, G23

INTRODUCTION

The monetary policy plays an important role in achieving macroeconomic goals represented in fostering economic growth and employment (Gourinchas, 2010). Its main target is to stabilize inflation level which is determined by a number of macroeconomic variables such as money supply, real Gross Domestic Product (real GDP), foreign exchange rate, banking lending rate and the government budget (Alexander *et al.*, 2015). Various policy tools such as overnight lending and deposit rates, exchange rate, discount rate, interest rates, open market operations affect its effectiveness in controlling inflation and cash reserve ratio. In addition, the shadow banking system which has witnessed a rapid growth in the last two decades could have an influence on the effectiveness of the monetary policy (Paraschiv and Qin, 2013; Verona *et al.*, 2013).

Although, the definition of the shadow banking system is arguable in the literature (Claessens and Ratnovski, 2014), the most commonly used one is the definition of the Financial Stability Board (FSB) of the International Monetary Fund which states that it is "a credit intermediation that involves entities and activities outside the regular banking system" (FSB, 2011).

The global financial crisis of 2008 has raised concerns about the evolving role of shadow banking in the international financial system. According to the FSB (2015), the size of shadow banking sector in the United States and United Kingdom in 2014 was estimated by 14 trillion USD and 4.1 trillion USD, respectively.

The Egyptian economy which is integrated with the international financial system is affected by global financial crises, e.g., the 2008 financial crisis. That requires a broader control of the monetary policy to increase its effectiveness in achieving its macroeconomic goals in line with the evolving domestic and global economic challenges.

This study aims at scrutinizing the impact of the shadow banking system on the monetary system in Egypt by measuring the activities of shadow banks and estimating their impact on inflation and effectiveness of the monetary policy.

Literature review
Shadow banking and effectiveness of monetary policy: The concept of "shadow banking" was introduced by Paul McCulley in 2007 to discuss the importance of non-banking financial institutions. Rajan discussed the shadow banking system and its weakness without referring to the concept itself. The Federal Reserve Bank of New York defines shadow banking as the financial intermediaries that transfer maturity, credit and liquidity without using central bank liquidity or credit guarantees

---

Corresponding Author: Yasmine Mohie El Din (Gharieb), Faculty of Economics and Political Science, Cairo University, Giza, Egypt

of public sector (Pozsar *et al.*, 2012). This definition focuses on the transactions of financial intermediaries other than traditional banks, occurred in an environment with no or less monitoring or prudential regulations (FSB, 2011). Institutions belonging to shadow banking take different types such as non-bank banks, money market mutual funds and finance companies.

These institutions could operate different types of activities such as repurchase agreements, assets backed commercial studys and securitizations. These institutions have different positive economic impacts as they could increase the economic efficiency by disintermediation and decentralization. This is because they allow lending without mark-up and increase the customer welfare due to financial portfolio diversification (Schwarcz, 2013). However, they could also increase the risk caused by credit, maturity, liquidity transformation and leverage since they transfer short-term funding from financial market to investors without relying on bank deposits.

Various empirical studies analyzed the shadow banking system and its relation to effectiveness of the monetary policy. Taking into consideration the impact of shadow banking, Verona *et al.* (2011) used a Dynamic Stochastic General Equilibrium (DSGE) model to assess the impact of the continuous low interest rate policy on the boom-bust cycle in the USA. The financial intermediaries belonging to the shadow banking sector are able to transfer a part of stockholder's profit to their own benefits and increase credit at a discounted rate. The model found that accommodative monetary policy applied for a long time is a precondition for but not a reason itself, a boom-bust cycle as the boom-bust cycle is the combination of a persistent monetary ease with microeconomic distortions in the financial system. Verona *et al.* (2013) simulated Un/anticipated monetary policy in DSGE models in which bonds funded by shadow banks in normal optimistic conditions only. The study concluded that the boom-bust cycle is a result of different factors, e.g., the continuous low interest rate and expecting continued good conditions. Moe (2012) presented the "liquidity money" concept to describe insufficiency of the financial system in which shadow banks operate. The researcher concluded that the central bank should provide liquidity to the shadow banks faced liquidity problem in the financial market only during the financial crises. Boulware *et al.* (2012) estimated a dynamic impact of capital conditions on one of activities of shadow banking, namely repurchase agreements (Repo) by using recursively identified auto-regression model in the USA. The model found that the federal interest rate significantly affects credit activity level and that the credit activity in Repo market is sensitive to the

monetary policy. Sunderam (2014) analyzed the role of the shadow banking system in money creation in the USA. The researcher examined whether shadow banks provide the same services like money creation before the global financial crisis during 2001-2007. By using an econometric model, the researcher found that shadow banks responds to money-like demand shocks.

