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## The impact of certain monetary variables on inflation rates: A comparative econometric study (Turkey-Egypt)

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### Abstract

The research aims to study monetary policy, represented by its quantitative tools, and its role in addressing inflation through the impact of certain monetary variables on the inflation issue faced by Turkey and Egypt. The research is based on the hypothesis that the expansion of the money supply has negative effects on economic performance. The study adopted the inductive method, which starts with particulars to reach general conclusions, using analytical and econometric methods to validate the hypothesis. The research concluded that the narrow money supply variable is the most influential on inflation in both countries, with the elasticity coefficient reaching 0.43 in Turkey and 0.303 in Egypt. The study confirmed that monetary policy tools in Turkey have a greater impact on inflation rates compared to Egypt, despite the significance of both models.

**Keyword:** Money supply, interest rate, exchange rate, consumer price index

### Introduction

The phenomenon of inflation has become global since World War II, particularly when the United States announced the devaluation of the dollar, which impacted global price levels in general. Consequently, inflation has become one of the most significant macroeconomic issues. Attention to this phenomenon increased markedly as inflation rates rose significantly, making it difficult to control and prompting the adoption of contractionary monetary policy implemented by central banks to address inflation. The sample countries suffer from inflation due to both domestic and imported causes, which negatively affect the economy by redistributing income in favor of advanced (monopolizing) countries. Therefore, monetary policy seeks to maintain acceptable inflation rates through the use of its quantitative tools. Keynes emphasized the necessity of accepting a certain level of inflation to achieve full employment, while monetarists assert that inflation is a monetary phenomenon and that monetary causes are behind the continuous rise in price levels. Hence, monetary policy should focus on aspects of excessive money supply, particularly the budget deficit of the state.

### Research Importance

The importance of the research lies in addressing inflation by selecting the optimal monetary policy, despite the reliance of the International Monetary Fund and the World Bank on reforms focused on curbing public expenditure in the sample countries.

### Research Problem

The sample countries are experiencing significant waves of inflation due to various reasons, the most important of which are related to their economic structure, making them more vulnerable to inflationary pressures compared to developed countries.

### Research Objective

The research aims to study monetary policy, represented by its quantitative tools, and its role in addressing inflation through the impact of certain monetary variables on the inflation problem faced by the countries under study.

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### Research Hypothesis

The research is based on the hypothesis that the expansion of the money supply in (Turkey and Egypt) has negative effects on economic performance.

### Research Methodology

The research relies on the inductive method, which begins with specific observations and ends with generalizable conclusions. It employs both analytical and econometric approaches to validate the hypothesis from which the study originated.

### Section One: The Role of Monetary Policy in Stabilization:

The belief in the effectiveness of monetary policy surpassed that of other economic policies, particularly prior to the Great Depression of 1929-1933, in achieving economic stability. The effectiveness of monetary policy lies in how it influences spending decisions across all sectors of the economy through its quantitative tools, as central bank policy primarily impacts the overall cost of credit (Mishkin, 2022, p. 47) <sup>[1]</sup>. This is evident in spending that is financed through borrowing from banks, which depends on monetary policy tools that reduce banks' ability to provide loans due to rising interest rates and falling stock prices. These factors affect the volume of spending that mainly relies on short- and medium-term loans provided by commercial banks, whose liquidity declines due to higher reserve requirements and an increase in the discount rate imposed on commercial banks (Romar, 2001, p. 22) <sup>[2]</sup>.

Commercial banks can continue expanding their lending by selling assets held as secondary reserves; however, the decline in asset prices and the rise in interest rates encourage commercial banks to retain their assets. The drop in the market value of the banks' investment portfolios affects their liquidity, making them hesitant due to reduced liquidity (Eduardo & Bernado, 2007, p. 3).

The New Keynesians affirm that changes in interest rates are the decisive factor in investment decisions related to the production of capital goods. They believe that changes in bank reserves and the money supply are influenced by fluctuations in interest rates. Despite differing views, all factors affect spending, prices, and income, regardless of the manner in which monetary policy exerts its influence whether through saving policy, lending policy, borrowing policy, or all of these combined. The immediate result of monetary policy is a reduction in the level of spending, and consequently, resistance to inflationary pressures (Tom & Ajina, 2021, p. 14).

Monetary policy can control the volume of money but not its velocity. Recently, there has been a shift in monetary policy thinking, where it was previously believed that low interest rates lead to higher investment. However, current reality shows that the more elastic the demand for money is in relation to the interest rate, the less effective monetary policy becomes. When the demand for money is perfectly elastic, monetary policy ceases to function altogether, placing the economy in a liquidity trap. In other words, monetary policy becomes less effective when investment does not respond to changes in interest rates (Hanafi & Others, 2024, pp. 7-8).

