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Abstract

This paper investigates the extent of monetary autonomy in Egypt amidst a history of active exchange rate management. First, we construct an Exchange Market Pressure (*emp*) statistic for 2005–2024 to quantify the magnitude of foreign exchange market disequilibrium and identify the policy tools used to absorb it. Second, we implement a three-dimensional Structural Vector Autoregression (SVAR) model to formally test monetary autonomy by assessing the impact of domestic monetary shocks on the exchange rate-adjusted differential between Egyptian and US interest rates on similar financial assets. Our findings reveal that of the three distinct episodes of heightened external accounts pressures (2008, 2011-2016, and 2021-2024), the latter (most recent episode) has been the most severe. The SVAR analysis confirms that while Egypt maintains a degree of monetary autonomy over the full sample, it is compromised by the policy mix that stabilizes the exchange rate amidst foreign capital outflows. The empirical findings show that monetary shocks explain a negligible portion of the variance in the exchange rate-adjusted interest rate differential, indicating that domestic monetary policy actions can only cause a minor "wedge" in the uncovered interest parity (UIP) condition. Breaking down the full dataset into sub-periods of interest also reveals interesting findings: Monetary autonomy has been generally stronger during the 2013–2018 transition, but was completely lost when the exchange rate was heavily managed during mid-2021–early-2024; a period characterized by the highest *emp* relative to previous similar episodes. Our results provide timely evidence on the constraints imposed by the macroeconomic policy mix in Egypt, particularly during the recent period of heightened volatility, and empirically demonstrate the trade-offs inherent in the macroeconomic policy trilemma.

Keywords: Monetary Autonomy, Exchange Market Pressure, Structural VAR, Macroeconomic Trilemma, Egypt.

JEL Classification : E44, E50, E6, F41

1. Introduction

Attempting to stabilize the exchange rate has historically characterized macroeconomic management in Egypt, even during episodes of capital outflows. How large and intense were the exchange market pressures during these episodes? And what has been the implications of pursuing a stabilized exchange rate for monetary autonomy[1] in Egypt? These questions invoke the "trilemma" which stipulates that "a country that has a fixed exchange rate and free capital mobility will have no autonomous monetary policy" (Mundell, 1963; Fleming, 1962).

The objective of this research paper is two-fold: (i) To quantify the exchange market pressure (*emp*)—a summary statistic that quantifies the disequilibrium in the foreign exchange (FX) market. The *emp* can be used to identify episodes where the exchange rate regime was "stabilized" despite rising pressures on external accounts; (ii) To empirically assess the degree of Egypt's monetary autonomy. That is, to gauge the ability of monetary policy to control domestic monetary variables, in light of the macroeconomic policy mix that involves *de facto* capital mobility and a stable exchange rate.

The contributions of this research paper include: (i) Quantifying *emp* using an extensive dataset for the past two decades (2005-2024) offers a gauge of FX market disequilibria, beyond just the level of the exchange rate during this extended period of study. *EMP* captures the combined movements in several key variables (including the nominal exchange rate, foreign reserves, and interest rates) used by the central bank to relieve the excess demand on foreign exchange, and thus provides a broader assessment when exchange rates are being actively stabilized despite mounting external pressures. (ii) Identifying Egypt's monetary autonomy clarifies how much control the central bank truly has over domestic monetary conditions amid *de facto* capital mobility and a stabilized exchange rate—together providing essential insights into whether monetary policy can effectively achieve its core goal of price stability under the prevailing policy mix.

To the authors' knowledge, there is no other work that assesses Egypt's monetary autonomy—especially for the most recent episode of heightened *emp* volatility in 2021–2024; making this analysis a timely and novel addition to the literature. This research can also contribute to the choice of policy mix in the future.

In terms of methodology, three different variants to estimate the *emp* are employed, and a Structural Vector Auto-regression (SVAR) model following Montiel and Pedroni (2018) is used to assess monetary autonomy. The SVAR is three-dimensional, with the following endogenous variables: A measure for domestic liquidity (M2); the exchange rate-adjusted differential between interest rates on Egyptian and US 3-month Treasury Bill (T-bill) rates; and the domestic lending rate for less than 3 months.

Our analysis yields several findings. The *emp* clearly delineates three periods of heightened external accounts pressures: the 2008 global financial crisis (albeit short-lived), the post-2011 political developments, and the 2021-2024 period of renewed external shocks that intersected with domestic structural challenges (including high public debt). The *emp* shows that FX market disequilibrium was highest during the most recent period (2021-2024). Our decomposition of the *emp* reveals that changes

[1] **The degree of monetary autonomy** refers to the extent to which monetary policy actions are capable of effectively steering domestic monetary aggregates independently from global financial market developments.

in foreign reserves have been the CBE's most consistently used tool, while the roles of the exchange rate and interest rate became more prominent following the 2016 exchange rate liberalization.

The SVAR impulse response functions (IRFs) and Forecast Error Variance Decomposition (FEVD) confirm that over the full dataset, Egypt has maintained a degree of monetary autonomy, but this autonomy is relatively weak. That is, monetary shocks are capable of influencing the interest rate differential (i.e., driving a "wedge" between the exchange rate-adjusted differential between domestic and foreign interest rates), as evidenced by a statistically significant IRF. However, the monetary shocks explain a negligible portion of the overall variance of the exchange rate-adjusted differential between domestic and foreign interest rates, as evidenced by the FEVD results. A deeper look into sub-periods reveals a more dynamic story: monetary autonomy was preserved during the transitional phase of 2013-2018 but was effectively non-existent during the heavily managed exchange rate regime period of 2021-2024 (prior to the March 2024 exchange rate liberalization). The bottom-line is that the autonomy of monetary policy in controlling domestic monetary aggregates (independently from global financial market developments) has been compromised due to the policy mix that seeks to stabilize the exchange rate amidst periods of heightened *emp* volatility.

The remainder of this paper is structured as follows. Section 2 provides a review of the relevant literature. Section 3 presents an analytical perspective of the exchange rate and monetary autonomy dynamics in Egypt. Section 4 describes the data and methodology used to construct the *emp* statistic and the SVAR model. Section 5 discusses the empirical results. Finally, Section 6 concludes with policy implications.