Inflation determinants: Inflation is a continuous and sustained increase in the general price level of a country. There are two commonly used approaches to define inflation. The first approach which is adopted by the Keynzians, Structuralists, Post-Keynzians and New Mexicans, considers inflation as a "Cost-Push". This approach argues that the increase in the general price level is a result of changes in relative prices which are caused by changes in costs of production that are a result of different non-monetary shocks such as an increasing of wages, interest rates, taxes, imported input prices and exchange rates.

On the other hand, the second approach which is adopted by the Monetarists, considers inflation as a "Demand-Pull". As it considers the increase of the production cost of a firm or an industry could be inflationary if it is not absorbed by money supply. Therefore, the direction of causal relationship comes from inflation to production cost not vice versa. This approach defines inflation as a continuous increase in prices of goods and services in the domestic market due to excessive increments in the domestic demand in normal conditions, when the aggregate demand exceeds aggregate supply and that pulls prices upward. Accordingly, inflation is a monetary phenomenon which is affected by the demand side when growth rates of money supply exceed growth rates of real GDP. Theoretically, this approach is supported by the well-known quantity theory of money which is described in the following identity:

$$MV \equiv PT$$

Where:
M = The money supply
V = The velocity of money
P = The general price level
T = The real output

The classical theory assumes that V and T are constants in the short run (Freidman *et al.*, 1956). Consequently, the previous identity could be reformulated as following:

$$P = (V/T) M$$

Given that V and T are constants, doubling money supply leads to doubling general price level. Brien (1975) pointed out that there are a number of differences between the classical and neoclassical versions of the quantity theory of money with regard to transmission mechanisms as the neoclassic economists supported the idea of the separation between the monetary and real sectors under the assumption of full employment. Accordingly, real wages are determined by forces of supply and demand in the labor market, i.e., the real sector while relative prices of goods market are determined by the money supply so any increase in the money supply increases the general price level, given a constant real output. On the other hand, classical economists did not assume full employment so there is no separation between the monetary and real sectors in the economy. As a result, an increase in the money supply leads to an increase in the general price level by increasing the purchasing power of individuals.

There are several empirical studies examined the determinants of inflation. Alexander *et al.* (2015) analyzed the inflation determinants in Nigeria using co-integration and VAR analysis during 1986-2011. The analysis showed that budget deficit, exchange rate, imports of goods and services, money supply and agriculture output affect the inflation rate in Nigeria in the long run while the lending rate only affects the inflation rate in the short run. Diouf (2008) analyzed a general-to-specific model to estimate inflation determinants by Mali (1979-2006) and the model resulted that deviation from the equilibrium in the monetary and external sectors are the most important inflation determinants in the long run. In addition, Boulwane *et al.* (2012) focused on the functional form of inflation model as he assessed the impact of monetary policy instruments on inflation in Nigeria during (1980-2010) using granger causality test. The model used different monetary tools such as broad money supply, interest rate, cash reserve ratio and liquidity ratio. It found that the liquidity ratio and interest rate are the most efficient monetary policy instruments that can be used to control inflation while the unethical practices of commercial banks in Nigeria leads to inefficiency of cash reserve ratio, broad money supply and exchange rate. Fetai (2013) analyzed the effectiveness of monetary policy and fiscal policy on economic growth during the financial crisis in 66 developing and emerging countries within 83 financial crisis episodes using Ordinary Least Square method (OLS) with robust standard errors and Generalized Method of Moment (GMM) estimator. The model shows that the contradiction between monetary policy and fiscal policy results from increasing the output cost during the financial crisis.

