ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية
2014

working paper series

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Working Paper No. 846

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October 2014

The views expressed in this paper are those of the author and should not be attributed to the IMF, its Executive Board, or its management. The author would like to thank Hoda Selim and Magda Kandil and participants at the ERF 20th Annual Conference in Cairo, Egypt for helpful comments and suggestions on an earlier version of this paper.

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First published in 2014 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
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www.erf.org.eg

Abstract

The objective of this paper is to test whether monetary policy in Egypt has been backward or forward-looking over the 2002M1-2012M12 period. Using different specifications of a simple Taylor rule, we show that the Central Bank of Egypt (CBE) has become more forward-looking, especially after it formally announced the overnight interbank rate as its main monetary policy instrument in 2005M7. Our empirical results also indicate a significant interest rate smoothing effect and suggest that the exchange rate and the Egyptian revolution of 2011M1 have applied upward pressure on short-term interest rates in Egypt. Our findings also suggest that the CBE is successfully managing the transition towards an effective inflation targeting regime.
JEL Classification: E5

Keywords: Taylor rules, Egypt, inflation targeting

ملخص

الهدف من هذه الورقة هو اختبار ما إذا كانت السياسة النقدية في مصر ارتجاعية النظرة أو تطلعية خلال الفترة من بداية 2002 الى نهاية 2012. باستخدام مواصفات مختلفة من قاعدة تايلور البسيطة، يتبين لنا أن البنك المركزي المصري قد أصبح أكثر تطلعي، وخاصة بعد أن أعلن رسميا عن سعر الفائدة بين البنوك كأداة رئيسية للسياسة النقدية في شهر يوليو 2005 . تشير نتائجنا التجريبية أيضا أن سعر الفائدة له تأثير كبير على التجانس وتشير إلى أن سعر الصرف والثورة المصرية فى يناير 2011 طبقت ضغوطا تصاعدية على أسعار الفائدة قصيرة الأجل في مصر. نتائجنا تشير أيضا إلى أن البنك المركزي يدير بنجاح التحول نحو النظام الفعلي لاستهداف التضخم.

1. Introduction

The main objective of a country's central bank is to achieve price stability. The Central Bank of Egypt (CBE) is no exception. In fact, law no. 88 of 2003 of the "Central Bank, Banking Sector and Monetary System" in Egypt explicitly entrusts the CBE with the formulation and implementation of monetary policy, with price stability being the primary objective. In such an environment, it is essential to understand how the CBE conducts is monetary policy and how it adjusts its monetary policy instruments in response to past, current and future macroeconomic and inflationary developments. The objective of this paper is to test whether monetary policy in Egypt has been backward or forward-looking over the period 2002M1-2012M12.

Building on Taylor (1993) and Clarida et al. (1998/2000) among others, we aim to understand the monetary policy stance in Egypt using simple backward and forward-looking Taylor rules. Taylor rules are simply monetary policy rules that describe how a central bank should adjust its monetary policy instrument, usually its short-term interest rate, in response to developments in inflation and macroeconomic activity. In 2005M7, the CBE announced its overnight interbank rate as its main operational monetary policy instrument, and we use this interest rate in our estimations (see CBE, multiple issues). We also take the roles of interest rate smoothing, exchange rate movements as well as the effect of the Egyptian revolution of January 25, 2011 into consideration when estimating the CBE's Taylor rule.

Empirical results indicate that monetary policy in Egypt has been more backward-looking over the entire 2002M1-2012M12 period. Using a forward-looking specification over this period does reveal some forward-looking component to monetary policy in Egypt. But when we test the monetary policy stance using a Taylor rule specification that combines both a backward and forward-looking component, it seems that the backward-looking feature prevails. Results also point to a significant interest rate smoothing effect and indicate that the exchange rate seems to play a significant role in influencing the CBE's short-term interest rate over this period.

We then limit our attention to the 2005M7-2012M12 period since that is when the CBE formally adopted the overnight interbank rate as its short-term operational monetary policy tool. Results following a two-step Heckman (1976) procedure indicate that monetary policy became more forward-looking after 2005M7. Other notable differences include the influence of future output gaps on the conduct of the CBE's conduct on monetary policy in the current period. Currency depreciation is also found to exert upward pressure on the CBE's short-term interest rate over this period. Finally, our results indicate that the Egyptian revolution of January 25th, 2011 has forced the CBE to tighten monetary policy in order to strengthen the financial system and to preserve overall confidence in the Egyptian economy.