2. Literature Review and Relevance to Today's Monetary Policy Choices

This literature review proceeds in three steps. *First*, it lays out the macroeconomic trilemma as the paper's guiding theory and conceptual framework, clarifying the trade-offs that it imposes, the evolution of theoretical literature, and indicating its policy relevance till this day. *Second*, it covers the empirical literature on monetary autonomy, outlining VAR-based identification strategies, cross-country evidence on how exchange rate regimes have implications for monetary autonomy, and reviewing Egypt-specific studies that gauge autonomy and policy reactions, thereby motivating our periodized approach to Egypt's exchange rate management. *Third*, it introduces Exchange Market Pressure (*emp*) as a practical measurement tool—summarizing its computation across early and more recent formulas—and explains how *emp* is used to assess pressures on external accounts.

First, on the theoretical background of the trilemma and monetary autonomy: The macroeconomic trilemma (Mundell, 1963; Fleming, 1962) posits that policymakers can simultaneously achieve at most two of three objectives: capital mobility, exchange rate stability, and monetary autonomy. Under free capital mobility and a fixed exchange rate, domestic monetary expansion is offset by capital flows that alter the central bank balance sheet—higher domestic assets matched by reserve losses—without durable effects on money supply or nominal interest rates. Under this policy mix, domestic interest rates are influenced by external financial conditions rather than being under full control of the monetary authority. Conversely, with a floating exchange rate and open capital account, monetary autonomy is theoretically preserved, although greater exchange rate volatility can arise in response to monetary shocks (Dornbusch, 1976).

The policy relevance of the trilemma is underscored by crises in emerging markets that combined soft pegs with liberalized capital accounts—Mexico (1994), Thailand/Indonesia/Korea (1997), Russia (1998), Türkiye (2000)—as well as Argentina's currency board in the 1990s, where the erosion of monetary autonomy contributed to the 2000/2001 crisis (Aizenman and Glick, 2009). More recently, the 2018 taper tantrum and ongoing US Federal Reserve monetary easing highlight ongoing exchange rate and monetary policy spillovers to emerging markets, including Egypt, via capital flow dynamics.

Rey (2015) argues that the policy choice reduces to a dilemma (rather than a trilemma): global financial cycle forces—largely shaped by the "core" country's monetary stance (in particular, monetary policy actions by large benchmark economies, like the US)—transmit to financially open economies irrespective of the exchange rate regime, diminishing monetary autonomy even under floats (in small open economies, like most emerging markets). In this view, autonomy requires capital flow management or macroprudential tools; exchange rate flexibility alone is insufficient in the presence of unchecked cross-border capital flows. Montiel and Pedroni (2018) attempt to reconcile between Rey's dilemma and the classic trilemma. Montiel and Pedroni provide an explanation for how monetary autonomy may be affected even under flexible exchange rate regimes: They show that a lower degree of monetary autonomy might be a conscious "choice" by small open economies. That is because these countries may want to avoid large exchange rate fluctuations which directly follows from the larger degree of capital mobility. In their words, Montiel and Pedroni say that "restricted monetary autonomy under floating exchange rate is not mandated by higher financial integration [and cross-border capital mobility], but rather a "choice" that becomes more attractive, especially when exchange rate volatility is perceived as especially harmful." Similarly, Shambaugh (2003) argues that for a small open country to pursue active/potent monetary policy, it means that this country is "willing to accept exchange rate fluctuations" as well.

Second, on the empirical approaches to measuring monetary autonomy: Monetary autonomy is commonly assessed with VARs that model the joint behavior of domestic monetary aggregates (M0, M1, M2, or domestic credit) and domestic interest rates, sometimes augmented with exchange rate variables. The core test asks whether domestic interest rates respond to shocks in domestic monetary aggregates after accounting for external conditions. If interest rates are insulated from global markets (i.e., capital mobility is limited), domestic monetary shocks transmit to domestic rates, indicating autonomy (Montiel, 1994; OST, 2005). *De facto* autonomy is summarized via impulse responses: the magnitude of the response of domestic rates to monetary shocks provides an estimate of the "strength" of autonomy.

Regarding cross-country evidence, Montiel and Pedroni (2018) estimate a three-variable structural VAR—exchange-rate-adjusted differential between domestic and foreign 3-month T-bill rates, domestic short-term lending rate, and a monetary aggregate. *De facto* financial integration is proxied by the impulse response of the interest differential to monetary shocks; *de facto* autonomy by the lending-rate response. They find that greater capital mobility is associated with smaller monetary autonomy. Pantelopoulos (2021) examines monetary independence across managed regimes using a large panel. Monetary autonomy is heterogeneous across non-floating regimes: band-based or crawling pegs retain significantly more independence than rigid conventional pegs. The paper concludes that *de jure* regime labels often mask *de facto* implementation, supporting periodization strategies like the one we conduct for Egypt in this research paper, where shifts between rigid and flexible management should have consequences for changes in the degree of monetary autonomy.

As for relevant previous studies on Egypt, Alnashar (2015) applies Granger-causality tests and finds that changes in domestic liquidity (M2) Granger-cause changes in the exchange-rate-adjusted differential between Egyptian and U.S. 3-month T-bill rates during January 2000–December 2011, including July 2004–June 2008, consistent with monetary autonomy over the sample. Kamaly and Erbil (2000) estimate a VAR on January 1991–March 2000 with four lags and three endogenous variables: EMP (their constructed measure), the change in domestic credit (scaled by base money), and the interest rate differential (domestic minus international). Two exogenous variables—deviation from PPP and international inflation—are included. Their EMP aims to jointly capture reserve holdings (scaled by base money) and the nominal exchange rate to measure exchange rate pressure. Domestic credit is the monetary policy instrument; the interest rate differential proxies the autonomous domestic stance. They argue the differential is better suited for assessing independence. In the EMP equation, large coefficients on domestic credit and the interest rate differential are interpreted as "low monetary autonomy," on the grounds that achieving objectives requires large instrument changes. They also document authorities' focus on exchange rate stability via frequent reserve adjustments, "consequently losing monetary autonomy."

