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Uncovering the Financial Effects of the Exchange Rate Regime Transition in Egypt*

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Abstract

We evaluate the financial effects of monetary policy over the transition period from a fixed to a floating exchange rate regime in Egypt. The baseline evaluation is implemented through an event study methodology (high frequency identification) by estimating the effects of monetary policy announcements on financial indicators. The results reveal that a currency devaluation leads to a significant increase in stock prices. A change in the monetary policy interest rate significantly affects treasury yields. It takes more time for treasury yields with longer maturities to reflect the effects of monetary policy announcements. The results are mainly driven by the period when the exchange rate regime was closer to a floating system. The results also highlight the importance of politically and economically stable environment for the efficient transmission of monetary policy.

Keywords: monetary policy, financial markets, exchange rate regime, developing economy.

JEL Codes: C22, E52, F31, G12, O23.

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1 Introduction

There are different economic policy objectives such as real growth, stable prices, and the natural level of employment. To achieve the objectives, there exist various economic policies. Monetary policy is one of the most important economic policies due to its short policy lag and effects on an economy. To confront the recent economic crises, monetary policy has widely been used, employing additional unconventional tools (Swanson, 2021).

Depending on the mandate of central banks, they can target price stability as well as maximum employment. Central bank achieve their targets through the application of their instruments. While the main conventional monetary policy instrument is the short-term interest rate in developed countries, monetary authorities use the foreign exchange rate as an additional instrument in the developing countries where the exchange rate regime is not free-floating. Since the collapse of the Bretton Woods system in the 1970s, countries have adopted different exchange rate regimes from free-floating to fixed systems (Levy-Yeyati and Sturzenegger, 2024). The selection of the exchange rate regime has been based on the unique characteristics, political landscape, and economic circumstances of each country (Bird and Rowlands, 2009; Markiewicz, 2006).

The way a country manages its monetary policy is deeply intertwined with its choice for an exchange rate regime and this interplay has significant policy implications (Gürkaynak et al., 2021). This feature implies that the choice of the exchange rate regime is essential for monetary policy formulation, particularly for a developing country. The choice of an exchange rate regime is also important for the macroeconomic stability of a country (Palazzo, 2024). Both fixed and flexible regimes have advantages and disadvantages. A fixed exchange rate regime reduces the risk of trading and investing. Therefore, it is mainly adopted by developing countries to attract foreign investment. A flexible exchange rate regime can help to adapt to external shocks, restore the balance of payments equilibrium,

and eliminate the need for monetary authorities to maintain substantial foreign exchange reserves. Nonetheless, to hedge against the risks associated with exchange rate fluctuations, financial market instruments should be widely available (Stone et al., 2008).

The effects of monetary policy on financial markets have mostly been studied for developed countries (e.g., Gürkaynak et al., 2005; Swanson, 2021). Nevertheless, the examination of these effects is also crucial for developing countries, especially because of their less efficient financial markets, less transparent communication from monetary authorities, and less confidence in the actions of these authorities (Serwa, 2006). These issues become aggravated in the cases of exchange rate devaluations and the transition to a flexible exchange rate regime (Bird and Rowlands, 2009; Markiewicz, 2006), as it has recently been the case with Egypt. Therefore, this paper aims to evaluate the effects of monetary policy on financial markets in Egypt over its transition process from a fixed to a flexible exchange rate regime, resulted in the series of its currency devaluations in 2011–2024.

To evaluate monetary policy effects, our baseline approach is an event study methodology, known also as high frequency identification in the literature. In particular, we estimate the effects of monetary policy announcements on the financial variables of interest. We find that currency devaluations have a significant positive impact on stock prices in Egypt. We interpret this result by that the acquisition of stocks tends to serve as hedging against higher expected inflation following currency devaluations. The results also indicate that monetary policy generally significantly affects treasury yields. The materialization of monetary policy effects generally takes more time for longer maturity yields. At the same time, financial markets do not react similarly over the study period. The transmission of monetary policy becomes more efficient with the system being closer to the a floating exchange rate regime. The changes in financial markets are also related to economic and political events at both internal and global levels.

This paper is related to several lines of research in the literature. First, this paper is

related to the literature on monetary policy event studies (e.g., Gürkaynak et al., 2021, 2005; Kuttner, 2001; Swanson, 2021). While we use a similar high frequency identification approach, we apply this method in the case of currency devaluations in addition to the changes in the monetary policy interest rate. In contrast to monetary policy event studies for developed economies, we apply high frequency identification for the economy that has not had sufficiently developed financial markets and has experienced the transition from a fixed to a floating exchange rate regime.

This paper also contributes to the literature on exchange rate regimes in developing and emerging economies (among others, Bird and Rowlands, 2009; Huett et al., 2014; Levy-Yeyati and Sturzenegger, 2024; Markiewicz, 2006; Martínez and Werner, 2002; Palazzo, 2024). In general, this literature considers the different options of exchange rate regime and their effects on an economy. Using a high frequency identification, we focus on the effects of the series of currency devaluations on financial markets in the process of transition from a fixed to a floating exchange rate system in Egypt.

This paper is structured as follows. Section 2 discusses the related literature in detail. Section 3 presents the institutional background and the framework of monetary policy in Egypt. Section 4 provides the data and the methodology used in the analysis. Section 6 presents empirical results and discusses them. Section 7 provides additional empirical results and Section 8 concludes this paper.

2 Literature Review

One of the earliest related papers is the work by Cook and Hahn (1989). They conduct an investigation using an event study methodology to analyze the impact of changes in the federal funds rate target on treasury bond rates in the US between 1974–1979. Their findings reveal that alterations in the target have significant effects on short-term rates, moderate

effects on medium-term rates, and mild effects on long-term rates, all in alignment with the direction of the target change. This study highlights the importance of understanding the short-term repercussions of adjustments in the federal funds rate target on various interest rates.

Thorbecke and Alami (1994) conduct a study utilizing the event study methodology developed by Cook and Hahn (1989) and the same data set for the federal funds rate targets to analyze the impact of changes in the federal funds rate target on various stock indices in the US. Their findings reveal that news that the Federal Reserve increases or decreases the federal funds rate results in a decrease or increase in stock prices, respectively, during the period of 1974–1979.

Since the seminal paper by Cook and Hahn (1989), related research work has evolved in various ways. One essential modification involves the differentiation between expected and unexpected changes in financial markets following monetary policy announcements. Unexpected changes in financial variables are often termed as policy surprises. The rationale behind this distinction is that an efficient market would only react to a surprise policy change, not to an expected one. To construct policy surprises, many researchers have used various proxies, including federal funds futures and Eurodollar futures (among others, Bernanke and Kuttner, 2005; Gürkaynak et al., 2005; Kuttner, 2001; Swanson, 2021).

In this area of research, a more recent seminal paper is the work by Gürkaynak et al. (2005). They show the significance of event study methodology in capturing the response of asset prices to information releases of monetary policy. This methodology is crucial in comprehending the immediate effects of monetary policy changes on financial markets, as in the case of the analysis of interest rate changes by Cook and Hahn (1989).