As a result of the debate surrounding the effectiveness of monetary policy, the Availability Doctrine emerged at the

hands of economist Robert Roosa. This doctrine states that monetary policy primarily operates through its influence on the investment portfolio components of lenders, particularly banks, and their decisions regarding the credit they extend to borrowers. The doctrine is based on the idea that financial institutions hold public debt on a wide scale, which facilitates the operation of monetary control and the transmission of changes in interest rates resulting from open market operations to the economy as a whole (Hassan & Fadol, 2020, p. 27) <sup>[1]</sup>. Minor changes in interest rates create uncertainty about future interest rate levels and affect the value of investments held by banks, resulting in significant financial losses that financial institutions attempt to avoid by retaining investments and refraining from liquidating them (Mishkin, 2022, p. 52) <sup>[1]</sup>.

The interest rate plays an important role in influencing the level of aggregate demand and, consequently, in determining macroeconomic equilibrium. Monetary equilibrium requires an interest rate that ensures equality between the supply and demand for money on one hand, and serves as a channel for transmitting monetary changes to aggregate demand on the other. In this way, the interaction of short-term aggregate supply and aggregate demand determines the equilibrium level of both real income (output) and prices (Romar, 2001, p. 25) <sup>[2]</sup>.

The failure of monetary policy to achieve price stability is not due to an inherent weakness in monetary policy itself, but rather due to its hesitation in imposing strict constraints, as such constraints may affect economic growth, employment, and utilization (Eduardo & Bernado, 2007, p. 5).

Controlling the money supply, managing public debt, and directly regulating credit allocation may, when combined, have an effective impact on the economy and in achieving economic stability and growth. However, this is not always the case for example, when investment is elastic in relation to the interest rate, or when expectations regarding the general price level are a factor (Tom & Ajina, 2021, p. 17). If these conditions are favorable, then monetary policy is effective in curbing excessive aggregate demand during inflation or preventing unemployment during recession.

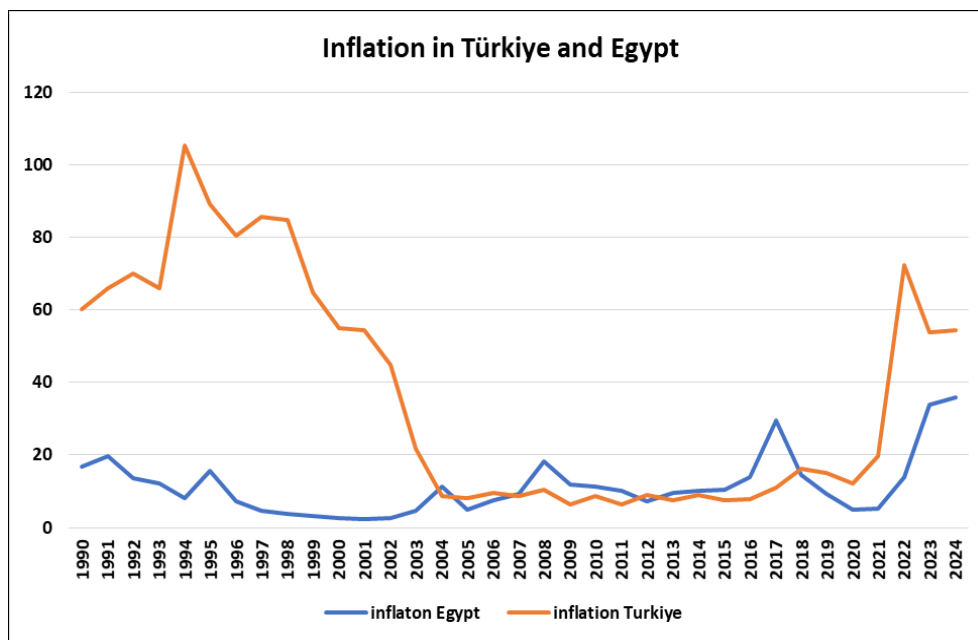
Some economists argue that inflation has become a global phenomenon, which indicates a worldwide increase in the money supply. Some specialists in international monetary affairs have attributed global inflation to inflation in the United States. Harry Johnson stated that prices in the United States act as a guide for prices in other countries (Hanafi & Others, 2024, p. 9).