Third, on computing emp: *EMP* measures the total pressure on a currency that can be absorbed via exchange rate changes, reserve interventions, or interest rate adjustments. Early formulations (Girton and Roper) aggregate exchange rate depreciation and reserve losses; later variants incorporate interest rate changes/differentials and standardize components by their volatilities. Model-independent applications typically compute *emp* as a weighted average of exchange rate changes, reserve changes, and interest rate changes, with weights set by sample standard deviations to prevent dominance by more volatile components. *EMP* is used to assess pressure in managed/fixed regimes and to classify episodes.

3. Analysis of Relevant Historical Trends in Egypt's Exchange Rate Management and Monetary Autonomy in Light of Capital Mobility

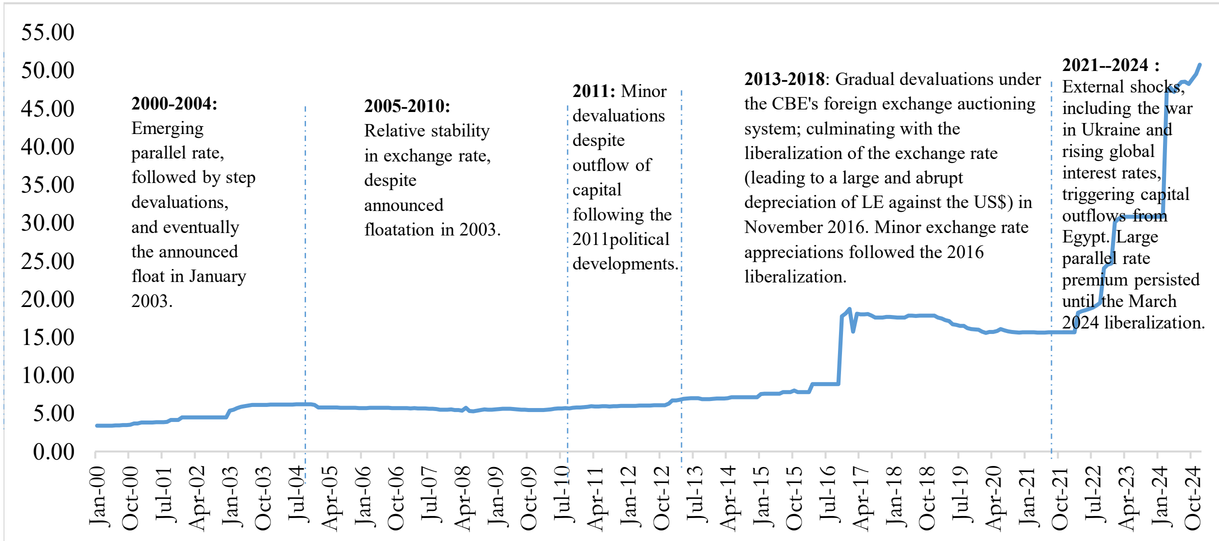
A central element in understanding the scope and limitations of monetary autonomy in Egypt is the evolution of the country's exchange rate policy in light of capital mobility. In this section, we present analysis to obtain initial assessments of the degree of monetary autonomy, prior to running the empirical investigation. The main message from this section is that monetary autonomy was weakened during episodes of stabilizing the exchange rate in the face of mounting pressures.

The country's recent history is marked by a series of shifts between pegs, controlled devaluations, and then decisions to liberalize (float) the currency, often in response to accumulating external pressures.[2] Figure 1 provides a visual narrative of the nominal exchange rate's (EGP/USD) journey since 2000. The figure demonstrates a recurring pattern: extended periods of exchange rate stability; where the exchange rate is not allowed to act as a shock absorber, eventually leading to the build-up of pressures that are ultimately released in a large and abrupt exchange rate depreciation. This historical overview reveals that despite announcements of a flexible regime, Egypt's exchange rate policy has, in the past, reverted to heavy management. This initial analytical observation is later confirmed by computing the *emp* statistic. For the purpose of this research paper which uses the "trilemma" as the conceptual framework, it is important to highlight that Egypt's attempts to stabilize the exchange rate were done in the context of a relatively large degree of capital mobility. Figure 2

[2] Literature has confirmed that previous floats have been short-lived. See for instance, Al-Mashat and Billmeier (2008).

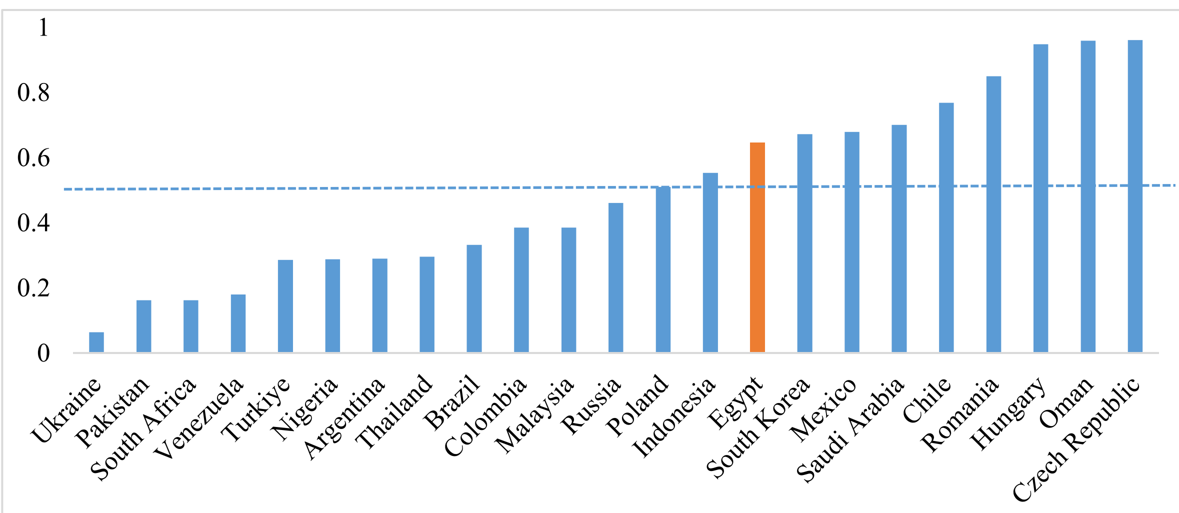
shows that Egypt has enjoyed a higher degree of capital openness, compared to the emerging markets' sample average (the average is given by the dashed horizontal line in figure 2).