Other studies have explored the reverse relationship investigating whether stock prices impact monetary policy decisions. Rigobon and Sack (2003) find a significant effects of the

changes in the S&P 500 index on the monetary policy stance in the US. Bohl et al. (2007) investigate the same relationship in the case of Germany before the transfer of monetary policy control to the European Central Bank. However, they find that the Bundesbank did not react to changes in German stock prices.

Rigobon and Sack (2003) argue that there could be a problem of endogeneity between monetary policy and stock markets because they can simultaneously affect each other. The concerns indicated in their work can be mitigated by measuring policy surprises in a tight window after monetary policy announcements as one of the authors shows in his another work (Gürkaynak et al., 2005). Since this influential work, the event study methodology remains one of the most common approaches in the current literature.

Despite the large literature in this area of research, there is a lack of papers on assessing and measuring the effects of monetary policy decisions on different financial instruments for developing countries compared to the work done for the US and Europe. One of few papers, which provide evidence for developing countries, is the study by Ben Naceur et al. (2007), who investigate the relationship for eight Middle East and North Africa (MENA) countries between 1990 and 2005. They find that stock markets mainly react to shocks in money supply but not to changes in interest rates.

Moussa and Delhoumi (2022) explore the asymmetric effects of interest rate and exchange rate fluctuations on stock market indices across the MENA region, including Egypt using a non-linear autoregressive distributed lag model. They find that stock markets in developing economies exhibit short-term asymmetric responses to positive and negative changes in interest and exchange rates, underscoring the role of these dynamics in shaping market reactions during periods of monetary and currency adjustments.

Xiao et al. (2024) investigate the impact of global economic disruptions, including the Russia-Ukraine war, on the spread of African sovereign bond markets. They find significant

spillover effects, highlighting that geopolitical conflicts and external shocks increase volatility and yield fluctuations in these markets. In particular, their work reveals that the link between the exchange rate and the bond spread for Egypt varies over time while it remains static for other countries.

There is large literature on exchange rate regimes and economic performance. Levy-Yeyati and Sturzenegger (2024) discuss the dynamics of the choices of exchange rate regimes and indicate that there has been an increasing trend towards floating regimes. Bird and Rowlands (2009) find that countries with an intermediate exchange rate regime tend to be lees dependent on external assistance in caparison to countries with a fixed exchange rate system. Analogously, Markiewicz (2006) indicates that countries with high inflation and more developed financial markets favor a floating exchange rate system. Based on the evidence on the transition from a fixed to floating exchange rate regime in Mexico, Martínez and Werner (2002) find that the floating system is more useful for the reduction of exchange rate exposure. Palazzo (2024) provides evidence for Argentina that competitive sectors are likely to increase export after continuous currency devaluations. Using the data from Belarusian black exchange rate market, Huett et al. (2014) show that the devaluations of the official exchange rate can be predicted by the transactions in the black market.

The results of this paper contribute to the literature by providing evidence on the effects of exchange rate regime transition on financial markets in Egypt. The estimation of these effects is implemented by high frequency identification, which is a common approach currently. The results are complimented with the estimations for the black exchange rate market, using more classical methods. We separately evaluate the effects of the latest currency devaluation, after which the official and the black market exchange rates have had similar dynamics. The estimations are implemented for the various stages of the exchange rage regime transition considering important political and economic events.

3 Economic and Institutional Background and Framework

This section provides the examination of the major economic and institutional changes in Egypt over the past decades. It assesses the effects of political upheavals in the early 2010s and subsequent reform initiatives aimed to achieve the objectives of Egypt Vision 2030.[1] In particular, this section describes the close collaboration between Egypt and the International Monetary Fund (IMF) between 2016 and 2022. This collaboration has been crucial in obtaining financial assistance and implementing essential economic reforms. Additionally, this section dives into the development of the Egyptian monetary policy framework. In general, this section seeks to provide a thorough overview of the historical context, institutional changes, and policy developments that have influenced the present economic environment in Egypt.

3.1 Institutional and Economic Reforms

Over the past three decades, the Egyptian economy has undergone significant transformations. These transformations have impacted overall economic performance and influenced how monetary policy has been implemented. The economic history of Egypt can be outlined into three distinct periods.

The initial phase, spanning from 1960 to 1973, was marked by a state-controlled

[1]Egypt Vision 2030 outlines an ambitious strategy to achieve sustainable development and create a brighter future for the nation. The vision basically focuses on six key objectives: improving the quality of life of Egyptians and raising living standards, ensuring social justice, protecting the environment, fostering a diversified, knowledge-based and competitive economy, developing well-designed infrastructure and enhancing the regional and global influence of Egypt. To bring these goals to fruition, the vision prioritizes essential enablers, with economic and institutional reforms taking a leading role. These reforms aim to strengthen governance, promote the expansion of the private sector, optimize public financial management, and establish a conducive environment for investment and innovation. By addressing deep-rooted challenges and building robust institutions, Egypt Vision 2030 lays the groundwork for a more inclusive, resilient, and prosperous future for Egypt.

economy where the government exerted substantial regulation over market mechanisms and implemented a range of directive policies. The subsequent period, from 1974 to 1991, represented a shift toward liberalization, characterized by the adoption of free-market principles and open economic policies. The final phase, from 1991 to 1996, involved comprehensive economic and structural reforms aimed at further enhancing market efficiency and integration into the global economy (Abo El-Oyon, 2003).

In the last period, Egypt initiated a comprehensive reform program in its economic, monetary and financial sectors with the support from international financial institutions.[2] Following extended negotiations that began in 1989, Egypt reached agreements with the IMF in May 1991 and with the World Bank in November of the same year on a package of stabilization and structural adjustment. These agreements form the foundation of the Economic Reform and Structural Adjustment Program (*ERSAP*).

The monetary policy reforms recommended by ERSAP revolved around various aspects and have resulted in eliminating the parallel market for foreign currencies and the unification of exchange rate system following a devaluation in February 1991. It has also motivated the elimination of interest rate ceilings to halt the distortion of capital markets and to ensure efficient allocation of financial resources. Moreover, it has backed up the introduction of Treasury bill auctions to reduce the role of the Central Bank of Egypt (hereafter CBE) in funding government deficits.[3] Subsequently, in 1992 and 1993, restrictions on lending to the private and public sectors were abolished to encourage the greater mobilization of domestic savings by means of competitive positive real interest rates (Korayem, 1997).

Twenty-five years later, following the economic disruptions caused by local revolutions in January 2011 and June 2013, and faced with a decline in financial resources, Egypt was

[2]This is a continuous process that has continued to take place until the current date.

[3]The existence of a parallel market for the exchange rate was a persistent problem for the Egyptian economy. During the period of this study, the parallel market was available during the periods between January 2015 and November 2016 and between January 2023 and March 2024.

compelled to embark on a comprehensive national reform program aiming at kick starting the development and achieving the objectives of Egypt Vision 2030. In pursuit of this, Egypt commenced negotiations with the IMF and secured a $12 billion loan, repayable over three years, in August 2016. This financial support was integral to a broader program of economic adjustment and reform designed to restore macroeconomic stability and to lay down the foundations for sustainable and long-term growth (Abouleinein, 2021).