Our findings have strong policy implications. The Monetary Policy Committee (MPC) of the CBE announced its intention to move toward a fully-fledged inflation targeting regime once all fundamentals are in place (CBE, multiple issues). Our findings indicate that the clear announcement of the overnight interbank rate as the CBE's main operational monetary policy tool is a step in the right direction. The fact that the CBE has become more forward-looking after 2005M7 indicates a healthy transition toward an effective inflation targeting regime.

The remainder of this paper is structured as follows. Following this introduction, section 2 presents the model and data. Section 3 presents the econometric methodologies and results. Finally, section 4 concludes.

2. The Model and Data

This section presents the Taylor rule specification used in this paper, presents a brief review of the literature and discusses data sources and properties.

2.1 Model Specification and Literature Review

Taylor rules explain how central banks set their interest rates in response to inflation and output gap among other variables. A review of the characteristics of Taylor rules as compared to alternative monetary policy guides can be found in Orphanides (2007). Taylor (1993) showed that the following equation explains movements in the Federal Reserve's federal fund rate in the USA quite well:

$$i_t = r^n + \pi_t + 0.5\ (\pi_t - \pi^*_t) + 0.5\ \tilde{y}_t \quad (1)$$

where i_t is the short-term nominal interest rate that the central bank uses as its monetary policy instrument. r^n_t is the natural rate of interest, π^*_t is the central bank's inflation target, π_t is the inflation rate and $\tilde{y}_t$ is the output gap. Basically, Taylor (1993) showed that the federal funds rate responds in the above fashion to the natural interest rate, which he estimated to be around 2 percent, as well as deviations of inflation and output from their long-run equilibrium levels. A number of studies have ever since tested the above simple model under different specifications, samples and countries, and using different econometric techniques.

Moura and de Carvalho (2010) and Sack and Wieland (1999) among others have argued that interest rate smoothing (see equation (2)) is a common practice in many central banks. In the case of small open economies, Hammond et al. (2009) and Mohanty and Klau (2004) among other studies have also argued for including exchange rates in Taylor rules when describing a central bank's monetary policy (see equation (3)).

$$i_t = (1-\rho)\ i^*_t + \rho\ i_{t-1} + \varepsilon_t \quad (2)$$

$$i^*_t = r^n + \pi_{t+k} + (\beta-1)\ (\pi_{t+k} - \pi^*_t) + \gamma\ \tilde{y}_{t+k} + \eta\ \Delta x_t \quad (3)$$

where i^*_t is the central bank's target interest rate and is expressed as a function of r^n_t, the natural rate of interest, π^*_t the inflation target and the Δxt exchange rate. We also allow i^*_t to be a function of past and/or future inflation rate, π_{t+k}, as well as past and/or future output gap, $\tilde{y}_{t+k}$, depending on the sign of k. The ρ coefficient in equation (2) above reflects the interest rate smoothing parameter. In this paper, we use year-on-year (y-o-y) changes when calculating the inflation rate in Egypt. The reason is that a number of papers have argued that the policy-maker tends to consider yearly rates of inflation when formulating decisions about monetary policy rather than looking at monthly changes (Clarida et al. (1998/2000)). Indeed, the CBE is no exception, as monetary policy statements released by the MPC indicate that the CBE reacts to (y-o-y) inflation changes when deciding upon any adjustments in their monetary policy instrument (CBE, multiple issues).

Putting equation (3) into equation (2) delivers the following equation:[1]

$$i_t = (1-\rho)\ \alpha + (1-\rho)\ \beta\ \pi_{t+k} + (1-\rho)\ \gamma\ \tilde{y}_{t+k} + (1-\rho)\ \eta\ \Delta x_t + \rho\ i_{t-1} + \varepsilon_t \quad (4)$$

Note that equation (4) allows for both a backward and a forward-looking specification for the CBE's monetary policy. In this paper, we allow k to take a negative (backward-looking Taylor rule) and/or positive (forward-looking Taylor rule) value. Indeed, an important discussion in the literature has been about a central bank's choice between backward versus forward-looking monetary policy rules. The distinction is usually based on the level of development of the country in general and its financial system in particular. On one hand, papers by Clarida et al. (1998/2000) and Qin and Enders (2008) argue that industrial countries usually show a more forward-looking, rather than a backward-looking, component in their conduct of monetary policy. On the other hand, studies by Moura and de Carvalho (2010), Hammond et al. (2009) and Mohanty and Klau (2004) claim that backward-looking Taylor rules are more appropriate

[1] It is worth noting that this specification allows the estimation of the CBE's *implicit* inflation target. A paper by Hosny (2013) estimates the CBE's (time-varying) implicit target rate of inflation over the 2002M1-2012M12 period.

in the case of developing and emerging economies. Furthermore, a number of studies have argued that central banks are usually more forward-looking under inflation targeting regimes as compared to other monetary policy regimes (Freedman and Otker-Robe (2009) and Roger and Stone (2005)). We, therefore, test two versions of the Taylor rule in this paper— a backward and a forward-looking rule—in an effort to understand which of these two possible scenarios is more appropriate for the case of Egypt.