Figure 1: Evolution of the EGP/USD Nominal Exchange Rate (2000-2024)



Source: Authors' compilation based on the CBE data and the IMF International Financial Statistics.

Figure 2: Chinn-Ito Index: A Comparison with Emerging Markets *(2000-2022, period average)*



Source: Authors' calculations based on the Chinn-Ito Index- A *De Jure* Measure of Financial Openness.

In order to initially assess the implications of this policy mix (featuring a relatively stabilized exchange rate whilst maintaining a relatively large degree of capital mobility) for monetary autonomy, we compute the correlation coefficient between the interest rate on Egyptian Treasury Bills and its US counterpart. That is, to gauge the extent to which domestic interest rates follow developments in similar financial assets in the benchmark economy; a key indicator of weak monetary autonomy. The correlation coefficient generally rises during periods when the exchange rate was heavily managed. For instance, the correlation coefficient averages[3] 0.8 at the beginning of the sample (2000-early 2003), prior to the January 2003 exchange rate floatation. And while the correlation declined sharply after the floatation, it picked up again around 2008 with the global financial crisis (when the exchange rate was heavily managed in the face of the external pressures). Similarly, towards the end of the dataset, the correlation coefficient increased to reach 0.9 since mid-2021 till early 2024, prior to the March 2024 exchange rate liberalization. This strong correlation coefficient is held as initial evidence that domestic monetary aggregates follow developments in the global financial markets, rather than respond to domestic monetary policy actions; an important sign of loss of monetary autonomy.

4. Methodology

This section is broken down into two parts: the first covers the methodologies employed to compute the *emp* statistic, and the second to cover the empirical technique used to run the SVAR to empirically assess monetary autonomy.

Exchange Market Pressure

Three variants of the *emp*[4] are considered:

(1) In its simplest form, the emp measure is the sum of exchange rate movements and changes in foreign reserves, with the latter acting as a proxy for direct central bank interventions in the foreign exchange markets:

$$emp = e - r \tag{1}$$

where e and r are changes in the exchange rate[5] and foreign reserves, respectively. Thus, when the domestic currency depreciates ($e > 0$) and/or the central bank intervenes by selling foreign assets ($r < 0$), then there is positive market pressure on the currency and $emp > 0$. Conversely, when the domestic currency appreciates ($e < 0$) and/or the central bank acquires foreign assets ($r > 0$), then $emp < 0$, denoting negative market pressure on the currency.

Further, the emp measure is valid for the range of exchange rate regimes. In a perfectly fixed regime, where $e = 0$, the emp is completely determined by foreign exchange interventions, r. On the other hand, in the case of a pure float, $r = 0$ and the emp measure is completely determined by currency movements, e. For exchange rates that are managed or that float within a band, the emp is determined by a combination of e and r.

(2) Girton and Roper (1977) derives an emp measure based on a monetary model arriving at

$$emp = e - r' \tag{2}$$

[3] The correlation coefficient was estimated for a rolling 24-month window over the full sample where data are available (2000-2024). The average was then computed for the periods that preceded a drastic exchange rate liberalization.
[4] Data specification is included in the appendix
[5] The exchange rate is domestic currency per unit of foreign currency.

where r' is the change in foreign reserves valued in domestic currency and deflated by a one-period lag of the monetary base.

(3) Subsequent work introduced monetary policy into the equation to account for indirect foreign exchange interventions:[6]

$$emp = e - r + i \tag{3}$$

where i is the change in the interest rate (or the monetary policy measure). In this case, positive pressure on the currency would be manifested by a combination of exchange rate depreciation, reduction in the foreign reserves, and an interest rate hike in defense of the exchange rate.

Monetary Autonomy

A Structural Vector-Autoregression (SVAR) model is run in order to assess the degree of monetary autonomy. Specifically, we are interested in assessing the ability of the central bank to cause "autonomous" changes in the short-term[7] domestic interest rates. For these changes in domestic interest rates to be considered "autonomous", they need to deviate from those of the benchmark economy (the U.S., in our case).

The test of monetary autonomy thus assesses whether monetary policy actions are capable of creating "deviations in the uncovered interest parity (UIP) condition". In other words, we would like to know whether the CBE can drive a "wedge" between Egyptian and U.S. interest rates.

Therefore, the empirical investigation is concerned with the impact of the central bank's actions (through domestic liquidity management) on the exchange rate-adjusted differential between domestic and foreign interest rates. This provides an assessment of the capability of the central bank to create an "autonomous" change in the domestic interest rate (i.e., effect changes in the domestic interest rate independently from developments in the benchmark economy).

This investigation into Egypt's monetary autonomy is done using a SVAR. The SVAR methodology allows us to model the joint behavior of the variables of interest, namely: the "domestic liquidity", along with the "exchange rate-adjusted differential between domestic and foreign interest rates" and the "lending rate". It is worth noting that all variables of interest in this model were found to be I(1), using the Augmented Dickey-Fuller Unit Root test. Initially, the Johansen test of cointegration was run in order to check whether a long-run equilibrium relationship exists amongst the variables. However, based on this test, the adopted methodology was thus a SVAR, since no long-run relationship was detected. The choice of this methodology is motivated by its rigor, compared to

[6] Waymark (1997) includes domestic credit to account for monetary policy. Tanner (2002) constructs the *emp* from three elements, namely a nominal money supply element, a real money demand element, and a residual term that includes changes in both the bilateral real exchange rate and foreign (U.S.) inflation. Eichengreen *et al.* (1996) present an *emp* index consisting of the change in the exchange rate, change in short term interest rate differential (vis-à-vis an anchor country) and change in the foreign reserve.