Six years later, Egypt once again had to ask the IMF for a loan and $3 billion was approved in December 2022 and, in March 2024, it was extended to about $8 billion following another currency devaluation. In 2022, Kristalina Georgieva, Managing Director and Chairman of the Board of the IMF, stated the following: "Egypt showed resilience to the COVID-19 crisis, supported by previous fund-supported programs."

While economic recovery gained momentum in 2021, imbalances also started building amidst the fixed exchange rate regime, high public debt, and delayed structural reforms. The war in Ukraine crystallized the pre-existing vulnerabilities, triggering capital outflows. In the context of the fixed exchange rate regime, it also reduced the foreign reserves of the CBE and the net foreign assets of Egyptian banks and widened the exchange rate misalignment.

The agreements with the international organizations implied various economic and structural reforms in both fiscal and monetary policies. In addition, they also implied the reduction of the state footprint and the promotion of private sector-led growth. However, the key metric for securing financial funds was a permanent shift to a flexible exchange rate system.

3.2 Monetary Policy Framework

Similar to the general economic history of Egypt, the management of monetary policy also went through three main phases. Selim (2010) categorizes the phases as follows. The first phase (1974-1990) was characterized by direct control measures such as the administrative

setting of interest rates. Credit ceilings were also used to provide revenues for the government and subsidize debt for public enterprises. In the second phase (1991-2003), the first attempts took place to address the inconsistencies in the monetary policy framework, within the adoption of the ERSAP in 1991. Following successive rounds of Egyptian pound (EGP) devaluations that started in 2000, inflation spiked until it reached double digits following the massive devaluation in 2003.[4] The announcement of this devaluation in 2003 marked the start of the third and last phase. Following several reforms after 2003 that helped to stabilize the exchange rate in January 2005, the CBE announced its intention to shift towards inflation targeting as a new policy regime, and the Monetary Policy Committee has been established.

The adoption of the inflation targeting regime by the CBE was gradual. Currently, the CBE official website states that, since June 2005, its operational target shifted towards the overnight inter-bank rate, from the quantitative target of excess reserves. The CBE has become committed to achieve and maintain low and stable inflation in the medium term and has been responsible for two key objectives: (i) formulating and implementing the Egyptian monetary policy, and issuing financial papers and instruments, commensurate with the nature of its funds and activities, as well as engaging in open market operations (ii) establishing the foreign exchange system and policy, and its implementation as well as regulating and supervising the foreign exchange market.

The CBE MPC systematically evaluates and delivers various economic, financial and material reports while suggestions are formulated by the CBE division of Monetary Policy and Markets.[5] Following a thorough discussion of potential perspectives, the members of the committee cast votes on essential decisions concerning the orientation of monetary policy,

[4]The government partially floated the Egyptian currency to decrease its value against USD from EGP 3.85 to EGP 6.86 while it was traded at EGP 7 to USD in the parallel market.

[5]The Monetary Policy and Markets divisions of the CBE are responsible for analyzing economic and market trends, providing reports and recommendations to support the MPC in making well-informed decisions.

utilizing available monetary instruments. The MPC sets key policy interest rates to align with the predetermined inflation target and to ensure price stability in the medium term. The committee meets eight times throughout the year to review the settings of the monetary policy. The schedule of these meetings is made public at the beginning of each year on the official website of the CBE. In addition, extraordinary meetings may occur under special circumstances.[6] Following each meeting, the MPC issues a press release on the CBE website, detailing the decisions made and providing explanations for them, which is crucial for managing inflation expectations among relevant stakeholders. The announcements are usually published on the website on Thursday afternoons.[7]

4 Description of Dataset

The data used in this empirical analysis include the CBE inter-bank overnight rate (IB), the rates of three, six and twelve months treasury bills (T3M, T6M and T1Y respectively) and the main Egyptian stock market index (EGX30), which includes the thirty most liquid and active stocks on the Egyptian stock exchange.[8] We take the logarithm of the EGX30 before using it in the empirical analysis. Also, five and ten years treasury bonds (T5Y and T10Y) are included. We use the exchange rate of Egyptian pounds (EGP) per the US dollar (USD) in the official market (FXO) as well as the exchange rate in the parallel market (FXP).[9] The data sources are the CBE official website and the Investing.com database.

The empirical analysis covers the period from January 2011 to May 2024. Although the initial objective was to begin the empirical analysis in 2005, in line with the establishment of the MPC and the adoption of the inflation targeting framework, this was not feasible due to

[6]The last extraordinary meeting took place on 6th of March 2024.
[7]This information is relevant and will be discussed again in the methodology section.
[8]EGX30 is the equivalent to the S&P 500 in the Egyptian stock market.
[9]The latter is also known as the black market and it is an informal, unregulated market that has appeared in response to discrepancies between the official exchange rate and the market demand.

data limitations and inconsistencies in reporting methodologies prior to 2011. In addition, 2011 marks a critical turning point in Egyptian economic and political landscape, with local and regional transformative events, significantly influencing the economy in subsequent years. After 18 days of nationwide protests sparked by the revolution on January 25 of 2011, the president, Hosni Mubarak, resigned on February 11 of 2011, ending his 30-year tenure in office. Besides, the end of the sample period in May 2024 reflects the last stage of the exchange rate regime transition.

During this period, the MPC conducted 110 meetings. The data set is divided into four panels (from A to D) that represent key and distinct periods within the full data sample. Panel A represents the full sample containing data from January 2011 to May 2024. Panel B represents the period before the first currency devaluation that took place in November 2016. Panel C is the period between the devaluation in 2016 and the outbreak of the Russo-Ukrainian War. Panel D represents the period after the outbreak of the Russo-Ukrainian War.

We also use the available data on the exchange rates in the parallel market, also known as the black or shadow market. The data of the parallel market are daily observations of the exchange rate USD/EGP from Investing.com. During the period between January 2023 and March 2024, the difference between official rates and parallel market rates deviated significantly, as can be seen in Figure 1. Since the adoption of the free-floating exchange rate system by the CBE in March 2024, the official and the parallel market exchange rates have generally coincided with each other. Therefore, for empirical analysis, we use the period between January 2023 and March 2024.

The summary of descriptive statistics that include the mean, the standard deviation, the minimum, and the maximum is presented in Table 1. We can see from the table that the exchange rates are quite different in the official (13.84) and parallel markets (43.50). The mean value of the interest rates vary with the level of their maturity. The average price of