Regarding Egypt, Metwally and Sowaidi (2004) estimated three equations simultaneously included inflation determinants based on both demand and supply sides to explain the nature and causes of inflation in Egypt during the period (1965-2004). The study concluded that both demand side and supply side factors determine the inflation in Egypt but the inflation rate is more elastic to changes in fiscal and monetary policies rather than import prices. While, Baz (2014) estimated inflation determinants in Egypt (1992-2012) using VAR model and he found that The inflation rate is affected by its expectation, output gap, domestic liquidity growth rate and nominal exhange rate depreciation. In addition, Helmy (2008) examined the long run relationship between budget deficit and inflation rate in Egypt. He analyzed the dynamic interaction between the two variables during (1982-2006) using Johansen test for co-integration and vector error correction model which found that the inflation rate in the long run is affected by budget deficit and its financing sources, in addition to real output growth and exchange rate. Also, the significant error correction coefficients indicated that there is a mutual interaction between budget deficit, credit granted to the government, exchange rate and inflation.

Recent trends of the monetary policy in Egypt: According to the Law No. 88 of 2003, the Egyptian Central Bank is responsible for planning and executing the monetary policy which main target is stabilizing prices using different instruments such as given there.

Corridor system: The corridor system is the main tool of the monetary policy to achieve its operational target which represented in the interbank overnight rate by determining overnight lending and deposit rates of transactions between central bank and commercial banks. In the second half of 2008, the central bank increased the overnight lending and deposit rates from 12-13.5% and from 10-11.5%, respectively due to the increase of the inflation rate. The inflation rate decline in 2009 led to decrease the overnight lending and deposit rates to 9.75% and 8.25%, respectively at the end of 2009. The political developments in 2011 affect the cash liquidity of banking sector negatively, so the central bank decided in November 2011 to increase the overnight lending and deposit rates to 10.25 and 9.25%, respectively and decrease the profit margin between them from 1.5-1%.

In June 2014, the overnight rates have been increased from 9.25-10.25% for lending and from 8.25-9.25% for deposit as a result of increasing the inflation rate (CBE, 2016a, b).

Table 1: Classification of shadow banks by economic functions

Economic function	Definition	Typical entity types
EF1	Management of collective investment vehicles with features that make them susceptible to runs	Fixed income funds, mixed funds, credit hedge funds, real estate funds
EF2	Loan provision that is dependent on short term funding consumer credit companies	Finance companies, leasing companies, factoring companies,
EF3	Intermediation of market activities that is dependent on short-term funding or on secured funding of client assets	Broker-dealers
EF4	Facilitation of credit creation	Credit insurance companies, financial guarantors, monoclines
EF5	Securitization-based credit intermediation and funding of financial entities	Securitization vehicles

Retrieved from FSB (2015) Global shadow banking monitoring. Washington: financial stability board

Interest rates: Loan and deposit interest rates are medium term tools used by the central bank to affect the domestic liquidity and stabilize prices. In June 2012, the deposit interest rate increased to 7.7% with growth rate 17% compared to the previous year in order to provide liquidity to banking sector which affected negatively from 25 January revolution. Also, the loan interest rate increased to 11.9% with growth rate 8% compared to the previous year. In June 2014, the deposit and loan interest rates decreased by 16 and 10%, respectively compared to June 2013 (The Central Bank of Egypt, different versions).

Cash reserve ratio: The cash reserve ratio is a ratio of total deposits the commercial banks forced to keep to meet liquidity requirements. In 2012, the central bank decided to decrease the cash reserve ratio from 14% to 12% in March then to 10% in May in order to provide liquidity to banking sector and improve credit status in the financial market (The Central Bank of Egypt, different versions).

Open market operations: The open market operations affect the domestic liquidity in the market by selling and buying financial assets especially treasury bills. In 2008/2009, the central bank's sales of foreign exchange increased in order to absorb liquidity surplus and decrease inflation rate. The central bank reapplied the 7 days repurchase agreements (report) in 2010/2012 to compensate the liquidity deficit resulting from the political developments in January 2011 (The Central Bank of Egypt, different versions).

Exchange rate: The Egyptian Central Bank has adopted a new tool, since December 2004 which is "Dollar Interbank" which allows buying and selling dollars among banks to avoid liquidity crisis in the light of political and economic developments the Egyptian economy in 2011 and 2013. To enhance the efficiency of Foreign exchange market, the central bank has also applied the "FX Auctions", since December 2012 to issue periodical auctions for buying and selling dollars (The Central BanK of Egypt, different versions).

A composite measure of shadow banking in Egypt: There is no a composite measure of shadow banking activities in Egypt. Therefore, the study attempts to measure it using the economic functions applied in Financial Stability Board (FSB) report of shadow banking in 2015 in which non-bank financial activities classify into five categories as mentioned in Table 1.