The literature on the appropriateness of Taylor rules and the response to past or future inflation is extensive in the case of emerging countries. For example, Moura and de Carvalho (2010) study monetary policy rules in the seven largest economies of Latin America over the period from January 1999 to January 2008, and conclude that Taylor rules explain the conduct of monetary policy quite well in these countries. Specifically, they find that interest rates respond in a statistically significant manner in Mexico and Brazil when past inflation or expected inflation is above the target, while Chile and Peru follow a milder monetary policy and finally monetary policy in Argentina, Venezuela and Colombia do not appear to respond to decrease inflation when it is above average. On Egypt, Selim (2012) studies the CBE's response to expected inflation using a GMM following the work of Clarida et al. (1998). That study shows that, for the 2000-2008 period, the CBE shows significant interest rate smoothing and has not been forward-looking in carrying its monetary policy.

2.2 An Initial Look at the Data

We use monthly observations over the 2002M2-2012M12 period to estimate the model outlined above. Data sources are the Central Bank of Egypt (CBE) and the International Financial Statistics (IFS) of the International Monetary Fund (IMF). All variables are seasonally adjusted and all variables, except the overnight interbank rate, are expressed in logs.

Figure (1) shows the development of the (y-o-y) inflation rate in Egypt versus the overnight interbank rate.

One can notice how the overnight interbank rate was more volatile during the beginning of the sample period up to 2005M7 when the CBE formally announced the overnight rate as its main monetary policy instrument. Furthermore, we can notice that periods of high inflation are generally associated with periods of high interest rates. This observation, however, simply shows a correlation or association of the two series and a formal econometric test of the relationship between the two variables is presented in the following section. We can also notice how the CBE maintained its short-term interest rate at around 9 percent following the Egyptian revolution in 2011M1 up to the end of the sample period. This is probably because the CBE wished to maintain confidence in the Egyptian economy following the revolution. Again, this hypothesis will be formally tested in section three below.

The output gap variable is usually calculated as follows:

$$\tilde{y}_t = GDP_t - \overline{GDP}_t \qquad (5)$$

The output gap ($\tilde{y}_t$) is the difference between actual GDP and its long-run trend $\overline{GDP}_t$. The long-run trend is usually calculated using the Hodrick-Prescott filter.

In this paper, we use the monthly total production index (TPI), published by the Ministry of Economic Development of Egypt, as a proxy for (GDP_t) since GDP is only available at a quarterly frequency. The correlation between both series is 0.941 over the 2001Q1-2012Q2 period. Figure (2) regresses quarterly TPI on quarterly GDP and shows that it serves as a close approximation for actual GDP.

Table (1) presents simple summary statistics for the variables used in the model, while Table (2) tests the time-series properties of the variables. We use the Augmented Dickey Fuller (ADF) and Elliott, Rothenberg and Stock (ERS) unit root tests to establish stationarity of the variables.[2]

The unit root results reported in Table (2) indicate that the output gap and the overnight interbank rate are stationary variables, while the consumer price index and the exchange rate are non-stationary, *I(1)*, in levels but become stationary, *I(0)*, after first differencing. The time series properties of these variables are taken into consideration when performing the econometric analysis in the following section.

3. Econometric Methodologies and Results

This section presents three different models for testing the monetary policy stance in Egypt. Specifically, we use a backward-looking and a forward-looking specification as well as a model specification that incorporates both a backward and a forward-looking component.

3.1 The backward-looking specification

We start with a simple backward-looking Taylor rule. Such a specification has been adopted by Moura and de Carvalho (2010) and Kuzin (2006) among others. The model that we estimate using OLS is as follows:

$$i_t = (1-\rho)\,\alpha + (1-\rho)\,\beta\,\pi_{t-1} + (1-\rho)\,\gamma\,\tilde{y}_{t-1} + (1-\rho)\,\eta\,\Delta x_t + \rho\,i_{t-1} + \varepsilon_t \qquad (6)$$

Note that model (6) is a simple version of model (4) where $k = -1$. The OLS results for the backward-looking Taylor rule for Egypt are presented in Table (3), where we present results for two sample periods in Panel A: 2002M1-2012M12 and Panel B: 2005M7-2012M12.[3]

Results from Table (3) reveal quite interesting information. First, if we concentrate on results from Panel A: 2002M1-2012M12, we can notice a significant interest rate smoothing effect as evident from the statistically significant coefficient attached to the lagged interest rate variable. This implies that past interest rate values carry a considerable weight in formulating current interest rate decisions. This shows that the MPC of the CBE tend not to change interest rates strongly from one month to the other and rather prefer to smooth any required changes so as not to disrupt the economy or cause any unnecessary instability in financial markets.