Although developing countries use one or more of the quantitative tools while considering the differences in their levels of economic growth, production structures, and integration with the global economy, many of these countries resort to qualitative control methods particularly those facing issues related to the nature of their economic structures. The effectiveness of monetary policy does not necessarily depend on the extensive use of tools, but rather on the coordinated use of various tools, which is essential for implementing a rational monetary policy (Mishkin, 2022, p. 52) <sup>[1]</sup>. From the above, it becomes clear that the decisive factor in inflation lies in the main driver of the global economy, namely the United States, as it leads the global monetary system.

**Section Two: Analytical Aspect**

**Inflation Rate Development Criterion in Egypt and Turkey:** The annual increase in consumer prices compared to global prices is considered inflation. Both Turkey and Egypt have suffered from high inflation rates. Turkey experienced particularly elevated inflation during the early 1990s, as illustrated in Chart (1). One of the contributing factors was the outbreak of the Second Gulf War in 1991, which resulted in the United Nations imposing a complete embargo on Iraq, leading to the cessation of oil exports through the Kirkuk-Turkey pipeline. This caused Turkey to lose billions of dollars. During 1992-1993, bond issuance reached \$7.5 billion. The financial inflows resulting from

borrowing led to rising interest rates. When Turkish commercial banks realized the existence of easy profit opportunities, they borrowed at global interest rates and lent at domestic rates, without concern for currency depreciation. Consequently, short-term external debt increased while both foreign and domestic confidence in the government's ability to manage upcoming debt installments declined. These conditions exacerbated economic difficulties and led to a continued increase in inflation rates throughout the 1990s, as illustrated in Chart (1). In 2001, the Turkish lira was floated, resulting in a significant devaluation, which recorded noticeable inflation rates.



Source: Prepared by the researcher based on data from Appendix (1) and Appendix (2), using the statistical software Excel.

Fig 1: Illustrates the development of inflation rates in Turkey and Egypt.

This reduced confidence in the Turkish government due to administrative and financial corruption, which in turn led to the collapse of the financial market. The Turkish economy underwent a significant transformation over the seven-year period between the domestic crisis in 2001 and the global financial crisis in 2008. However, the reforms adopted by Turkey and its heavy reliance on foreign investment helped improve the overall economic situation, which in turn reduced inflation rates to economically acceptable levels. Price stability persisted until the emergence of the COVID-19 pandemic, as shown in the figure above. The transformation was clearly reflected in all Turkish economic indicators. Between the two crises (2008-2022), the Gross National Product jumped from \$300 billion to \$750 billion, with a high growth rate of 6.8%. The average income per capita also rose from \$3,300 to approximately \$10,000. Thus, Turkey largely overcame the issues related to imbalances caused by inflation and deficits and achieved notable development, ranking sixth at the European level. From the above figure, it is evident that inflation rates began to rise again from the end of 2019 until 2024. This is attributed to the negative repercussions faced globally, despite Turkey's diversified and developed productive base across various sectors, including agriculture, industry, and

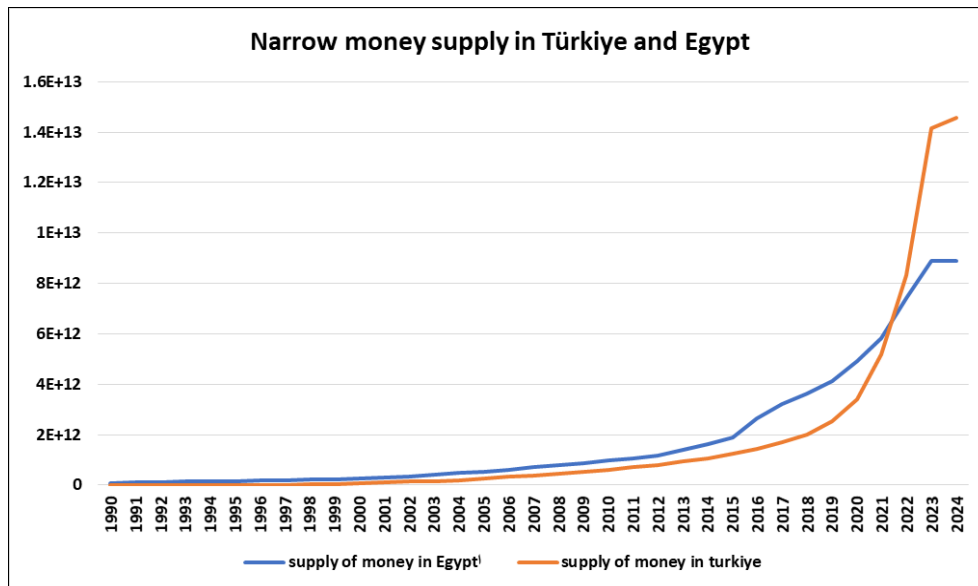
tourism. Recently, it has also begun producing weapons, generating acceptable revenues. However, Turkey continues to suffer from an energy problem, as it heavily relies on external sources. All these factors contributed to the rise in inflation rates, which reached 19.85%-a high rate despite the government's attempt to reduce it to 16%. In reality, inflation in Turkey stems from both supply and demand sides. The rise in interest rates leads to increased production and service costs, particularly since the Turkish economy relies heavily on credit. On the other hand, the depreciation of the local currency increases inflation from the demand side. There are also concerns about a potential rise in global oil prices, which may prolong the inflation period. This requires a gradual reduction in interest rates to avoid alarming savers about sudden interest rate drops. The same situation applies to Egypt, where high inflation rates have been recorded since the global financial crisis of 2008 and continued to increase until 2024. This rise is attributed to the increase in money issuance in addition to Egypt's recent adoption of a floating exchange rate policy.