Based on the above-mentioned criteria applied by Financial Stability Board (FSB), the study uses the combining data collected from Global Shadow Banking Monitoring Report of Financial Stability Board (FSB) in 2015, the Egyptian Financial Supervisory Authority, public authority for social insurance and social fund for development and Nasser social bank in order to present a composite measure of shadow banking activities. The measure includes includes; the factoring companies have been excluded because of data availability. First, capital Market, the measure includes the primary market activities such as new issuing stocks and increasing capital stocks in addition to securitization bonds. Second insurance companies total investments insurance companies total investment and compensations are included in the measure while the installments are excluded because they are not a constraint on the investments and compensations size. Third, mortgage Finance, the measure includes the granted Mortgage funding presented by mortgage finance companies not traditional banks. Fourth, Financial leasing, the financial leasing contracts and securitization bonds if exist are implicated in the measure. Fifth: private and public pensions funds, the net flow of funds which equals total subscriptions minus total compensations and total fund's investments are included. Sixth, social fund for development, the measure depends on loan portfolio of the fund and total funds to small enterprises and micro credit by either direct lending or the intermediaries such as banks and civil associations. Seventh, the Egyptian Central Bank, like other 40 traditional banks has not regulated Nasser Social Bank, this bank until now. Therefore, it must be added to shadow banks as its financial activity affects the domestic liquidity. The measure includes saving deposits and excludes current deposits because they are just intermediary accounts for salaries, pensions and loan installments. Figure 1 presents the evolution of shadow
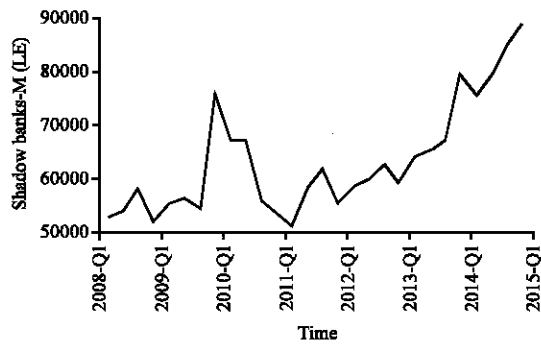
Fig. 1: Evaluation of shadow banking in Egypt (2008-2014)

banking activities measure in Egypt during (2008-2014). According to previous figure, the global financial crisis in September 2008 affected the shadow banking activities in Egypt as the measure of shadow banking drooped from about 5.7 LE billions in the third quarter of 2008 to about 5 LE billions in the last quarter of 2008. The January revolution affects negatively on the shadow banking activities according to its measure as they decreased to about 5.5 LE billions in 2011 compared to about 6 LE billions in 2010 to then it started to increase again until it reached about 8 LE billions in 2014.

MATERIALS AND METHODS

Methodology and data description: In order to examine the possible impact of the shadow banking system on inflation and effectiveness of the monetary policy in Egypt, the study adopts two specifications that are based on Alexander *et al.* (2015) and Iyaji *et al.* (2012) as shown. The next two subsections describe the methodology in details.

Shadow banking and Inflation: The first specification is based on the empirical study of Alexander *et al.* (2015) to examine the impact of the shadow banking system on inflation. According to the researchers, level of inflation is a function of the aggregate money supply, real gross domestic product, lending interest rate, fiscal balance and the agriculture output. Thus, the inflation is a function of the following variables:

ROI = F(MS, RGDP, EX, LR, FD, ARGDP, MP)

Where:
ROI	=	The rate of inflation
MS	=	The money supply
RGDP	=	The real exchange rate
LR	=	The lending rate
FD	=	The fiscal deficit
ARGDP	=	The output of agriculture sector
MP	=	Imports

Based on Spearman correlation test, the study drops the agriculture output due to high correlation with both real GDP and money supply with correlation coefficients estimated by 0.76 and 0.83, respectively. The study drops the exchange rate due to high correlation with both the money supply and the imports with correlation coefficients estimated by 0.97 and 0.87, respectively. Finally, the study drops the imports due to high correlation with the money supply with correlation coefficient estimated by 0.89. Therefore, the inflation function could be specified in the following log-linear form as:

$$\ln(ROI_t) = \beta_0 + \beta_1 \ln(MS_t) + \beta_2 (RGDP_t) + \beta_3 \ln(LR_t) + \beta_4 \ln(FD_t) + U_t... \quad (1)$$

Based on the previous specification, the study estimates two models: the base model which contains a control variable that is determined by the quantity theory of money, i.e., the broad money supply (M2) and commonly used variables, i.e., the real GDP, lending rate and budget balance; the extended model which includes in addition to the control variable and the commonly used variables, a variable of interest represented in the measure of activities of the shadow banking described. In both models, i.e., the base model and the extended model, the study uses the consumer price index (Jan. 2010 = 100) as a measure of inflation.