Second, we can see that the choice of a backward looking Taylor rule does seem appropriate in the case of Egypt, as there is a statistically significant coefficient attached to the lagged inflation variable in the both specifications reported in Panel A of Table (3). Lagged output gap, on the other hand, does not seem to carry an important weight when taking decisions on monetary policy in Egypt as evident from the statistically insignificant coefficients attached to this variable.

Furthermore, it appears that exchange rate movements are indeed an important factor when deciding upon overnight interbank interest rate changes. Results indicate that a depreciation of the Egyptian pound versus the US dollar is associated with an increase in the overnight interbank rate. This can be explained as follows. Egypt's exchange rate regime over the period under investigation could be described as a managed float (see IMF, multiple issues). In such a regime in a small open economy, currency depreciation is encountered by selling foreign currency reserves to maintain the managed float. Intervention in the foreign exchange market

[2] It has been argued in the literature that one should use the test proposed by Elliott, Rothenberg and Stock (1996) for maximum power against very persistent alternatives, i.e. series that are very close to being non-stationary.

[3] In what follows, we present separate results for two periods, namely 2002M1-2012M12 and 2005M7-2012M12. We performed a Quandt-Andrews breakpoint test and find no evidence of a breakpoint in the model. We still, however, decide to present results for the 2005M7-2012M12 period separately since we believe it may better reflect the conduct of monetary policy in Egypt given the introduction of the CBE policy rate in 2005M7.

leads to an increase in the supply of foreign exchange and a decrease in the supply of domestic money, thus putting upward pressure on domestic interest rates. This explanation is true in both specifications in Panel A in Table (3). This result seems in-line with findings from previous literature supporting the important role of the nominal exchange rate in influencing domestic monetary policy in Egypt (Moursi and El Mossallamy 2007).

Moving to results from Panel B in Table (3) above, we limit our attention to the period 2005M7-2012M12 which is the period when the CBE officially announced the overnight interbank rate as its main operational monetary policy tool. Again, we have results with and without the revolution dummy. All results in Panel B closely follow those from Panel A. It also seems that interest rate smoothing has become stronger as the absolute value of the coefficient attached to the lagged interest rate variable has increased in Panel B. Another point to notice is the weaker exchange rate effect. Despite being statistically significant, the coefficient attached to the exchange rate variable has decreased in absolute terms. One can also notice the better model fit in Panel B as compared to Panel A as evident from the higher R^2 reported in Table (3).

Finally, we test whether the Egyptian revolution of January 25, 2011 has had any impact on the formulation of monetary policy in Egypt. We do so by adding a dummy variable to our basic regression equation that takes the value of one from 2011M1 onwards, and zero otherwise. Results from Table (3) indicate that the revolution had no effect when using the entire sample (Panel A), but it does seem to have a small, although statistically significant, effect on interest rate setting in Egypt in the 2005M7-2012M12 period (Panel B). It appears that the revolution has created instability and decreased confidence in the Egyptian economy. As a result, the CBE has increased the interest rate in an attempt to stabilize financial markets and regain confidence in the Egyptian pound.

3.2 The forward-looking specification

We now turn to the forward-looking specification. The model is as follows:

$$i_t = (1-\rho)\,\alpha + (1-\rho)\,\beta\,\pi_{t+1} + (1-\rho)\,\gamma\,\tilde{y}_{t+1} + (1-\rho)\,\eta\,\Delta x_t + \rho\,i_{t-1} + \varepsilon_t \qquad (7)$$

Again model (7) is a simple version of model (4) when $k = +1$. This specification has been adopted by a number of papers, most notably Clarida et al. (1998/2000).