[7] By short-term, we mean 'less than one year'.

a reduced-form VAR: In the SVAR, the long-run[8] behavior of the endogenous variables of the system towards the "identified shocks" is underpinned by economic relationships.[9]

The SVAR model specification, including the choice of variables and structural shocks adopted henceforth, draws on Montiel and Pedroni (2018). The SVAR here is three-dimensional, as it includes the following endogenous variables, in this ordering: (i) domestic liquidity (M2), (ii) the exchange rate-adjusted differential between interest rates on domestic and foreign financial assets (3-month T-bill rates), and (iii) the domestic lending rate (for less than 3 months).

The SVAR Notation

The SVAR can be expressed as follows in polynomial matrix form:

$$\Delta Z_t = A(L)\varepsilon_t \tag{4}$$

Where $\boldsymbol{Z_t}$ is a two-dimensional vector of the endogenous variables included in the model (Log_M2, Exchange rate-adjusted EGY-U.S. 3-month T-bill rate differential). These endogenous variables are inserted in the model in their first differences in order to render the variables stationary (which explains the 'Δ' in equation above).

A(L) is a matrix polynomial of structural moving average coefficients, and **L** is the polynomial lag operator. $\boldsymbol{\varepsilon_t}$ is a vector of uncorrelated structural shocks that have unit variances and zero covariances. **A(0)** gives the contemporaneous effect of ε on X. And **A(1)** gives the long-run impact of ε on X.

The vector $\boldsymbol{\varepsilon_t}$ includes the following three shocks: (i) a nominal (monetary) shock $\varepsilon_{1,t}$, and (ii) A "deviations from UIP" shock that captures the shocks that causes permanent changes to the exchange rate-adjusted differential (such as a "risk premium shock") $\varepsilon_{2,t}$.

The SVAR Identification and Estimation

The SVAR is estimated using monthly data, for the full sample period (2000M1—2024M12). The same model is also run for two sub-periods: (Sub-period 1: 2013M1—2018M12; Sub-period 2: 2021M7—2024M2), using 1 lags for the full sample, as well as the first and second Sub-periods.

The procedures consist of ***first*** running the reduced-form VAR, ***and then*** imposing long-run assumptions to fully identify the SVAR.[10] The reduced form VAR is given by equation 5 below:

$$R(L)\Delta z_t = \mu_t \tag{5}$$

[8] In this paper, the SVAR is identified using long-run restrictions on the behavior of the endogenous variables in response to the structural shocks. The SVAR identification may alternatively be done by imposing *short-run* restrictions. These restrictions (whether for the short- or long-run) are generally drawn from economic theory. SVARs with short-run restrictions are straight-forward to interpret, as it imposes restrictions on the contemporaneous response of the variables (on impact). However, Pedroni (2010) argues that these economic relationships (upon which the restrictions are based) may be more likely to hold in the long-run.

[9] That is to say that, the shocks in the SVAR system are "identified", in the sense that they are shocks that have an economic interpretation (for example, a monetary (nominal) shock, a real (demand-side) shock, a risk premium shock, etc.). On the other hand, the reduced-form VAR can be considered rather mechanical, as no theoretical basis supports the analysis.

[10] For simplicity, we drop the constant term in the derivation of the SVAR model here.

The coefficients of the VAR in matrix $R(L)$ above are then inverted to obtain the vector moving average (VMA) coefficients $F(L)$:

$$\Delta z_t = F(L)\mu_t \tag{6}$$

Where $F(L) = R(L)^{-1}$.

The variance-covariance matrix (Ω_μ) of the VAR in equation 6 above, is important as it is later utilized to obtain the structural matrix of contemporaneous responses (A(0), mentioned in the previous section).

Our ultimate goal is to estimate the structural VAR, expressed in equation 5 above [that is, $\Delta z_t = A(L)\varepsilon_t$]. We then set L=1, which gives us A(1); the matrix of long-run impulse responses.

5. Empirical Findings

The empirical results are presented for the Exchange Market Pressure statistic, and then for the SVAR to assess monetary autonomy.

Exchange Market Pressure

An analysis of the Exchange Market Pressure (*emp*) variants reveals several key findings regarding the Egyptian currency vis-à-vis the US dollar. The plots presented in Figures 3.a through 3.c clearly indicate that the currency experienced notable positive exchange market pressure during three distinct periods: in 2008 amid the global financial crisis, the period around the 2016 exchange rate liberalization episode that followed Balance of Payments (BoP) pressures, and again starting in mid-2021 following renewed BoP pressures as domestic structural challenges intersected with key adverse external shocks, notably spillovers from the war in Ukraine and the wave of monetary tightening in advanced economies. These episodes are identifiable in the plots, not only by the elevation of spikes in the data but also by their high frequency within a short timeframe, suggesting that the density of these spikes is as significant as their magnitude.

When comparing the intensity of these episodes, the data show that the exchange market pressure was most pronounced in the most recent period since mid-2021. The pressure observed in 2016 was significant but less intense than the 2021 period. This pattern is rendered with particular clarity in Figure 3.c, which corresponds to Equation 3.

Figure 3: Plotted EMP Variants

Figure 3.a: The simplest *emp* measure per eq 1.

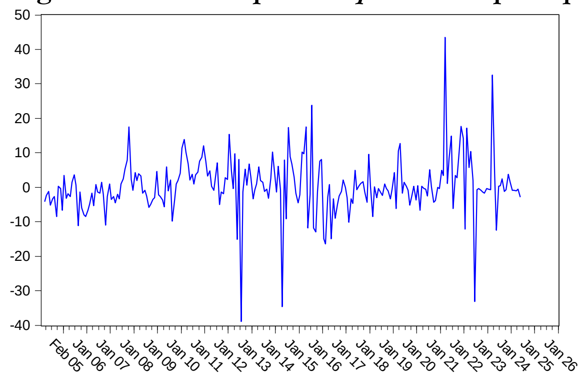


Figure 3.b: Girton and Roper (1977) *emp* per eq 2.