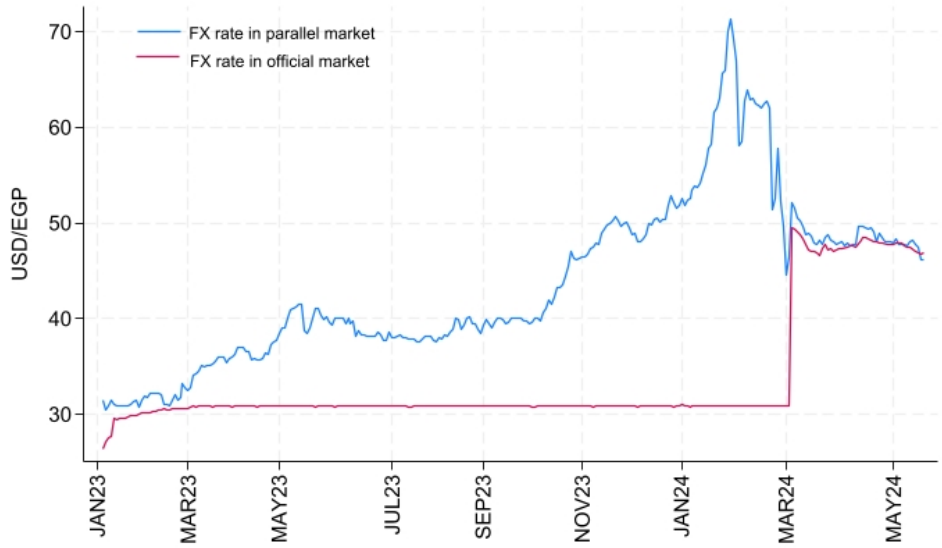

Figure 1: USD/EGP, official and parallel market rates
Source: Central Bank of Egypt and Investing.com

stock prices is 10677 EGP with a high variation spanning from the minimal value of 3586 EGP to the maximum value of 33382 EGP over the study period.

Table 1: Descriptive statistics

	EGX30	IB	T3M	T6M	T1Y	T5Y	T10Y	FXO	FXP
MEAN	10677	12.20	14.95	15.59	15.96	16.28	16.82	13.84	43.50
STD DEV	5095	4.11	3.82	4.17	4.19	3.38	3.08	8.18	8.60
MAX	33382	27.67	30.45	30.97	31.82	30.38	33.33	49.5	71.3
MIN	3586	8.25	9.35	9.90	9.75	11.40	12.70	5.80	30.48
OBSERVATIONS	2972	2991	2748	2759	2677	2691	2681	3167	301

Note: Statistics are computed over the period from January 2011 to May 2024 except for the parallel market statistics computed from January 2023 to March 2024.

5 Methodology

During the period of analysis (from January 2011 to May 2024), the monetary policy framework in Egypt shared similarities with that of the US and, in some periods (similar to other emerging economies), Egypt followed the path of the US monetary policy when the Fed made changes in the policy interest rate. In both countries, monetary authorities

publicly announce monetary policy decisions following their meetings: the Federal Open Market Committee (FOMC) in the US, and the Monetary Policy Committee (MPC) in Egypt. After these meetings, the decisions are communicated to the public on specific dates. Nevertheless, the data for Egypt are not available on the same high frequency as in the case of the US where data are available on the 10-minute time frame.

To empirically assess the impact of monetary policy changes on stock prices, we follow Swanson (2021) and use an event study methodology (high frequency identification). The event study methodology is commonly used in the related literature since the influential papers by Kuttner (2001) and Gürkaynak et al. (2005). This methodology involves analyzing the reaction of stock prices or other financial instruments to unexpected shifts in monetary policy. These unexpected shifts are sometimes called "monetary surprises" in the literature. The event study methodology assumes that the change in the variables of interest is affected by the shift in monetary policy given the measurement of that change closely after the announcement of monetary policy decisions. By using event study methodology, we can evaluate the influence of monetary policy announcements on various financial variables.

For the event study approach, we consider the following regression model:

$$\Delta Y_t = \beta_0 + \beta_1 \Delta FX_t + \beta_2 \Delta IB_t + \epsilon_t, \tag{1}$$

where t indexes MPC announcements, Y denotes a particular financial instrument to be analyzed, Δ is the change in 1 business day window bracketing each MPC announcement, FX is the exchange rate of Egyptian pounds per one USD, IB is the inter-bank overnight rate and ϵ_t is an error term.[10] β_is are the parameters of the model, which are estimated by ordinary least squares (OLS). The exogeneity of the independent variables and the consistent estimation of the model parameters are provided by the timing of the measurement of the

[10] As ΔY_t, we one by one consider the stock market index (EGX30), short-term treasury bills (T3M, T6M, and T1Y), and long-term treasury bonds (T5Y and T10Y).

changes in the variables closely after MPC announcements.

Our objective of the event study estimation is to observe the changes in the target variables closely after monetary policy announcement taking into account the features of the Egyptian financial markets. As mentioned in Section 3, MPC announcements in Egypt take place on Thursday afternoons, usually after the closure of the financial markets. Since Thursday is the last working day of the week[11] in Egyptian markets, the effects of MPC decisions cannot materialize until the following business day (Sunday).[12] Therefore, we set the event window to be between two consecutive business days, t and $t+1$. This formulation of the event window ensures that the model can capture the changes of the variables that take place due to MPC announcements. In addition, as a robustness check, we also estimate the effects in the case of the window of 2 and 5 business days. Yet, for longer evaluation windows, there is a caveat that the dependent variables might be affected by the events other than the changes in the monetary policy instruments.

In our analysis, we estimate the effects of the two key monetary policy tools used by the CBE, namely, the inter-bank overnight rate and the currency exchange rate. As discussed in previous sections, various monetary policy tools are used in the literature to evaluate the effects of monetary policy. Because of the nature of the Egyptian monetary policy framework for the period under consideration, we include the exchange rate as a policy instrument in the model in addition to the short-term interest rate. As a developing country, Egypt used to adjust its currency exchange rate according to its targets and macroeconomic circumstances.

Before conducting the event study analysis, we first check the series for stationary, using the Augmented Dickey-Fuller (ADF) test. The test results show that variables are non-stationary and are integrated of order one. Therefore, we take the first order differences of dependent

[11] The standard working week in Egypt is from Sunday to Thursday.

[12] Campbell et al. (1998) state that it is possible to expand the event window for two days, which is the day of the announcement and the day that follows in order to capture the effects of announcements made after the markets closure on the announcement day.

and independent variables before we estimate the model. Consequently, in the estimation results, the stock market index is in the unit of percent change while the interest rates are in the units of percentage changes.

We standardize the values of the monetary policy instruments to facilitate the comparison and interpretation of the estimation results. That is, we transform the values of these variables such that each instrument has a mean of zero and a standard deviation of one. The standardization enables the estimation of effects per standard deviation change, making the results clearer and more comparable.

The event study analysis is conducted for different estimation samples. In addition to the full sample, we also run the analysis on the three different sub-samples that are described in Section 4. The objective of this sub-sample analysis is to focus on the periods of different characteristics both in terms of the MPC framework and the external shocks.

In addition to the event study methodology, we use an autoregressive distributed lag (ADL) model to evaluate the effects of monetary policy on stock prices using the data from the parallel exchange rate market. In the current case, the crucial difference is that t index expresses consecutive working days instead of MPC announcements. Consequently, we cannot assume that the dynamics of stock prices are only due to the changes in monetary policy. Therefore, in the model, we include the lagged values of the stock prices to control for their potential inertia and other variables that can impact it. At the same time, as in the previous case, we consider the contemporaneous values of the independent variables. Thus, in the case of the data from the parallel exchange rate market, we use the following model:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta Y_{t-1} + \cdots + \alpha_p \Delta Y_{t-p} + \beta_1 \Delta FX_t + \beta_2 \Delta IB_t + \upsilon_t, \tag{2}$$

where t indexes consecutive days, Y is the stock market index (EGX30) here, Δ is a daily change, p is a lag order, υ_t is an error term, and FX and IB are the same as defined above.