The estimation of the above model is not as straight-forward as in the backward-looking case. This is because the current specification suffers from an endogeneity problem where future values of inflation and output gap are correlated with the error term. A number of studies, including Mohanty and Klau (2004) and Clarida et al. (2000), have used conventional IV and GMM approaches to correct for the endogeneity. For the specific case of Egypt, a study by Selim (2012) employed GMM to estimate a forward-looking Taylor rule in Egypt in order to estimate the role of the exchange rate in the CBE's monetary policy reaction function. In this paper, we follow a more recent approach by Kim (2006) and Kim and Nelson (2006) to correct for the endogenous regressors and produce consistent estimates. Specifically, these papers suggest following a two-step Heckman (1976) procedure where in the first step we regress inflation and output gap on a set of instruments and obtain the residuals. Following Kim and Nelson (2006), we use four lags of inflation, output gap, global commodity prices and interest rate as instruments. These residuals are then added to the original Taylor rule specification in the second step to deliver efficient estimates as follows:

$$i_t = (1-\rho)\,\alpha + (1-\rho)\,\beta\,\pi_{t+1} + (1-\rho)\,\gamma\,\tilde{y}_{t+1} + (1-\rho)\,\eta\,\Delta x_t + \rho\,i_{t-1}$$
$$+\sigma_1\,residdlcpi + \sigma_2\,residlgap + \mu_t \qquad (8)$$

Variables *residdlcpi* and *residlgap* represent the residuals derived from step one where we regress a set of instruments on inflation and output gap, respectively. The above model can now be estimated using OLS after correcting for endogeneity. If there is no endogeneity in

equation (7), then estimates of σ_1 and σ_2 in equation (8) should be statistically insignificant. Results using the two-step Heckman procedure are presented in Table (4).

Again, we present results in two Panels; Panel A for the entire sample from 2002M1-2012M12 and Panel B for the 2005M7-2012M12 sub-sample. Focusing on results for the entire sample from Panel A, we can see that there are only two statistically significant coefficients; those attached to the lagged interest rate variable and future inflation. This indicates that the CBE has been following an interest rate smoothing strategy and it takes future inflation into consideration when formulating its current monetary policy decisions. Output gap and the exchange rate do not seem to explain any of the variation in the CBE's short-term monetary policy tool. Adding the revolution dummy does not seem to change the results.

If we turn to Panel B with results for the 2005M7-2012M12 period, we can still notice a significant interest rate smoothing effect. In this sample period, however, the CBE becomes more forward-looking than during the entire sample. We can see that the CBE responds today to future changes in inflation and the output gap. This forward-looking feature of the CBE policy is a satisfying step toward its transition towards a fully-fledged inflation targeting regime. As discussed earlier, the CBE announced its formal intention to adopt inflation targeting once the required fundamentals are put in place (see CBE, multiple issues). According to Freedman and Otker-Robe (2009) and Roger and Stone (2005), one such pre-requisite is a healthy forward-looking monetary policy, and it seems that the CBE is on the right track to doing so.

Other results from Panel B indicate an active role for the exchange rate in influencing the CBE's short-term interest rate. This feature was also true in the previous sub-section when we tested the monetary policy stance in Egypt using a backward-looking specification. Furthermore, our findings indicate that the revolution has had a very small, yet statistically significant, effect on the conduct of monetary policy in Egypt, putting upward pressure on the short-term overnight interbank rate. Finally, if we examine the coefficients attached to the two residuals, we can notice that at least one of them is statistically significant in the results reported in Panel B of Table (4). This indicates that correcting for the endogeneity problem in the original specification using the Heckman procedure was successful and that the list of instruments we use is strong.

3.3 The backward/forward-looking specification

We now turn to our final robustness check where we estimate a specification of the Taylor rule in Egypt that is both backward and forward-looking. Such a specification has been previously suggested by Clarida et al. (1998/2000) among others. The model is as follows:

$$i_t = a + b\,\pi_{t-1} + c\,\pi_{t+1} + d\,\tilde{y}_{t-1} + e\,\tilde{y}_{t+1} + f\,\Delta x_t + g\,i_{t-1}$$

$$+\theta_1\,residdlcpi + \theta_2\,residlgap + \eta_t \qquad (9)$$

We can notice that model (9) above is simply an augmented version of equation (4) where we allow k = ±1. Thus, this serves as a simple test of whether the policy-maker is more backward or forward-looking when deciding upon monetary policy changes. We believe such a specification is the most appropriate since it is more realistic that any given policy-maker is simultaneously faced with these two options and is likely to take decisions about monetary policy taking both views into consideration. Note, again, that we apply the Heckman two-step procedure to correct for endogeneity and allow the estimation of the above equation using OLS. Results are reported in Table (5).