**Narrow Money Supply Development Criterion**

The analysis is based on the narrow money supply in local currency for each country. This variable was chosen because

it has a greater impact on inflation than broad money supply, due to the large volume of currency in circulation, especially in developing countries. Moreover, narrow money supply exerts a positive effect on inflation rates. In the IS-LM model, an increase in the money supply leads to a decrease in interest rates, which results in increased investment and a higher level of aggregate demand. This contributes to the worsening of the inflation problem, particularly when the production system is characterized by rigidity or lacks responsiveness to increases in aggregate demand. As shown in Figure (2), the increase in money

supply in both Turkey and Egypt began in 2003. This rise contributed to the increase in inflation rates in both countries and the depreciation of their local currencies especially in Egypt. The value of the Egyptian pound, which was 0.87 per US dollar in 1990, dropped to 3.40 pounds per dollar by 2000. The rise in money supply further contributed to the devaluation of the pound, which reached its lowest level at 7 pounds per dollar in 2013. The continued increase in the money supply has gradually led to the depreciation of the Egyptian pound.



Source: Prepared by the researcher based on data from Appendix (1) and Appendix (2), using the statistical software Excel.

Fig 2: Illustrates the development of narrow money supply in Turkey and Egypt.

The value of one US dollar reached 49.5 Egyptian pounds, and the above chart illustrates the steady upward trend in money supply throughout the study period. In Turkey, the situation does not differ much from Egypt in terms of the gradual increase in the money supply, as clearly shown in Figure (2). During the 1990s, the Turkish government accelerated the issuance of high-denomination currency units while eliminating smaller denominations. The continuous rise in prices persisted until the Justice and Development Party came to power, which attempted to reduce inflation rates. The value of the Turkish lira reached its highest level in 2018, then declined significantly in 2019, with the depreciation continuing until the end of the study period. The primary reason for this decline lies in the expansion of the money supply, in addition to other factors such as the increase in interest rates, which encourages the inflow of foreign capital. Moreover, the devaluation of the currency helps generate surpluses in the balance of payments a level of trade both countries aim to achieve.

**Interest Rate Development Criterion**

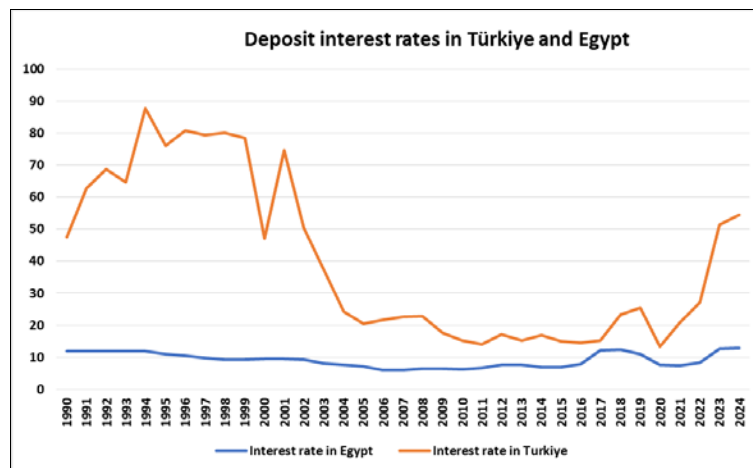
There have been significant developments regarding the efficiency of monetary policy in recent times. Prior to the Great Depression, the prevailing belief was that investment always responds to low interest rates. However, the experience of the Great Depression shattered this notion. Despite the adoption of expansionary monetary policies in Western Europe and the United States and the reduction of

interest rates, investment remained low. In other words, investment proved to be inelastic to changes in interest rates. This inelasticity is attributed to several factors, such as the fact that interest constitutes only a small portion of the total costs of short-term investment. Additionally, monetary policy becomes ineffective when the demand for money is elastic, and it ceases to function entirely when demand is perfectly elastic-placing the economy in a liquidity trap. The effectiveness of monetary policy also declines when investment is less responsive to interest rate changes and becomes entirely ineffective when investment is completely unresponsive.