As in the case of the previous model, we take the first order differences of the variables to ensure their stationarity and then we estimate the model with the OLS. As the lag order p of the dependent variable, we choose the lowest lag, in which case the residuals of the model are not serially correlated.

6 Empirical Results

This section presents the empirical results from the evaluation of the effects of changes in the exchange rate and the inter-bank overnight rate on Egyptian stock and treasury markets. We examine the reactions of the financial markets over three different MPC announcement windows: one, two, and five working days (one week). The one-day reaction measures the change in asset price from the day of the MPC announcement to the following working day, and the estimation results are presented in Table 2. The two-day reaction captures the price change from the MPC announcement to two working days later, and the results are provided in Table A.1. The five-day reaction considers the price change in five working days after the MPC announcement and the estimates are displayed in Table A.2.[13]

6.1 Stock Market Index

Economic theory suggests that stock prices typically decline following a rise in interest rates. This is based on the premise that the stock price of a company reflects the anticipated present value of its future net cash flows. Consequently, a tightening of monetary policy diminishes future cash flows, raises the discount rates applied to these cash flows and leads to the preference for bonds over stocks. It has been empirically shown in various papers (e.g., Thorbecke, 1997; Bjørnland and Leitemo, 2009).

[13]As explained earlier, we choose the working day that follows the MPC announcement to allow the markets to react to the decisions announced after the market closure on the day of the announcement.

Table 2: Estimated effects of changes in the exchange rate and the inter-bank overnight rate on the stock market index and Egyptian treasury yields

	EGX30	T3M	T6M	T12M	T5Y	T10Y
(A) Full sample, Jan. 2011-May 2024 (110 Observations)						
Change in exchange rate	0.15***	0.05*	-0.01	0.05*	0.03	0.03*
	(4.758)	(1.704)	(-0.426)	(1.973)	(1.404)	(1.750)
Change in IB rate	0.03	0.20***	0.03	0.16***	0.17***	0.17***
	(0.666)	(2.896)	(0.818)	(2.749)	(3.090)	(3.882)
Regression R^2	0.20	0.15	0.01	0.16	0.16	0.23
(B) Pegged exchange rate phase, Jan 2011-Oct 2016(45 Observations)						
Change in exchange rate	0.07	-0.18	-0.07	-0.03	-0.26	-0.51*
	(0.137)	(-0.678)	(-0.250)	(-0.117)	(-0.396)	(-1.886)
Change in IB rate	-0.03	0.08	-0.04	-0.02	0.36	0.36**
	(-0.517)	(0.658)	(-0.309)	(-0.172)	(1.094)	(2.666)
Regression R^2	0.01	0.03	0.02	0.01	0.07	0.32
(C) Controlled flotation phase Nov 2016-Feb 2022 (45 Observations)						
Change in exchange rate	0.48***	0.48***	-0.01	0.42***	0.28***	0.25***
	(4.733)	(8.749)	(-0.243)	(7.875)	(5.151)	(5.363)
Change in IB rate	0.01	0.16**	0.06	0.12*	0.17**	0.18***
	(0.683)	(2.440)	(1.425)	(1.848)	(2.552)	(3.403)
Regression R^2	0.48	0.79	0.06	0.74	0.63	0.69
(D) Post Russo-Ukrainian war Feb 2022-May 2024 (23 Observations)						
Change in exchange rate	0.10***	0.01	-0.01	0.02	0.01	0.01
	(3.107)	(0.119)	(-0.063)	(0.562)	(0.948)	(0.729)
Change in IB rate	-0.09	-0.02	0.02	0.04	0.03	0.01
	(-0.723)	(-0.119)	(0.203)	(0.341)	(0.673)	(0.080)
Regression R^2	0.41	0.00	0.00	0.03	0.08	0.03

Note: The coefficients are in the units of percentage point changes per a standard deviation change in the monetary policy instrument except for the EGX30 coefficient, which is represented as a percent change.

***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. t statistics are in parentheses

The one-day reactions are presented in Table 2. Panel (A) summarizes the effects of the two monetary policy instruments over the entire sample but, before discussing these results, we first discuss the sub-sample results. Panel (B) reports the results for the period of the fixed exchange rate regime when the Egyptian pound was pegged to the US dollar. During this period, the inter-bank rate was raised six times and was cut in four occasions. For this period, the estimation results show that the changes in the exchange rate and the inter-bank rate generally do not have significant effects on financial markets.

Panel (C) reports the results for the period between November 2016 and February 2022, before the outbreak of the Russo-Ukrainian war. The results show that a one standard deviation increase in the exchange rate of USD/EGP (devaluation of the Egyptian pound) elevates the stock market index by approximately 0.48% while the change in the inter-bank rate does not affect the EGX30 index significantly.

Panel (D) reports the results for the period following the outbreak of the Russo-Ukrainian war, the period between February 2022 and the end of the sample in May 2024. During this period, the results indicate that a one standard deviation increase in the exchange rate raises the stock market index by approximately 0.10%. This panel of the results also shows that the index does not change significantly following the increase in the inter-bank rate.

Finally, in the case of the full-sample estimates presented in panel (A), while the responses of the stock market index to the change in the inter-bank rate are consistent across sub samples, the responses to the change in the exchange rate are not. For the whole estimation sample, the stock market index significantly goes up by 0.15% following a standard deviation increase in the exchange rate whereas it does not respond to changes in the inter-bank rate. The results are similar to the findings by Moussa and Delhoumi (2022) in terms of the significant and positive effect of exchange rate devaluations on the stock market index.

We present the results for the responses after two and five working days following a MPC announcement in Table A.1 and Table A.2, respectively. The two-day reactions are qualitatively similar to the previous estimates. In terms of quantitative effects, over the whole sample, the two-day reactions of the stock index to the changes in the exchange rate and the inter-bank rate are 0.26% (which is relatively higher) and 0.12% (which is significant in this case), respectively. In contrast, five-day reactions to changes in the exchange rate and the inter-bank rate are not generally significant. Thus, we can infer from the results that the Egyptian stock market mostly needed two days to reflect the effects of the MPC announcements.

6.2 Market Interest Rates

Standard monetary theory posits that monetary policy tightening typically leads to an increase in short-term and long-term market interest rates and vice versa. This relationship is well documented in the economic literature (Ellingsen and Söderström, 2001). Below we discuss the results related to the market interest rates responses to the changes in the exchange rate and the inter-bank overnight rate. We expect that exchange rate depreciation should lead to the increase in the interest rates[14] while the elevation of the inter-bank rate should trigger the rise in the market interest rates. As short-term interest rates, we consider the three, six and twelve months treasury yields. As long-term interest rates, we include the five and ten years treasury yields in the empirical analysis.[15]

6.2.1 Reaction of Short-Term Interest Rates

In line with the discussion of the results on the stock market index, we analyze the results (provided in Table 2) on the short-term interest rates first for the sub-samples and then for the full sample. As can be seen from Panel (B), short-term interest rates do not react significantly to changes in the FX rate and the inter-bank rate. Panel (C) indicates that there is a positive and significant response of the three and twelve month treasury yields to the changes in both monetary policy tools in contrast to the six month yields that do not significantly respond to these changes. The results in Panel (D) are similar to the results from Panel (B) and the responses of the short-term rate are not significant for any maturity. Turning to the results for the full sample, Panel (A) shows that both three and twelve month treasury yields increase by 0.05 percentage points (significant at 10% level) per a standard deviation increase in the FX rate while they increase by 0.20 and 0.16 percentage

[14]The devaluation of the currency generally makes imports more expensive and Egypt is a net importer with a long-term current account deficit. So, the devaluation of the currency should bring inflation up and consequently raise interest rates.