Results from Panel A indicate that the CBE has been backward-looking over the entire 2002M1-2012M12 period. This is evident from the fact that the coefficient attached to lagged inflation is statistically significant while that attached to future inflation is not. Other factors

such as the output gap, exchange rate or the revolution do seem to have any effect on the overnight interbank rate during this period.

We take these results with a grain of salt, since the CBE only formally introduced the overnight interbank rate as its official short-term monetary policy instrument starting 2005M7. We now turn our attention to results reported in Panel B of Table (5). Empirical results indicate that the CBE has become more forward-looking than backward-looking during the more recent 2005M7-2012M12 period. We can notice that the CBE reacts to future inflation by adjusting today's (current period) interest rate. We can also see how future output gap dominates past output gap when considering any adjustments to the overnight rate.

Other results still point to a significant interest rate smoothing effect. It seems that the MPC of the CBE favors gradual changes in interest rates over sudden unpredictable changes. This strategy may certainly create confidence and stability in the financial and banking system in Egypt. Moreover, we can notice how a depreciation of the Egyptian currency and how the revolution lead to a tightening of monetary policy. Finally, it is worth noting that the statistically significant coefficients attached to the residuals derived from the first step of the Heckman procedure indicate that a model specification without such error correction would be biased. This is true for all specifications reported in Panels A and B in Table (5).[4]

4. Conclusion and Policy Implications

Is monetary policy in Egypt backward or forward-looking? Results from this paper indicate that monetary policy became more forward-looking in Egypt starting in 2005M7 after the CBE formally introduced the overnight interbank rate as its official short-term monetary policy instrument. Empirical results, however, over the entire sample period from 2002M1-2012M12 suggest that monetary policy was backward-looking in the sense that the CBE responded to past inflation rates rather than future ones.

More specifically, we use three different specifications of a simple Taylor rule in an attempt to describe the conduct of monetary policy in Egypt; namely a backward, forward as well as a specification that incorporates both a backward and forward-looking component. The Taylor rule simply aims at explaining how a central bank adjusts its short-term interest rate in response to changes in inflation, output gap, lagged interest rates and exchange rate movements. We also add a dummy variable to account for the effect of the Egyptian revolution in 2011M1. In all specifications and regardless of the sample period under question, we are able to detect a significant interest rate smoothing effect. This implies that the MPC of the CBE has been keen to change its main interest rate in a gradual manner rather than shocking the economy with unpredictable changes that may produce unneeded consequences in the financial and banking systems.

Taking the whole sample period from 2002M1-2012M12 into consideration, results suggest that monetary policy in Egypt has been more backward-looking as the CBE seemed to react to past inflation and not respond that much to future changes in the inflation rate. Past and/or future changes in the output gap never seemed to induce any change in the CBE's interest rate. Exchange rate depreciation only had an effect on short-term interest rates when using the backward-looking specification. But this effect seems to disappear when we do robustness checks using other specifications.

Results change considerably, however, if we only concentrate on the 2005M7-20102M12 period. We specifically consider this sub-sample since the CBE officially announced the overnight interbank rate as its main operational monetary policy instrument in 2005M7. We,

[4] It is also worth mentioning that the specification with both a backward and forward-looking component outperforms the other two specifications with a backward or forward looking component only. Specifically, the RMSE for the backward, forward and backward-forward-looking specifications were 0.0087, 0.011 and 0.0078 respectively.

therefore, wanted to consider this sub-sample separately to be able to more accurately and fairly judge the CBE's actions. Empirical findings suggest that monetary policy in Egypt became more forward-looking over this period. It is apparent from the estimated regressions that the CBE started to take future inflation rates and the output gap into consideration when deciding upon its interest rate in the current period. Moreover, we are able to detect the upward pressure the Egyptian revolution of 2011M1 has created on interest rates over this period.

What are the policy implications of this study? First, our results indicate that monetary policy in Egypt became more forward-looking recently with the introduction of the overnight interbank rate as an official monetary policy tool. This implies that such a decision was indeed a move in the right direction on behalf of the monetary policy-maker in Egypt. We have shown that the CBE is slowly but surely moving toward fulfilling the required preconditions of a fully-fledged inflation targeting regime. A number of country experiences and studies in the literature have called for some initial preconditions for an effective inflation targeting regime, one of which is an independent central bank with a forward-looking monetary policy stance.