Based on the Augmented Dickey Fuller unit root test, two variables, namely real GDP and financial balance are stationary, i.e., integrated of order zero (I (0)) at 5% significance level. Four variables namely the consumer price index, broad money supply, lending rate and shadow banking activities are stationary at first difference, i.e., integrated of order one (I (1)) at 5% significance level. Table 2 presents the predicted relation between the inflation rate and its determinants according to the economic theory.

Shadow banking and effectiveness of the monetary policy: The second specification is based on the empirical study by Iyaji *et al.* (2012) to examine the impact of the shadow banking system on effectiveness of the monetary policy. According to the researchers, inflation is affected by a number of monetary policy instruments namely the broad money supply, the nominal interest rate, the commercial banks cash holding ratio and the liquidity ratio. In practice, the Central Bank of Egypt uses in addition to the previously mentioned instruments other instruments to achieve its main goal of price stability, namely overnight lending and deposits rates, discount rate, exchange rate and open market operations. Based on Spearman correlation test, the study drops discount rate due to high correlation with overnight lending rate with correlation coefficients estimated by 0.82. Also,

Table 2: Predicted relationship between inflation and its determinants

Variables	The predicted relationship with inflation
Money supply	Positive
Real GDP	Negative
Lending rate	Negative
Financial deficit	Positive or negative (depending on the source of financing)
Shadow banking	Positive

Table 3: Predicted relation between inflation gap and its determinants

Variables	The predicted relationship with inflation
Overnight lending rate	Negative
Exchange rate	Positive
Open market operations	Negative
Interest rate spread	Negative
Shadow banking	Positive

the study drops commercial banks cash holding ratio due to high correlation with exchange rate with correlation coefficients estimated by 0.85.

Since, the purpose of this study is to examine the impact of the shadow banking on effectiveness on the monetary policy, a measure of effectiveness of the monetary policy is required. As long as the main target of any monetary policy is to stabilize the inflation level, using a measure that reflects the deviation from inflation target rate for the medium term is reasonable. Hence, the study defines effectiveness of the monetary policy as follows:

$$IG = inf\text{-}inf^*$$

Where:

IG = The inflation gap, i.e., the deviation from the inflation target rate

inf = The actual inflation rate

inf^* = The inflation target rate

Since, Egypt has no official explicit inflation target rate, the study relies on the implicit inflation target rates calculated by Hosny (2016). The author calculated the implicit inflation target rates in Egypt during the period 2002-2012 based on a backward-looking Taylor rule. The author found that during the period of the study the inflation target rate was 9.1% as an average. This study relies on Hosny's calculations and assumes that the inflation target rates during the period 2008-2014 are 9.1% as an average. Therefore, based on Iyaji *et al.* (2012) and Hosny (2016) and after taking into consideration the practicies of the Central Bank of Egypt, effectiveness of the monetary policy could be specified as:

$$IG_t = \beta_0 + \beta_1\,OLR_t + \beta_2\,EX_t + \beta_3\,OMO_t + \beta_4\,RS_t + \beta_5\,SB_t + U_t \ldots \tag{2}$$

Where:

IG = The inflation gap

OLR = The overnight lending rate

EX = The exchange rate

OMO = The open market operation as a percentage of broad money supply

RS = The interest rate spread which is the difference between loan and deposit interest rates

SB = The shadow banking activities as a percentage of money supply

Based on the Augmented Dickey Fuller Unit Root Test, two variables, namely inflation gap and interest rate

Table 4: The statistical summary of variables used in the specifications of the study