Figure (3) illustrates that interest rates in Turkey were high during the period (1990-2003) and began to decline gradually starting from 2004, continuing this trend until 2021, after which rates increased gradually. There are several opinions regarding interest rates. One view suggests that a drop in interest rates causes the collapse of the lira and a rise in inflation. Another perspective holds that one of the causes of inflation is the rise in interest rates, as high rates act as a barrier to investors by increasing production costs. When comparing Turkey’s interest rates with those of G20 countries, it is found that these countries have rates close to 1%, while in Turkey, they reached 20%. High interest rates make the rich richer and the poor poorer, and they yield profits for external entities, such as global financial funds, which enter the market for speculative purposes to gain extraordinary profits. Interest rates reached

their peak at 60% and continued at high levels until the end of 2003, when they stood at 50%. After the Justice and Development Party came to power, efforts were made to lower interest rates. By 2008, the rate had declined to 25%, and continued decreasing until it reached 15% in 2012. For the first time, the government managed to reduce the interest rate to 9%, and by 2017 it reached its lowest level at

7.8% a period considered the best in terms of performance and economic stability. However, the Central Bank subsequently raised the interest rate again, reaching 19%. Despite this, inflation in Turkey rose to 22%, and the value of the lira continued to decline against the dollar, accompanied by a notable increase in exports.



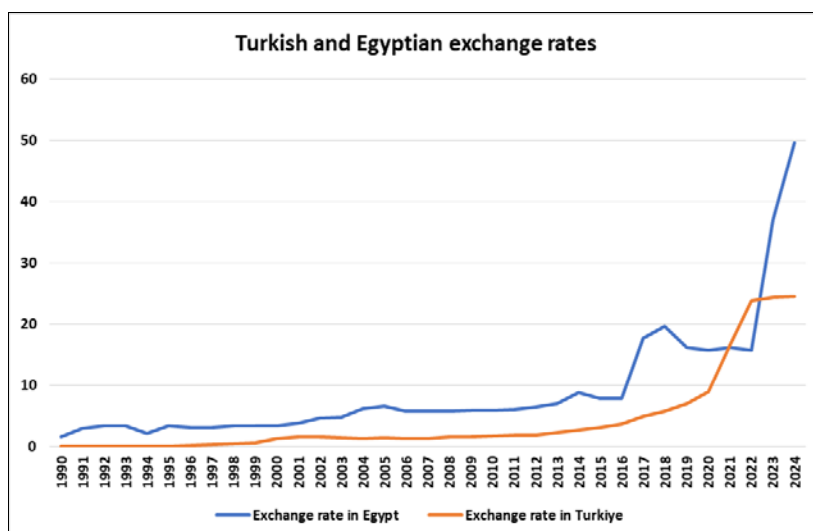
Source: Prepared by the researcher based on data from Appendix (1) and Appendix (2), using the statistical software Excel.

Fig 3: Illustrates the development of interest rates in Turkey and Egypt.

In Egypt, as inflation rates tended to decline, the Central Bank’s policy remained committed to maintaining the interest rate unchanged. This approach is attributed to several factors, including the general slowdown in inflation rates, particularly during the period 2004-2016, as clearly shown in the figure above. Additionally, there was an improvement in foreign currency liquidity, driven by increased foreign investment rates and financial aid provided by Arab and foreign countries. The decline in risks in the Egyptian market further encouraged the inflow of foreign capital. After 2022, foreign capital inflows rose due to the currency floatation policy, which left the exchange rate to market forces. This, in turn, contributed to the rise in inflation rates, as illustrated in Figure (3) above.

**Exchange Rate Development Criterion**

As shown in Figure (4), the exchange rate of the Turkish currency was significantly low. This is attributed to the deterioration of the economic situation during the 1990s, which forced monetary policy, represented by the Central Bank, to issue new large-denomination notes and eliminate lower denominations. The depreciation of the local currency against the US dollar continued until 2003 and remained persistent due to the ongoing economic decline in Turkey, as illustrated in Figure (4). In the same year (2003), the growth rate began to rise, reaching 5.3%. However, economic growth in Turkey declined again due to the global financial crisis that hit in 2008. Despite this, in 2013, Turkey achieved clear growth rates and a noticeable appreciation of the lira against the US dollar.



Source: Prepared by the researcher based on data from Appendix (1) and Appendix (2), using the statistical software Excel.