Second, we can also claim that the decision of the MPC of the CBE to keep interest rates relatively unchanged following the Egyptian revolution in 2011M1 was a wise decision. Third, another important observation is that depreciation in the Egyptian currency still seems to induce a contractionary monetary policy. Such a situation may become difficult for the CBE moving forward as it may have to face a choice between stabilizing the exchange rate or stabilizing inflation. Indeed, a critical pre-requisite for an effective inflation targeting regime is that the central bank should, at least gradually, move away from exchange rate targeting. Finally, our findings do suggest that Egypt may be ready for an inflation targeting regime, at least from a monetary policy perspective. However, fiscal policy and institutional preconditions are also requirements for inflation targeting that were not addressed in this paper. In fact, studies in the literature, including Carare et al. (2002) among others, have presented evidence that supportive fiscal policy, macroeconomic stability, developed financial systems as well as an appropriate institutional framework are all important factors in the success of any inflation targeting regime.

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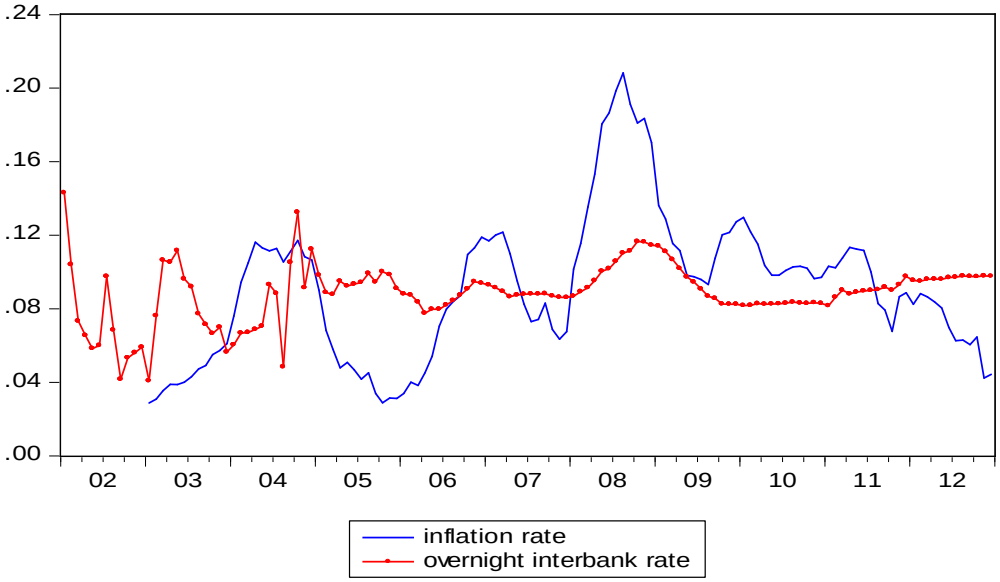
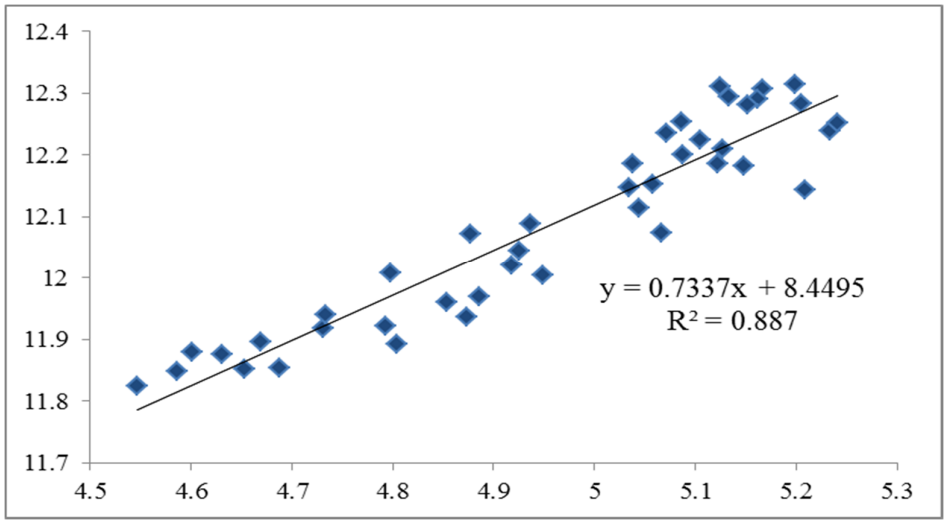
Figure 1: Inflation and Interest Rates in Egypt: 2002M1-2012M12



Source: Central Bank of Egypt and International Financial Statistics.

Figure 2: TPI versus GDP in Egypt: 2002Q1-2012Q2



Source: Ministry of Economic Development.