Statistics	Mean	SD	Min.	Max.	Obs.
CPI	116	21.6	79.2	155	28
M2	1072745	256315	756553	1606505	28
RGDP	417994	25256	366468	470442	28
FD	96481	59556	27065	254715	28
LR	11.7	0.57	10.7	12.5	28
SB (activities)	62098	10974	49144	88712	28
SB (M2) (%)	6.04	0.93	5.05	8.86	28
IG	0.40	1.75	-1.83	4.1	28
OLR	10.4	1.15	9.25	13.5	28
EX	6.07	0.62	5.36	7.14	28
OMO	-7.17	7.81	-23.9	3	28
RS	4.81	0.52	4.1	6.2	28

spread are stationary, i.e., integrated of order zero (I (0)) at 5% significance level. Three variables, namely exchange rate, open market operations and shadow banking activities are stationary at first difference, i.e., integrated of order one (I (1)) at 5% significance level. The next Table 3 presents the predicted relationship between the inflation gap and the monetary policy instruments. In both specifications, i.e., 1 and 2 explained in applying the Ordinary Least Square (OLS) estimation could result in spurious regression with inconsistent and inefficient estimators; therefore, the two specifications are estimated using two time-series regression methods; Prais-Winsten estimation and regression with Newey-West standard errors. In the both estimation methods, the potential seasonality effect is subtracted. The models are estimated with trend and without drift. With respect to Prais-Winsten estimation, the used standard error is adjusted for the possibility of heteroskedasticity and the Cochrane-Orcutt first-order auto-regression is used. With respect to the regression with Newey-West standard errors, the error structure is assumed heteroskedastic also, the possibilities of autocorrelation of order one is considered.

The study uses a quarterly data during the period 2008-2014. This period is chosen because of the role of the 2008 global financial crises in raising concerns about the shadow banking worldwide. The sample for this study comes from several data sources; the International Financial Statistics (IFS) of international monetary fund, the World bank databank, the Central Bank of Egypt and the Egyptian Ministry of Planning, Monitoring and Administrative Reform (WB, 2010). Table 4 reports the main statistical summary of the variables used in the specifications 1 and 2.

RESULTS AND DISCUSSION

Empirical results: In this study, the study examines the impact of shadow banking system on inflation and effectiveness of the monetary policy. The study first reports the results obtained from specification.

Shadow banking and inflation: This subsection reports the regression results obtained from specification which examines whether the shadow banking affects inflation using Prais-Winsten regression and regression with Newey-West standard errors. Table 5 presents the results for both the base model and extended model. The results summarized in Table 5 show that based on the both estimation methods, inflation has a positive and statistically significant relationship with money supply and a negative and statistically significant relationship with real GDP in both the base and extended models. This implies that the increase in money supply leads to an increase in the cash balances held by economic units so their expenditure and aggregate demand increase and hence, general price level increases. While the real GDP growth decreases inflation by increasing goods and services in the market that lead to excess supply and decrease the general prices level. The coefficient sign of fiscal deficit is negative as the fiscal deficit in Egypt is mainly financed by issuing treasury bills and government bonds rather than issuing money. However, the fiscal deficit has no statistical significant effect on inflation in the both base and extended models. The relationship between lending rate and inflation is negative as the higher lending rate decreases price levels because of its effect on the production cost and aggregate supply. However, the lending rate has no statistical significant effect in the both models. Regarding the effect of shadow banking activities, there is a positive and statistically significant relationship between the measure of shadow banking and inflation in Egypt as the various shadow banking activities could increase the domestic liquidity by the activities of securitization in the money market and

leasing companies. Furthermore, the total investment of insurance companies and compensations provided to customers affect the money supply. Also, the granted funding by mortgage finance and leasing companies and the total loans of social fund for development to small enterprises and micro credit can increase the money supply.

Shadow banking and effectiveness of the monetary policy: Table 6 reports the regression results of specification which examines whether the shadow banking affects effectiveness of the monetary policy using Prais-Winsten regression and regression with Newey-West standard error.