Fig 4: Illustrates the historical development of the exchange rate in Turkey and Egypt.



Subsequently, the Turkish lira continued to rise steadily against the US dollar, reaching its highest level in 2018. However, its value declined significantly after 2019 due to the outbreak of the COVID-19 pandemic. In 2023, the lira began to appreciate again against the dollar, continuing this trend until the end of the study period. As for the Egyptian pound, its value remained above the US dollar for several decades. However, with the beginning of the new millennium, the pound began a new downward trajectory, reaching its lowest levels following the floatation policy adopted by the Egyptian government. In 1989, the value of one dollar was 0.87 pounds. Since 1990, the value of the pound continued to decline, reaching 3.40 pounds per dollar in 2000. The depreciation continued, and by 2013 the pound had fallen to 7 per dollar. The downward trend persisted, with the pound exceeding 30.8 per dollar in 2023. By the end of 2024, the value of one US dollar reached 49.5 pounds, as illustrated in Figure (4) above.

**Section Three: The Econometric Aspect**

In this section, we will present the econometric and statistical results obtained from estimating the study model using modern econometric methods, including time series analysis, stationarity testing, and cointegration testing, in order to arrive at realistic results that allow for a logical analysis of economic relationships and to avoid misleading results that may arise from traditional estimation methods. These traditional methods often rely on results without testing the stationarity of time series. Even if the results are statistically significant based on the common statistical tests such as the t-test, F-test, and R<sup>2</sup>, they may not provide an accurate interpretation due to the issue of spurious regression and the absence of variance stability (Gujarati, 2013, p. 636)<sup>[8]</sup>. The study will rely on the following model

$$\text{LnGDp}_t = \beta_0 + \text{Ln}\beta_1 X_1 + \text{Ln}\beta_2 X_2 + \text{Ln}\beta_3 X_3 + \dots + \epsilon_t$$

Where:

- **Y:** Consumer Price Index (Inflation).
- **X<sub>1</sub>:** Broad Money Supply-Economic theory suggests a direct relationship between money supply and inflation rates; as the money supply increases, the general price level rises.
- **X<sub>2</sub>:** Interest Rate-There is an inverse relationship between the interest rate and the general price level. According to economic theory, as the interest rate increases, the general price level decreases.
- **X<sub>3</sub>:** Exchange Rate-There is an inverse relationship between the exchange rate of the local currency and the general price level. According to economic logic, as the exchange rate decreases (i.e., local currency depreciates), the general price level increases.

**First: Results of the Time Series Stationarity Test (Turkey-Egypt)**

The first step in data analysis is to test the stationarity of the time series in estimation. According to the regression theory, if the time series possesses the stationarity property, it is considered integrated of order zero and is denoted as I (0). If the time series lacks the stationarity property, the resulting regression between time series variables will be spurious, especially when the coefficient of determination (R<sup>2</sup>) is high, along with an increase in the value of the t-test and F-test (Asterion & Hall, 2007, p. 31)<sup>[9]</sup>. This also leads to the emergence of the autocorrelation problem, as indicated by the D.W test.

**Table 1:** Summary of Augmented Dickey-Fuller Test Results for Time Series Stationarity of the Variables under Study for Both Models

Variables Levels	Stability of the first model Türkiye 1990-2024			Stability of the second model Egypt 1990-2024		
	First Difference			First Difference		
	Without Constant	With Constant	With Constant and Trend	Without Constant	With Constant	With Constant and Trend
Consumer Price Index	-3.5769 (0.0000)	-3.3548 (0.0001)	-4.0581 (0.000)	-2.7705 (0.0000)	-2.6880 (0.0000)	-3.1467 (0.0000)
Narrow Money Supply	-2.3551 (0.0372)	-2.3679 (0.0000)	-4.9025 (0.02342)	-1.0293 (0.0443)	-3.9441 (0.0243)	-2.7473 (0.0243)
Interest Rate	-5.4348 (0.0000)	-5.3718 (0.0000)	-5.3228 (0.0000)	-10.5467 (0.0004)	-12.7096 (0.0079)	-1.7234 (0.0015)
Exchange Rate	-1.6043 (0.0154)	-6.2226 (0.0134)	-6.4348 (0.0142)	-2.7705 (0.0000)	-2.6880 (0.0000)	-3.1467 (0.0000)

Source: Prepared by the researcher based on the results of the statistical software EViews 10.