[15]The nine months and two year treasury yields are excluded due to data unavailability.

points (significant at 1% level), respectively, following a standard deviation increase in the inter-bank rate. At the same time, the response of the six months treasury yield is not significant.

For the three and the twelve months yields, the two-day responses to the changes in the FX rate and the inter-bank rate are in line with the previous results while the two-day response of six months yields to the changes in the monetary policy instruments is significant at 1% level in this case. For the six and the twelve months yields, the five-day responses are 0.13 and 0.10 percentage points, respectively, and they stay significant while the responses of the three months yields are not significant anymore. Thus, the responses of the short-term interest rates are theoretically coherent. In general, the three months yields significantly react to the MPC announcements already in one working day while at least two working days are needed for the materialization of the MPC announcements for the six and the twelve months yields.

6.2.2 Reaction of Long-Term Interest Rates

As previously, we first discuss the results in the case of the sub-sample analysis. Panel (B) shows that the responses of the five years yields to the changes in the monetary policy instruments are not significant. The ten-year interest rate reacts significantly only to a standard deviation increase in the inter-bank rate, increasing by 0.36 percentage points. Panel (C) reports that both yields have similar significant responses to changes in both policy tools. The five and the ten years yields go up by 0.28 and 0.25 percentage points, respectively, in response to a standard deviation increase in the FX rate and the inter-bank rate. They also go up by 0.17 and 0.18 percentage points in response to a standard deviation increase in the inter-bank rate. Panel (D) indicates that the long-term interest rates do not respond to the changes in the policy tools.

Panel (A) shows that both interest rates insignificantly go up by 0.03 percentage points to a standard deviation increase in the exchange rate while they significantly rise by 0.17 percentage points in response to a standard deviation increase in the inter-bank rate. The two-day responses of both interest rates still significantly react to the changes in both policy tools over the whole sample. Again, those responses are mainly driven by the results from Panel (C) that represents the period of the controlled flotation between November 2016 and February 2022. The five-day responses of the long-term interest rates are not significant over the whole sample but they are still significant in response to the change in the inter-bank rate over the sub-sample of Panel (C).

6.3 Discussion

As discussed above, the results presented in Panel (A) for the full sample are mainly driven by the results provided in Panel (C). We attribute the significant responses observed in Panel (C) during the period between November 2016 and February 2022 to the political stability and financial autonomy encountered by Egypt during this period. These features highlight the importance of their roles in the transmission of monetary policy decisions to financial markets. Besides, the results are also driven by the fact that the exchange rate regime was closer to a floating system during this period. Similarly, Martínez and Werner (2002) find that a floating exchange rate regime was useful for decreasing exchange rate exposure.

The insignificant results are mainly found in Panels (B) and (D). The insignificance of the results implies the unresponsiveness of the financial variables to monetary policy announcements and we interpret it by the following factors. First, Panel (B) provides the results for the period between 2011 and 2016 when a lot of significant results took place in Egypt. A revolution took place in Egypt during the period from January 25 to February 11 of 2011. Hosni Mubarak, the president of Egypt, stepped down and the authority was transferred to the supreme council of the armed forces. In June 2013, another revolution

led to the resignation of Mohamed Morsi, who was elected as a president in 2012. The aftermath of both revolutions was accompanied by regional tensions imposing significant threats and complications on Egyptian economy. Brandao-Marques et al. (2020) argue that the inability to detect transmission in emerging economies is frequently related to the issues on data quality and methodological approaches. Yet, within the scope of our analysis for Egypt, we think that, during critical periods, financial markets can be more affected by the factors related to political stability rather than monetary policy decisions.

We attribute the insignificant results from Panel (D) to the fact that, Egypt being a developing country, its MPC has mainly been following the path of the US Federal Open Market Committee (FOMC), as can be seen from Table A.3. Also, as it has been argued by the literature (Foley-Fisher and Guimaraes, 2013; Uribe and Yue, 2006; Edwards, 2012), the US interest rates have a significant impact on developing economies. In particular, Egyptian monetary authorities closely followed US monetary policy and MPC announcements usually took place one week after FOMC announcements as can been seen from Table A.3. Therefore, our interpretation of the results is that the decisions of the MPC in Egypt were already anticipated by the financial markets over that period. MPC announcements might also contain information effects (Gürkaynak et al., 2021). Besides, the outbreak of the Russo-Ukrainian war caused a global run of hot money from developing economies to developed countries as a response to increased risks. Egypt, among other developing economies, had to follow the path of US economic policy trying to mitigate the increased risks related to foreign exchange reserves.

7 Additional Empirical Results

7.1 Parallel Market

We also evaluate the effects of the exchange rate changes in the parallel market on stock prices, thereby complimenting the analysis in the case of the official exchange rate. As discussed in Section 5, now we use the ADL model with daily (working day) changes in the exchange rate for the period between January 2023 and March 2024 in contrast to the exchange rate changes following the MPC meetings.[16] Checking for serial correlation in the ADL model, we choose the lag order of the stock market index to be two. The results of the Breusch-Godfrey test are presented in Table A.4 while the results of the model estimation are provided in Table 3.

As we can see from Table 3, the reaction of the stock market index to exchange rate changes in the parallel market is large and significant, as similarly found by Huett et al. (2014). In particular, in the current case, a one standard deviation increase in the parallel market exchange rate increases the stock market index by 0.25%. At the same time, in line with the baseline results, the change in the inter-bank rate does not significantly affect the stock market index.

7.2 March 2024 Devaluation Effects

In the pursuit of the transition towards a floating exchange rate regime, the CBE eased the control over the exchange rate and, as a result, the EGP depreciated substantially in March 2024. This devaluation took place just once in March 2024 and there were no further devaluations afterwards. Consequently, we cannot apply our previous event study approach

[16] For this period, only eleven meetings took place and so the application of the event study methodology would not provide reliable results.

Table 3: Stock market reaction in the parallel market

	EGX30
Sample, Jan. 2023-March 2024 (277 Obs.)	
$EGX30_{t-1}$	-0.01
	(-0.218)
$EGX30_{t-2}$	0.04
	(0.649)
Change in exchange rate	0.25**
	(2.333)
Change in IB rate	0.03
	(0.153)
Regression R^2	0.03

Note: Coefficients are in units of percentage points change per standard deviation change. *** , ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. t statistics are in parentheses.

based on the regression analysis but instead we can evaluate the effects of this one-time devaluation by simply measuring the changes in the variables immediately after the event.