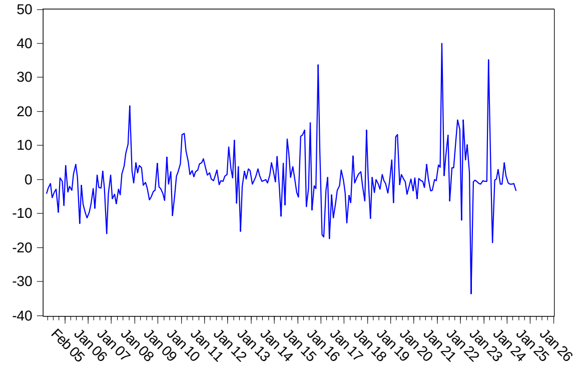
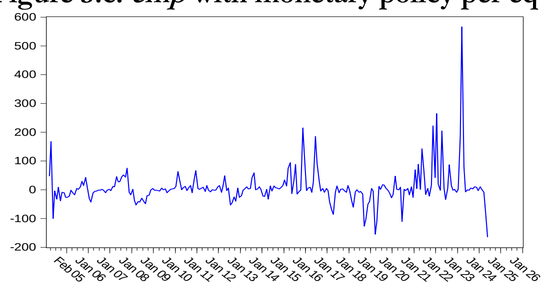


Figure 3.c: *emp* with monetary policy per eq 3.



This is held as evidence that the exchange rate has been closely managed, especially during the most recent episode (mid-2021-early-2024) prior to the March 2024 liberalization of the exchange rate. Next, we present the results of the monetary autonomy test during the full sample period, as well as during the sub-periods of interest.

Monetary Autonomy

Using the impulse response functions and the forecast error variance decompositions generated from the SVAR,[11] the main finding is that monetary autonomy is preserved for the full sample period (2000-2024), but found to be relatively weak. The 2 sub-periods of interest are also presented to contrast episodes of relative flexibility in the exchange rate versus a more closely managed exchange rate regime, with the latter showing complete loss of monetary autonomy.

For the full dataset (2000-2024), the empirical results point to some degree of monetary autonomy. The accumulated impulse response function (IRF) to the monetary shock of the exchange rate-adjusted differential between Egyptian and US T-Bill rates is statistically significant for the majority of the 10-period forecast horizon, as indicated by the confidence bands remaining largely above zero. This confirms that a monetary policy shock has a statistically significant, discernible, and persistent effect on the exchange rate-adjusted differential between interest rates on Egyptian and US

[11] In this version of the research paper, we focus only on the impulse response functions to the monetary shock of the "exchange rate-adjusted differential between the Egyptian and US T-Bill rates". However, in the next version of this paper, other IRFs will be considered: For instance, the impact of deviations (or shocks) in this exchange rate-adjusted differential between domestic and foreign T-Bill rates on other short-term domestic interest rates (such as the lending rate) will be investigated. That is, to shed light on the "signaling" power of the autonomous monetary policy changes to other domestic monetary aggregates.

T-Bill. In other words, monetary authorities' actions are capable of creating a wedge in the UIP condition. As such, monetary policy autonomy is preserved for the full sample period.

However, the magnitude of this response is relatively small. The accumulated response barely reaches 0.4 units after 10 periods, suggesting a muted impact of monetary policy actions on the exchange rate-adjusted differential between interest rates on Egyptian and US T-Bill. This finding points towards a limited degree of monetary autonomy. This initial conclusion is further substantiated by the variance decomposition analysis (presented below), which confirms that monetary shocks account for only a small fraction of the exchange rate-adjusted differential between interest rates on Egyptian and US T-Bill's forecast error variance.

For sub-period 1 (2013-2018), as shown in Figure 4.b, the empirical results point to preserved monetary autonomy. While it is still found to be weak, monetary autonomy during this sub-period was slightly stronger than that of the full data set. The IRF is statistically significant throughout the full IRF horizon, and demonstrates a more pronounced reaction compared to the full sample. The accumulated impulse response of the exchange rate-adjusted differential between interest rates on Egyptian and US T-Bill to the monetary shock is slightly higher for the period 2013-2018 (approximately reaching 0.5 units), indicating relatively stronger monetary autonomy. This suggests that the gradual devaluations and eventually the November 2016 exchange rate liberalization, followed by relative flexibility in the exchange rate management thereafter, have contributed to the preservation of a higher degree of monetary autonomy. The FEVD also confirms this finding, as evidenced by a larger contribution of the monetary shock to the variance of the exchange rate-adjusted differential between Egyptian and US T-bill rates (as presented and discussed below).

For sub-period 2 (2021M07-2024M02), as depicted in Figure 4.c, the empirical results point to loss of monetary autonomy; in contrast to sub-period 1 and to the full dataset. The accumulated IRF generated from the SVAR run for sub-period 2 is statistically insignificant throughout the entire horizon, as the confidence intervals consistently include zero. This implies that during this recent period, monetary policy shocks had no statistically significant, discernible impact on the exchange rate-adjusted differential between Egyptian and US T-Bill rates. This is supported by the results of the FEVD presented below. They are also consistent with the finding of the previous analysis (in Section 3 above) which found a very high correlation coefficient (0.9) between domestic and foreign interest rates.

The finding of "loss of monetary autonomy" during sub-period 2 (2021M07-2024M02) is explained by the fact that this period had witnessed the highest level of pressures on external accounts, as captured by the *emp* statistic results discussed earlier in the same section. The movements in the nominal exchange rate have not been sufficient to stem these pressures.

In summary, the effectiveness of monetary policy to drive a wedge in the UIP condition (i.e., the ability of monetary policy to induce independent changes in domestic monetary aggregates) has varied significantly with the prevailing exchange rate policy regime. For the full period of study (2000-2024), monetary autonomy is preserved but relatively weak. Breaking down the data into sub-periods of interest shows that introducing a degree of flexibility in the exchange rate regime enhances the extent of monetary autonomy, whereas fixing the exchange rate in the face of rising *emp* bears the consequence of loss of monetary autonomy.