The time series stationarity of both the Turkish and Egyptian models was tested using the unit root test to determine the statistical properties of the time series under study, employing the Augmented Dickey-Fuller (ADF) test. The test results indicated that the calculated significance levels for the variables whether without a constant, with a

constant only, or with a constant and a time trend were lower than the critical values at all levels of the calculated t-test. This means that the null hypothesis of the presence of a unit root, i.e., the non-stationarity of the time series, cannot be rejected for all model variables. Therefore, it can be concluded that the calculated t-values were smaller than the

tabulated ones, leading to the acceptance of the null hypothesis and rejection of the alternative hypothesis, confirming that the time series of all variables are non-stationary at level. However, after applying the same test to the first differences of the non-stationary series, it was found that they are stationary at the first difference I (1), as shown in Table (1). The results indicated that the null hypothesis could not be rejected and the alternative hypothesis stating that the series are stationary at first difference was accepted at statistically acceptable significance levels.

Based on the previous unit root tests, the time series of the study variables are integrated of order one I (1). This indicates the possibility of conducting cointegration tests, and Table (2) presents the results of the Johansen-Juselius

cointegration test for both models (Turkey and Egypt) over the period 1990-2024. The trace test ( $\lambda$  trace)<sup>(1)</sup> showed that the computed maximum likelihood values were greater than the critical values for all variables in both the Turkish and Egyptian models at statistically acceptable significance levels. Therefore, we reject the null hypothesis ( $r = 0$ ) and accept the alternative hypothesis, meaning that cointegrating vectors exist. This conclusion is supported by the maximum eigenvalue test ( $\lambda$  max), where the computed maximum likelihood values also exceeded the critical values for both models at statistically acceptable significance levels. Accordingly, we reject the null hypothesis ( $r = 0$ ) and accept the alternative hypothesis ( $r = 1$ ), indicating the existence of cointegrating vectors.

**Table 2:** Trace Test ( $\lambda$  Trace) and Maximum Eigenvalue Test ( $\lambda$  Max) for the Turkey and Egypt Models

Trace Test ( $\lambda$ Trace) for the Turkey Model				
Null Hypothesis	Alternative Hypothesis	$\lambda$ trace	Critical Value	Eigenvalue
$r = 0$	$r = 1$	52.31954	29.79707	0.653414
$r \leq 1$	$r = 2$	18.41153	15.49471	0.377909
$r \leq 2$	$r = 3$	3.841465	3.222104	0.095787
Maximum Eigenvalue Test ( $\lambda$ Max) for the Turkey Model				
Null Hypothesis	Alternative Hypothesis	$\lambda$ Max	Critical Value	Eigenvalue
$r = 0$	$r = 1$	33.90801	21.13162	0.653414
$r \leq 1$	$r = 2$	15.18942	14.26460	0.377909
$r \leq 2$	$r = 3$	3.841465	3.222104	0.095787
Trace Test ( $\lambda$ Trace) for the Egypt Model				
Null Hypothesis	Alternative Hypothesis	$\lambda$ trace	Critical Value	Eigenvalue
$r = 0$	$r = 1$	44.11901	29.79707	0.515240
$r \leq 1$	$r = 2$	20.94777	15.49471	0.437983
$r \leq 2$	$r = 3$	3.841465	2.508644	0.075401
Maximum Eigenvalue Test ( $\lambda$ Max) for the Egypt Model				
Null Hypothesis	Alternative Hypothesis	$\lambda$ Max	Critical Value	Eigenvalue
$r = 0$	$r = 1$	23.17124	21.13162	0.515240
$r \leq 1$	$r = 2$	18.43913	14.26460	0.437983
$r \leq 2$	$r = 3$	3.841465	2.508644	0.075401

Source: The table was prepared by the researcher based on the results obtained from the statistical software EViews 10.

To determine the lag intervals, the Akaike Information Criterion (AIC) was used, and it was found that the optimal lag length is one year. This finding aligns with the view of Milton Friedman, who stated that the effect of monetary policy typically occurs within a period not exceeding one year.

The trace test and the maximum eigenvalue test both confirm a single fact: there is cointegration among the time series of the model variables for both countries, Turkey and Egypt. This indicates the existence of a long-term equilibrium relationship among them, which has future

implications if the independent variables are activated to influence the inflation phenomenon faced by both countries. It appears that the strategy adopted by both countries to devalue their local currencies by increasing the money supply is a deliberate approach aimed at boosting exports and achieving surpluses in their balance of payments. Additionally, Turkey's economic policy has maintained high interest rates in order to support savings, bridge the investment gap, and attract foreign capital, which in turn contributed to the rising trend of the debt-to-GDP ratio.