Table 4: Changes in the variables after the devaluation

	USD/EGP	EGX30	IB	T3M	T6M	T12M
Pre-devaluation	30.85	30669	21.669	22.95	28.10	29.91
Post-devaluation	49.50	31301	27.673	27.25	30.96	31.82
Percent Change	60.45%	2.06%	27.70%	18.74	10.18%	6.38%

Note: Values vary between changes between 5th and 6th of March, and 5th and 11th of March according to the timing of the variable changes. For instance, if a variable was not auctioned on the 6th of March such as the treasury bills, the difference was taken between the 5th and the 11th of March which was the first day of trading after the devaluation.

As can be seen from Table 4, the variables were substantially affected by the latest devaluation that took place in March 2024. The Egyptian pound devaluated against the

US dollar by 60.45%. The devaluation leads to the increase in the stock market index by 2.06%. The inter-bank overnight rate increased by 6 percentage points and the 3-month interest rate rose by 4.3 percentage points while the changes in the interest rates with a longer term maturity were more moderate. Following the devaluation, the six and the twelve months yields go up by 2.86 and 1.91 percentage points, respectively. Thus, as in the case of the baseline results, the responses of the short-term rates to the currency devaluation are stronger than the responses of the long-term rates.

8 Conclusion

This study analyzes the effects of monetary policy decisions, specifically interest rate adjustments and currency devaluations, on the financial markets in Egypt over the period from 2011 to 2024. Employing an event study methodology, the results reveal relevant insights on the dynamics between monetary policy and financial variables such as stock prices and treasury yields.

The stock market index has a significant positive reaction to the currency devaluations, particularly for the period of controlled flotation from November 2016 to February 2022. At the same time, the stock market index significantly responds to the inter-bank overnight rate only in two working days. Thus, stock prices are more sensitive to currency devaluations than to the changes in the monetary policy rate over the study period.

In general, the short-term (three, six, and twelve months) treasury yields significantly increase following the currency devaluation and the increase in the inter-bank overnight rate, especially for the controlled flotation phase. In particular, the three and twelve months treasury yields have significant responses over the full sample. At the same time, the six months yields do not react significantly but their response is significant in the case of the two-day working window.

Long-term (five and ten years) treasury yields significantly go up in response to the currency devaluation and the increase in the inter-bank overnight rate for the controlled flotation phase. For the full sample, they also respond significantly but only to the inter-bank overnight rate. That is, long-term yields are more sensitive to changes in the inter-bank rate rather than to currency devaluations. Yet, the long-term rates significantly respond to currency devaluations in the case of the two-day working window. In general, the results show that more time is needed for the realization of monetary policy announcements for the longer term interest rates.

The variations in the reactions of financial market to monetary policy announcements across different periods emphasize the importance of political stability and financial autonomy for the efficiency of monetary policy transmission. The significant responses of the variables for the controlled flotation period reflect the period of relative political and economic stability in Egypt. Besides, this period also reflects the system that is closer to a floating exchange rate regime. In contrast, monetary policy effects are muted for the periods marked by political upheaval or external shocks, such as the pre-flotation and the Russo-Ukrainian war periods. That is, this evidence indicates that external and domestic uncertainties can dampen the impact of monetary policy. Therefore, for policy implications, these findings highlight the importance of maintaining political stability and clear communication to enhance the effectiveness of monetary policy.

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Appendix

Table A.1: Two-day reactions of the stock market index and treasury yields to the changes in the exchange rate and the inter-bank overnight rate

	TWO–DAY REACTIONS					
	EGX30	T3M	T6M	T12M	T5Y	T10Y
(A) Full sample, Jan. 2011-May 2024 (110 Observations)						
Change in exchange rate (O)	0.26***	0.03	0.14***	0.12***	0.05***	0.07***
(t -stat.)	(6.828)	(1.254)	(5.902)	(5.221)	(2.705)	(3.581)
Change in IB rate	0.12**	0.07*	0.08**	0.08**	0.08***	0.06**
(t -stat.)	(2.112)	(1.884)	(2.294)	(2.183)	(2.692)	(2.301)
Regression R^2	0.38	0.06	0.33	0.29	0.16	0.19
(B) Begged exchange rate phase, Jan 2011-Oct 2016 (45 Observations)						
Change in exchange rate (O)	0.29	0.69***	0.78***	0.78***	0.17	0.02
(t -stat.)	(0.468)	(3.893)	(3.034)	(4.424)	(0.779)	(0.078)
Change in IB rate	0.08	-0.00	0.01	0.00	0.02	0.01
(t -stat.)	(1.132)	(-0.168)	(0.303)	(0.046)	(0.713)	(0.427)
Regression R^2	0.05	0.32	0.23	0.41	0.04	0.01
(C) Controlled flotation phase, Nov 2016-Feb 2022 (45 Observations)						
Change in exchange rate (O)	0.55***	0.13**	0.34***	0.31***	0.24***	0.23***
(t -stat.)	(4.346)	(2.051)	(4.852)	(4.224)	(3.784)	(4.147)
Change in IB rate	0.15	0.28***	0.31***	0.28***	0.25***	0.19***
(t -stat.)	(1.034)	(3.854)	(3.776)	(3.172)	(3.382)	(2.960)
Regression R^2	0.49	0.49	0.67	0.60	0.59	0.59
(D) Post Russo-Ukrainian war, Feb 2022-May 2024 (23 Observations)						
Change in exchange rate (O)	0.21***	0.00	0.12***	0.10***	0.03**	0.04**
(t -stat.)	(5.900)	(0.115)	(3.977)	(3.742)	(2.776)	(2.550)
Change in IB rate	0.01	-0.02	0.06	0.06	0.04	0.02
(t -stat.)	(0.074)	(-0.120)	(0.474)	(0.593)	(0.902)	(0.361)
Regression R^2	0.70	0.00	0.52	0.49	0.36	0.31

Note: The coefficients are in the units of percentage point changes per a standard deviation change in the monetary policy instrument except for the EGX30 coefficient, which is represented as a percent change.

*** , ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Table A.2: Five-day reactions of the stock market index and treasury yields to the changes in the exchange rate and the inter-bank overnight rate