Figure 4: Accumulated Impulse Response of the Exchange Rate-Adjusted Differential between Interest Rates on Egyptian and US T-Bill to Monetary Shock

Figure 4.a: Full sample (2000-2024)

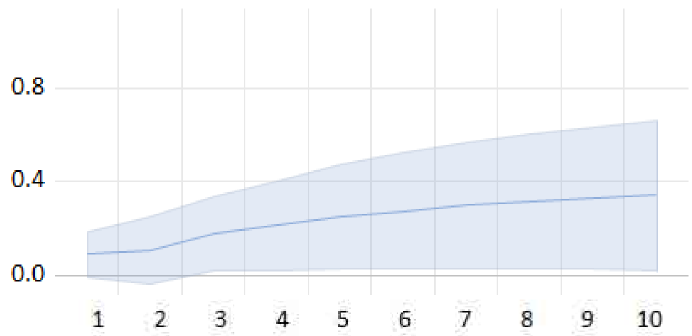


Figure 4.b: Sub-period 1 (2013-2018)

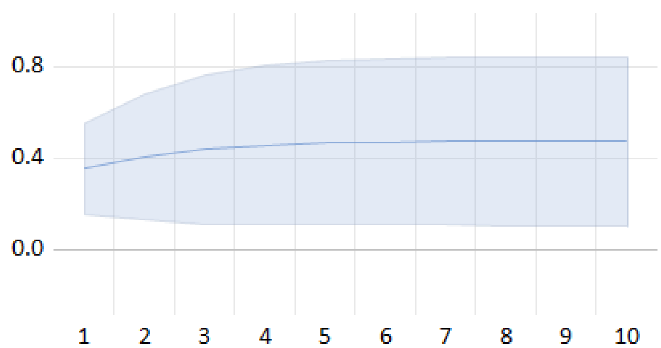
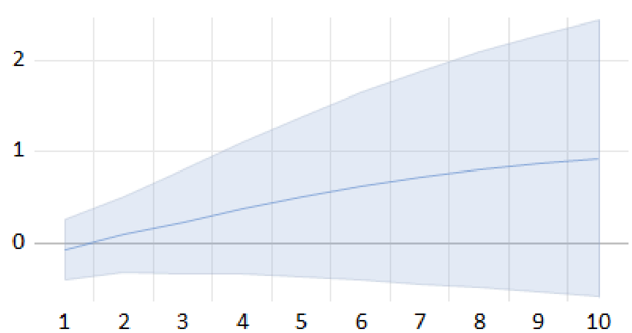


Figure 4.c: Sub-period 2 (2021:07-2024:02)



The SVAR Variance Decomposition

The SVAR impulse response analysis is complemented with the **forecast error variance decomposition**. This helps us *quantify* the contribution of the structural monetary shock to the observed variability of the data (Kilian, 2011). In other words, the variance decomposition gives the relative importance of each structural shock as a contributor to the variability of the exchange rate-adjusted differential between Egyptian and US T-Bill rates (our variable of interest in the SVAR).

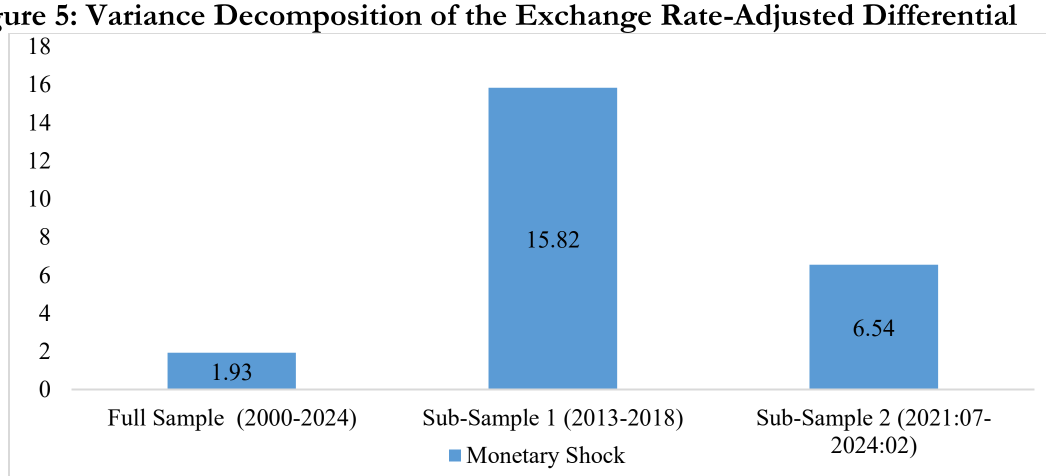
For the full dataset (2000-2024), the relative contribution of the monetary policy shock to the variance of the exchange rate-adjusted differential between the Egyptian and US T-Bill rates is a mere **1.93%** (Figure 5). This remarkably low figure provides supporting evidence of weak monetary autonomy. It suggests that most of the variability in the exchange rate-adjusted differential stemmed from global financial market conditions, rather than discretionary domestic monetary policy actions. This aligns with the Egyptian economic context, which has been characterized by a heavily managed exchange rate for significant portions of this period, thereby constraining the central bank's ability to independently target domestic objectives.

For sub-period 1 (2013-2018), the relative contribution of monetary shocks to variance of the exchange rate-adjusted differential between Egyptian and US T-Bill rates surged to **15.82%**. This period witnessed relative movement in the exchange rate in response to *emp*. It began with the introduction of FX auctioning system and periodic devaluations and culminated in the landmark decision to float the Egyptian pound in November 2016.

The high contribution of monetary policy is consistent with a central bank actively using its tools to navigate this transition. In the lead-up to and immediate aftermath of the floatation, monetary policy (particularly aggressive interest rate hikes) was a primary instrument used to manage the currency's depreciation, attract capital inflows, and anchor inflation expectations. In this context, monetary policy signals were relatively more pronounced.