The regression results reported in Table 6 regression results of the impact of shadow banking on effectiveness of the monetary policy show that based on both estimation methods there is a positive and statisticallysignificant relationship between exchange rate and the measure of effectiveness of the monetary policy, i.e., inflation gap. In addition, there is a negative and statistically significant relationship between inflation gap and interest rate spread in both estimation methods. This is because of the depreciation of exchange rate, i.e., the reduction of the currency value, decreases the actual inflation rate. Hence, that broadens the inflation gap which indicates a negative effect on effectiveness of the monetary policy. While, raising the interest rate spread result in a decrease in inflation rate and so inflation gap because of absorbing liquidity. Although, the overnight lending rate negatively affects inflation gap, due to the negative relationship between overnight lending rate and inflation rate, it is statistically insignificant. Regarding the open market operations, its coefficient is negative and statistically significant in Prais-Winsten estimation but statistically insignificant in regression with Newey-West standard error. The negative sign could be explained by the fact that the increase in open market operations as a percentage of broad money supply results in a reduction in inflation rate and so inflation gap through the

Table 5: Regression results of the impact of shadow banking on inflation

	The base model		The extended model	
Lncpi	Prais (Prais indicates Prais-Winsten regression)	Newey (Newey indicates regression with Newey-West standard error)	Prais (Prais indicates Prais-Winsten regression)	Newey (Newey indicates regression with Newey-West standard error)
LnM2t	0.196 (0.071)***	0.252 (0.063)***	0.135 (0.073)*	0.201 (0.060)***
LnRGD$_{Pt}$	-0.166 (0.075)**	-0.230 (0.063)***	-0.137 (0.078)*	-0.208 (0.062)***
LnFD$_t$	-0.007 (-0.008)	-0.010 (-0.007)	-0.006 (-0.008)	-0.009 (-0.007)
LnLR$_t$	-0.135 (-0.080)	-0.085 (-0.058)	-0.123 (-0.081)	-0.074 (-0.058)
LnSB$_t$	.	.	0.038 (0.018)**	0.034 (0.014)**
Obs.	23	24	23	24
Adjusted DW	2.007	.	1.993	.

The dependent variable is inflation measured by consumer price index (Jan. 2010 = 100). The independent variables are the broad money supply (M2), Real Gross Domestic Product (RGDP), Fiscal Deficit (FD), Lending interest Rate (LR) and a measure of activities of shadow banking described. The inflation function takes log-linear form; * indicates statistical significance at the 10% level; ** indicates statistical significance at the 5% level; *** indicates statistical significance at the 1% level

Table 6: Regression results of the impact of shadow banking on effectiveness of the monetary policy

IG	Prais (Prais indicates Prais-Winsten regression)	Newey (Newey indicates regression with Newey-West standard error)
OLR	-0.068 (-0.436)	-0.562 (-0.515)
EX	1.514 (0.479)***	1.546 (0.562)***
OMO	-0.081 (0.037)**	-0.010 (-0.072)
RS	-3.743(0.849)***	-2.277 (0.902)**
SB	1.403 (0.455)***	1.080 (0.410)**
Obs.	23	24
Adjusted DW	2.189	.

The dependent variable is the measure of effectiveness of the monetary policy which is obtained as described. The independent variables are Overnight Lending Rate (OLR), Exchange Rate (ER), Open Market Operations (OMO), interest Rate Spread (RS) and a measure of activities of shadow banking described. * indicates statistical significance at the 10% level; ** indicates statistical significance at the 5% level; *** indicates statistical significance at the 1% level

absorption of cash liquidity and hence, a decrease in effectiveness of the monetary policy. With respect to the measure of activities of shadow banking, there is a positive and statistically significant relationship between the measure of shadow banking and inflation gap. The increase of activities of shadow banking results in higher inflation rate and broadens the gap between actual and targeted inflation which affect negatively on the effectiveness of the monetary policy in targeting inflation. This is because activities of shadow banking could increase the domestic liquidity in the financial market without considering their effect in planning and conducting monetary policy.

CONCLUSION

The global shadow banking assets growth was affected negatively by the 2008 global financial crisis. The monetary authorities reconsidered the role of shadow banking in the financial market and in affecting the monetary as it can affect the inflation in a country by affecting the domestic liquidity that is the main determinant of inflation based on the quantity theory of money. The study found that activities of the shadow banking have a significant positive impact on the inflation and a negative significant impact of effectiveness of the monetary policy. Consequently, the monetary authority should consider the potential impact of the shadow banking system when planning and conducting the monetary policy. Furthermore, there should be coordination between the Egyptian Central Bank and the Egyptian Financial Supervisory Authority responsible for monitoring and supervising shadow banking activities to better control on shadow banking.

REFERENCES

Alexander, A.A. and A.H.A.M.G. Danpome, 2015. Analysis of the main determinants of inflation in Nigeria. Anal. Res. J. Finance Accounting, 6: 144-155.