	FIVE–DAY REACTIONS					
	EGX30	T3M	T6M	T12M	T5Y	T10Y
(A) Full sample, Jan. 2011-May 2024 (110 Observations)						
Change in exchange rate (O)	0.17	-0.03	0.13***	0.10***	0.03	0.04
(t -stat.)	(1.550)	(-0.135)	(3.848)	(3.084)	(1.565)	(2.240)
Change in IB rate	0.35	0.04	0.06	0.05	0.05	0.04
(t -stat.)	(2.136)	(0.109)	(1.190)	(1.126)	(1.713)	(1.299)
Regression R^2	0.09	0.00	0.17	0.12	0.07	0.08
(B) Begged exchange rate phase, Jan 2011-Oct 2016 (45 Observations)						
Change in exchange rate (O)	-0.95	0.37	0.61**	0.66	0.11	-0.05
(t -stat.)	(-1.024)	(1.644)	(2.294)	(1.510)	(0.452)	(-0.278)
Change in IB rate	0.40***	0.00	0.01	0.03	0.02	0.02
(t -stat.)	(3.997)	(0.183)	(0.375)	(0.675)	(0.800)	(0.789)
Regression R^2	0.34	0.09	0.16	0.10	0.03	0.02
(C) Controlled flotation phase, Nov 2016-Feb 2022 (45 Observations)						
Change in exchange rate (O)	0.99	0.24	0.24*	0.13	0.03	-0.05
(t -stat.)	(2.051)	(1.666)	(1.711)	(1.034)	(0.284)	(-0.557)
Change in IB rate	0.25	0.16	0.19	0.19	0.25**	0.27**
(t -stat.)	(0.444)	(0.952)	(1.148)	(1.285)	(2.053)	(2.364)
Regression R^2	0.16	0.16	0.18	0.13	0.17	0.16
(D) Post Russo-Ukrainian war, Feb 2022-May 2024 (23 Observations)						
Change in exchange rate (O)	0.06	-0.26	0.10*	0.09***	0.02	0.04
(t -stat.)	(1.131)	(-0.433)	(2.024)	(3.298)	(1.530)	(2.319)
Change in IB rate	-0.50**	-1.85	-0.11	-0.03	-0.05	-0.11
(t -stat.)	(-2.231)	(-0.765)	(-0.581)	(-0.288)	(-1.118)	(-1.655)
Regression R^2	0.35	0.05	0.24	0.44	0.21	0.37

Note: The coefficients are in the units of percentage point changes per a standard deviation change in the monetary policy instrument except for the EGX30 coefficient, which is represented as a percent change.

*** , ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Table A.3: FOMC and MPC announcements between 2023 and 2024

2022			2023			2024		
Meeting Day	US	EGYPT	Meeting Day	US	EGYPT	Meeting Day	US	EGYPT
26-01-22	-		01-02-23	0.25		31-01-24	-	
03-02-22		-	02-02-23		-	01-02-24		2
16-03-22	0.25		22-03-23	0.25		06-03-24		6
21-03-22		1	30-03-23		2	20-03-24	-	
04-05-22	0.50		03-05-23	0.25		01-05-24	-	
19-05-22		2	18-05-23		-	23-05-24		-
15-06-22	0.75		14-06-23	-				
23-06-22		-	22-06-23		-			
27-07-22	0.75		26-07-23	0.25				
18-08-22		-	03-08-23		1			
21-09-22	0.75		20-09-23	-				
22-09-22		-	21-09-23		-			
27-10-22		2	01-11-23	-				
02-11-22	0.75		02-11-23		-			
14-12-22	0.50		13-12-23	-				
			21-12-23		-			

Source: The table is compiled based on data from the Fed and the CBE.
Note: Announcements are presented in terms of the percentage point changes in monetary policy rates. The sign − denotes no change in monetary policy rates.

Table A.4: Results of the test for serial correlation

Breusch–Godfrey LM test for autocorrelation			
Lags	Chi2	df	Prob >Chi2
1	7.623	1	0.0058
2	1.184	2	0.5534
H0: no serial correlation			

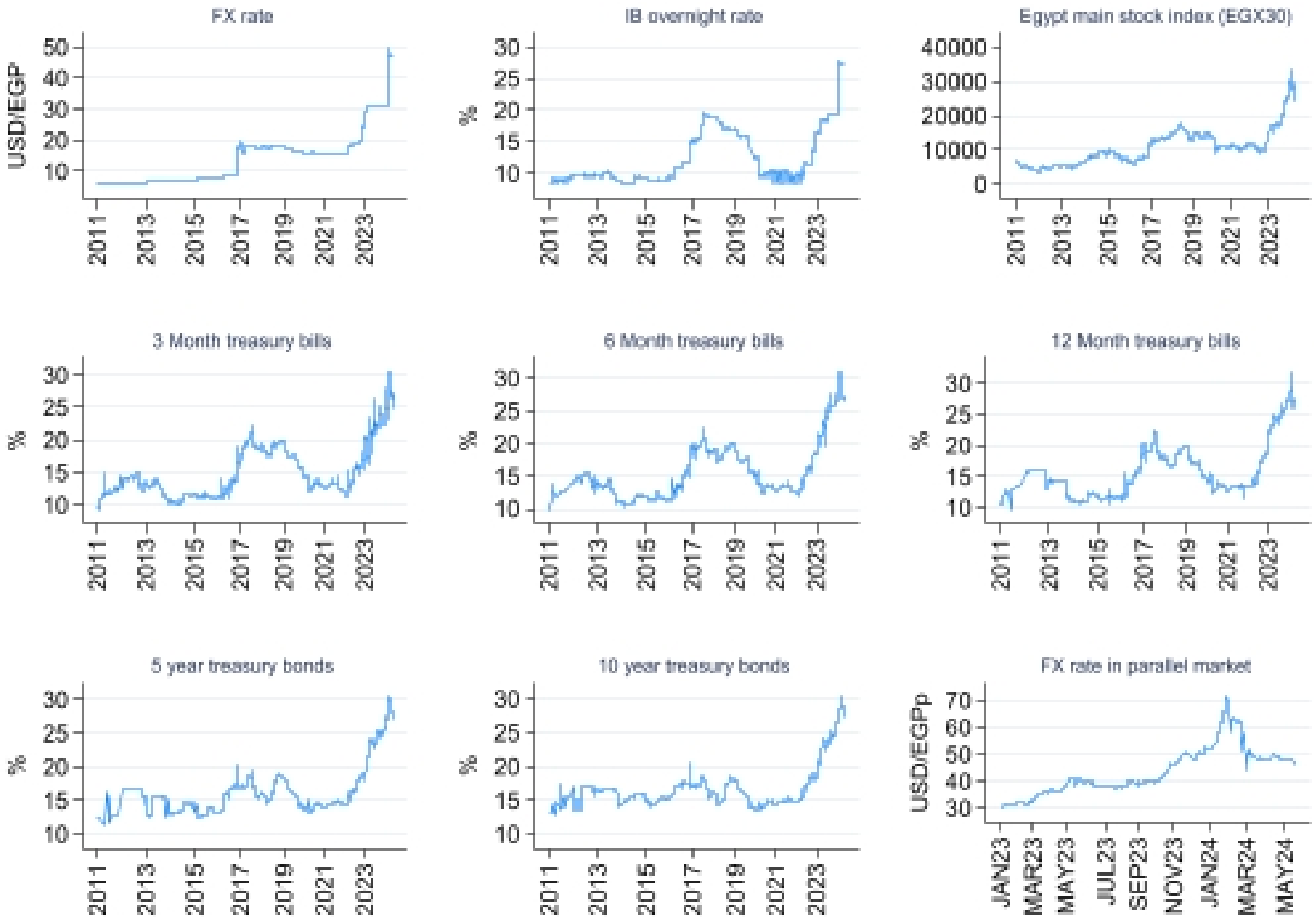

Figure A.1: Time series evolution of the variables

Source: The graphs are based on the data from the CBE and Investing.com.

Note: The X-axis is time for all the variables. The Y-axis is for the yields of treasury bills and bonds. The Y-axis is for the EGP of the EGX30 index. The Y-axis is for the exchange rate of EGP/USD for both official and parallel exchange rates.