For sub-period 2 (2021M07-2024M02), the relative contribution of monetary shocks to variance of the exchange rate-adjusted differential between Egyptian and US T-Bill rates fell once again to **6.54%**. This finding is consistent with the statistically insignificant IRF during this sub-period, and the economic reality of the time.

Figure 5: Variance Decomposition of the Exchange Rate-Adjusted Differential



6. Conclusion

This paper set out to investigate exchange market pressures, and the degree of monetary autonomy in Egypt. By constructing an Exchange Market Pressure (*emp*) statistic and employing a Structural Vector Autoregression (SVAR) model—we have provided a nuanced and dynamic assessment of the constraints facing the Central Bank of Egypt (CBE) as stipulated by the macroeconomic trilemma over the past 25 years.

The *emp* statistic shows that the Egyptian foreign exchange market has been subject to recurrent and intensifying periods of distress. The episodes of 2008, post-2011, and post-2021 are clearly delineated, with the most recent episode being the most severe in magnitude. A key finding from the *emp* decomposition is the CBE's evolving reaction function. While intervention through foreign reserves has been a consistent and primary tool, the period following the November 2016 liberalization saw a significant increase in the use of both the exchange rate and interest rates as policy instruments, although the nominal exchange rate adjustments were delayed and insufficient prior to the eventual liberalization of the exchange rate in March 2024.

For monetary autonomy tests, over the full 2000-2024 sample, we find evidence of weak monetary autonomy. While monetary policy actions can practically drive a wedge between domestic and U.S. interest rates (adjusted for the expected exchange rate movements), this impact is relatively small in magnitude; indicating the attempts to stabilize the exchange rate amidst capital mobility challenge the effectiveness and independence of monetary policy.

The findings of this research carry significant policy implications. The recurring cycle of prolonged exchange rate stability followed by sharp and large depreciations suggests that Egypt's "fear of floating" (Reinhart and Calvo, 2002) has been a costly strategy. By resisting gradual, market-driven adjustments, policymakers allow imbalances to accumulate, ultimately leading to more painful corrections that disrupt economic activity. This pattern underscores the difficulty of achieving macroeconomic stability without the role of the exchange rate as a shock absorber.

Further research is needed to help link this analysis to the root causes of Egypt’s exposure to external shocks. Most notably, the country’s fiscal stance and institutional (governance) challenges stand out as key drivers of the sudden and large-scale capital outflows during downturns, which in turn, cause the heightened exchange market pressure and require strong exchange rate adjustments. Addressing these root causes and linking them to the analysis conducted in this research paper all lend themselves to promising future research areas; altogether needed for a more stable and resilient macroeconomic environment in Egypt.

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Appendix 1: *EMP Data Specifications*

Nomenclature	Description	Source	Comments/Treatment
E^o	Official exchange rate (LE/US$)	MoF, CBE, WB (GEM)*	
E^p	Parallel exchange rate (LE/US$)	WB	A parallel market emerged between April 2013-January 2017, and between February 2022-May 2023. WB staff calculations based on (i) Commercial International Bank (CIB) - Egypt stock price domestically as compiled from Mubasher and (ii) CIB - Egypt stock price abroad as compiled from Yahoo Finance
E	Market exchange rate (LE/US$)		$E = \begin{cases} E^p, \ Apr13 - Jan17;\ Feb\ 22 - Feb\ 24 \\ E^o, \ all\ other\ times \end{cases}$
R^o	Official reserve assets (US$ mn)	CBE	Foreign currency reserves + IMF reserve position + SDRs + Gold + Other reserve assets
R^h	Other foreign currency assets (US$ mn)	CBE	Foreign securities, deposits and loans not included in official reserve assets
R	Total reserves (US$ mn)		$R = R^o + R^h$
M^0	The monetary base (EGP mn)	CBE	
R'	Total reserves deflated by the monetary base		$R' = \frac{R_t}{\frac{M^0_{t-1}}{E_{t-1}}}$
I	Overnight interbank rate (percent annum)	MoF	
EMBI Spread	Egypt Emerging Market Bond Index	JP Morgan	

* MoF is the Ministry of Finance, CBE is the Central Bank of Egypt, WB is the World Bank and GEM is the Global Economic Monitor publication by the World Bank.

The correlation matrix for E, R', I, $EMBIG$

Table A1. The correlation matrix $\boldsymbol{E}$, $\boldsymbol{R}$ *and* $\boldsymbol{I}$

	E_t	R'_t	I_t	$EMBI_t$
E_t	1	0.61	0.90	0.55
R'_t	0.61	1	0.60	0.19
I_t	0.90	0.60	1	0.32
$EMBIG_t$	0.55	0.19	0.32	1

Table A1 presents the correlation matrix for: E, R'_t, I_t, and the $EMBI_t$ spread. The correlation coefficients (CCs) are low to high in magnitudes with the expected signs, except for those involving R'. Movements in the exchange rate and the overnight interest rates are positively and highly correlated, as EMBI spreads moderately capture exchange rate pressures. Meanwhile, deflated FX reserves perversely rise with exchange rate depreciations.

Taking the monthly changes E, R'_t and I_t, which we denote in lower case

Table A2. The correlation matrix $\boldsymbol{e_t}$, $\boldsymbol{r_t}$, $\boldsymbol{i_t}$, *and the EMBI spread*

	e_t	r'_t	i_t	$EMBI_t$
e_t	1	0.12	0.50	0.05
r'_t	0.12	1	0.21	-0.06
i_t	0.50	0.21	1	0.13
$EMBIG$	0.05	-0.06	0.13	1

Notes: *e is m-o-m %⊿ in the market exchange rate, r' is m-o-m ⊿ in total reserves deflated by the monetary base, i is m-o-m ⊿ in levels for the overnight interbank rate and EMBI is Emerging Markets Bond Index.*

A depreciation in the currency is moderately correlated with interest rate increases, with the latter only weakly correlated with widening spreads. Meanwhile, even though the correlation coefficients for the EMBI spreads vis-à-vis each of exchange rate movements and changes in deflated reserves have the expected signs, the magnitudes are very small.