Baz, E.O., 2014. The determinants of inflation in egypt: An empirical study (1991-2012). Egyptian Center For Economic Studies-ECES, Cairo, Egypt. https://mpra. ub.uni-muenchen.de/56978/.

Boulware, K.D., J. Ma and R.R. Reed, 2012. How do money market conditions affect shadow banking activity? Evidence from security repurchase agreements. University of Alabama, Tuscaloosa, Alabama. http://citeseerx.ist.psu.edu/viewvdoc/download?doi=10.1.1.269.5763&rep=rep1&type=pdf.

Brien, O.D.P., 1975. The Classical Economists. Oxford University Press, ?Oxford, England,.

CBE., 2016a. Pree release. The Central Bank of Egypt, Cairo, Egypt. http://www.cbe.org.eg.

CBE., 2016b. Time serires data. The Central Bank Of Egypt, Cairo, Egypt. http://www.cbe.org.eg.

Claessens, S. and L. Ratnovski, 2014. What is shadow banking. International Monetary Fund, Washington, D.C., USA.http://www.imf.org/en/ Publications/WP/Issues/2016/12/31/What-is-Shadow-Banking-41334.

Diouf, M.A., 2008. Modeling inflation in Mali. International Monetary Fund, Washington, DC., USA.

FSB., 2011. Shadow banking: Strengthening oversight and regulation; Recommendations of the financial stability board. Financial Stability Board, Washington, USA.

FSB., 2015. Global shadow banking monitoring. Financial Stability Board, Washington, USA.

Fetai, B., 2013. The effectiveness of fiscal and monetary policy during the financial crisis. J. Econ. Bus., 16: 3-66.

Freidman, M., P. Cagan, J.J. Klein, E.M. Lemer and R.T. Selden, 1956. Studies in the Quantity Theory of Money. University of Chicago Press, Chicago, Illinois,.

Gourinchas, P.O., 2010. US monetary policy, Imbalances and the financial crisis. Remarks Prepared for the Financial Crisis Inquiry Commission Forum, Washington DC., USA. https://pdfs. semanticscholar.org/371b/2f56eb5649feddc75baf4c957bc0c7c1b9c1.pdf.

Helmy, O.A., 2008. The impact of budget deficit on inflation. The Egyptian Crntre for Economic Study, Cairo, Egypt.

Hosny, A.S., 2016. What is the central bank of Egypt's implicit inflation target?. Intl. J. Appl. Econ., 13: 43-56.

IMF., 2016. International financial statistics. International Monetary Fund, Washington, D.C., USA. http://www.imf.org.

Iyaji, D., M.J. Success and E.B. Success, 2012. An assessment of the effectiveness of monetary policy in combating inflation pressure on the Nigerian economy. Erudite J. Bus. Administration Manage., 1: 7-16.

Metwally, M.M. and A.S. Sowaidi, 2004. The main determinants of inflation in Egypt. Middle East Bus. Econ. Rev., 16: 30-38.

Moe, T.G., 2012. Shadow banking and the limits of central bank liquidity support: How to acheive better balance between global and officail liquidity. Levy Economics Institute of Bard College, Annandale-on-Hudson, New York, USA.

Paraschiv, F. and M. Qin, 2013. Extreme spillover between shadow banking and regular banking. MBA Thesis, University of St. Gallen, Gallen, Switzerland.

Pozsar, Z., T. Adrian, A. Ashcraft and H. Boesky, 2012. Shadow banking. Federal Reserve Bank of New York, New York, USA. https://studys.ssrn.com/sol3/studys.cfm?abstract_id=1640545.

Schwarcz, S.L., 2013. Shadow banking, financial risk and regulation in China and other developing countries. MBA Thesis, University of Oxford, Oxford, England.

Sunderam, A., 2014. Money creation and the shadow banking system. Rev. Financial Stud., 28: 939-977.

Verona, F., M.M. Martins and I. Drumond, 2011. Monetary policy shocks in a DSGE model with a shadow banking system. MBA Thesis, University of Porto, Porto, Portugal.

Verona, F., M.M. Martins and I. Drumond, 2013. (Un)anticipated monetary policy in a DSGE model with a shadow banking system. Intl. J. Cent. Banking, 1: 73-117.

WB., 2016. Data bank. World Bank, Washington, D.C., USA. http://www.worldbank.org.