Table 1: Summary Statistics

	Mean	Std. Dev.	Min	Max
Inflation	0.091	0.039	0.028	0.208
Overnight rate	0.088	0.015	0.040	0.143
Exchange rate	1.732	0.083	1.493	1.841
Output gap	-0.000	0.053	-0.248	0.187

Note: Variables, except overnight rate, are expressed in logs.

Table 2: Unit Root Tests

Variable	Description	Level		First Difference	
		ADF	ERS	ADF	ERS
Cpi	Consumer price index	0.474	981.162	-2.899**	3.627**
Int	Overnight interbank rate	-3.744***	2.362***	-7.785***	0.017***
Gap	Output gap	-6.917***	1.300***	-11.127***	0.127***
Exr	Exchange rate	-2.429	19.785	-6.777***	0.940***

Notes: *** Significant at the 1% significance level, ** Significant at 5%, * Significant at 10%. Numbers reported are the computed t-statistics for ADF tests, and p-statistic for ERS test. The null hypothesis in both tests is the series contains a unit root.

Table 3: Backward-Looking Taylor Rule

cons	i_{t-1}	π_{t-1}	$\tilde{y}_{t-1}$	Δx_t	rev	R^2
Panel A: 2002M1-2012M12						
0.031	0.611	0.046	-0.008	0.105		0.50
(0.006)***	(0.067)***	(0.023)**	(0.018)	(0.062)*		
0.031	0.606	0.047	-0.007	0.102	0.002	0.51
(0.006)***	(0.068)***	(0.023)**	(0.018)	(0.063)*	(0.002)	
Panel B: 2005M7-2012M12						
0.005	0.913	0.025	0.004	0.034		0.95
(0.002)**	(0.265)***	(0.006)***	(0.004)	(0.016)**		
0.006	0.900	0.029	0.006	0.028	0.001	0.96
(0.002)***	(0.025)***	(0.006)***	(0.004)	(0.015)*	(0.000)***	

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Robust standard errors are in parentheses

Table 4: Forward-Looking Taylor Rule

cons	i_{t-1}	π_{t+1}	$\tilde{y}_{t+1}$	Δx_t	rev	residdlcpi	residlgap	R^2
Panel A: 2002M1-2012M12								
0.0231	0.696	0.044	-0.009	0.028		0.060	-0.003	0.54
(0.006)***	(0.066)***	(0.022)*	(0.019)	(0.065)		(0.109)	(0.023)	
0.022	0.691	0.047	-0.006	0.024	0.002	0.060	-0.004	0.55
(0.006)***	(0.067)***	(0.022)**	(0.019)	(0.065)	(0.002)	(0.109)	(0.023)	
Panel B: 2005M7-2012M12								
0.003	0.935	0.028	0.006	0.034		-0.014	-0.012	0.96
(0.002)	(0.024)***	(0.005)***	(0.004)	(0.015)**		(0.025)**	(0.005)	
0.003	0.919	0.036	0.008	0.030	0.001	-0.015	-0.010	0.97
(0.002)*	(0.022)***	(0.006)***	(0.004)**	(0.015)**	(0.000)***	(0.022)	(0.004)**	

Notes: Robust standard errors are in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Backward and Forward-Looking Taylor Rule

cons	i_{t-1}	π_{t-1}	π_{t+1}	$\tilde{y}_{t-1}$	$\tilde{y}_{t+1}$	Δx_t	*rev*	*residdlcpi*	*residlgap*	R^2
Panel A: 2002M1-2012M12										
0.031	0.605	0.141	-0.088	-0.002	-0.007	0.016		0.234	-0.006	0.56
(0.007)***	(0.079)***	(0.067)**	(0.068)	(0.017)	(0.019)	(0.065)		(0.136)*	(0.023)	
0.030	0.605	0.135	-0.081	-0.002	-0.005	0.013	0.002	0.227	-0.005	0.56
(0.007)***	(0.079)***	(0.068)**	(0.069)	(0.017)	(0.019)	(0.065)	(0.002)	(0.137)*	(0.023)	
Panel B: 2005M7-2012M12										
0.001	0.965	-0.027	0.052	0.002	0.006	0.041		-0.012	-0.045	0.96
(0.002)	(0.029)***	(0.016)*	(0.015)**	(0.004)	(0.004)	(0.016)**		(0.031)	(0.004)**	
0.001	0.950	-0.027	0.059	0.002	0.007	0.036	0.002	-0.046	-0.009	0.97
(0.002)	(0.027)***	(0.014)*	(0.014)***	(0.003)	(0.003)*	(0.014)**	(0.000)***	(0.027)*	(0.004)**	

Notes: Robust standard errors are in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.