**Table 3:** Summary of ARDL Model Estimation Results for Turkey and Egypt

probability	Coefficient	The First Model (Egypt)	probability	Coefficient	The First Model (Turkey)	Variables
0.2200	3.0312	t= 1.252706	0.0419	-4.3412	t= -2.125577	X1
0.0967	1.656640	t= 1.714745	0.0033	0.543408	t= 3.188414	X2
0.1300	0.436874	t= 1.557021	0.0003	5.027814	t= 4.095548	X3
-	-	0.405339	-	-	0.414645	R <sup>2</sup> adj
0.000309	-	8.497919	0.000246	-	8.792006	F
-	-	2.427497	-	-	2.855848	D.W

Source: Table prepared by the researcher based on the results of the statistical software EViews 10.

After it was confirmed that there is a long-term relationship between the study variables-i.e., cointegration exists between the dependent variable and the independent variables-it was necessary to estimate the regression for both models. The adjusted coefficient of determination ( $R^2$  adj) for the Turkey model reached 41%, meaning that the independent variables influence the dependent variable Y, which is the Consumer Price Index (inflation), by 41% in the Turkey model and 40% in the Egypt model. The remaining 59% and 60%, respectively, are attributed to variables outside the model and not included in the estimation. Additionally, the F-statistic value reached 8.79 in the Turkey model and 8.49 in the Egypt model, both at statistically acceptable significance levels, confirming the overall significance of the regression model. It was also found that not all the independent variables have a statistically significant effect on the dependent variable. The variable with the highest statistical significance from the table is X1 (narrow money supply), which showed a significant effect at acceptable significance levels. In the Turkey model, the elasticity coefficient was 43%, meaning that an increase in the narrow money supply by 1% leads to an increase in inflation rates by 43%. This result is statistically significant and consistent with economic theory. In Egypt, X1 also showed statistical significance with an elasticity coefficient of 303%, meaning that a 1% increase in the money supply leads to a 303% increase in inflation, which is also a strong and significant relationship according to economic logic and the stated elasticity value. The variable X2 (interest rate) demonstrated statistical significance in both models, with a negative sign, which aligns with economic logic. The elasticity was 34% in the Turkish model and 165% in the Egyptian model. This means that an increase in the interest rate by 1% leads to a reduction in inflation by the stated elasticity values for both countries. This is because the interest rate affects borrowing behavior, reducing borrowing levels, although it may increase imported inflation in cases where there is free international capital mobility.

As for the variable X3 (exchange rate), it also proved statistically significant in both models, with a negative sign, indicating an inverse relationship with the dependent variable—again consistent with economic logic. The elasticity was 202% in Turkey and 43% in Egypt. This implies that a 1% increase in the exchange rate leads to a decrease in inflation by the respective elasticity values. From the above, it is clear that the money supply variable (X1) is the most influential on inflation rates in both models, which supports the main hypothesis upon which the study was based.

## Conclusions and Recommendations

### First: Conclusions

1. Quantitative tools are the most influential instruments of monetary policy, especially the required reserve ratio, as it significantly impacts the money supply, which directly affects inflation rates particularly in developing countries such as Turkey and Egypt.
2. The econometric results showed that narrow money supply had a positive effect on inflation rates in both countries, especially in Turkey, where its elasticity was estimated at 0.43, which is higher than the elasticity

coefficient observed in Egypt's model. Therefore, tight monetary policy is considered more effective in controlling inflation.

3. Interest rate showed an inverse effect on inflation in both models, which aligns with economic theory. The elasticity was 0.34 in Turkey and 0.16 in Egypt, both with a negative sign, confirming the theoretical expectation.
4. The exchange rate policy also aligned with economic logic, showing a negative sign, indicating that a depreciation of the exchange rate leads to an increase in inflation. The elasticity was estimated at 0.202 in Turkey and 0.13 in Egypt.
5. Among the studied variables, X1 (money supply) had the greatest influence on inflation rates compared to X2 (interest rate) and X3 (exchange rate).

### Second: Recommendations

1. Since the money supply variable has a strong relationship with inflation rates, the monetary authorities in Turkey and Egypt should, if they intend to increase the money supply for any reason, do so at reasonable rates that align with inflation levels.
2. Quantitative tools have proven to be highly effective due to the flexibility of exchange rates consistent with foreign trade in both Turkey and Egypt. Therefore, such tools should be used to influence the money supply, which in turn affects inflation rates.
3. It is necessary to adopt a strict fiscal policy in both countries, as reducing public spending lowers inflation rates. Likewise, a tight monetary policy should be pursued to achieve economically rational inflation levels.
4. Excessively reducing inflation may have negative economic consequences, such as increased unemployment. Therefore, inflation should not be driven to zero, but rather maintained at economically acceptable levels that align with the economic conditions of the sample countries.
5. The study also recommends adding additional economic variables in future models, such as the balance of payments surplus or deficit, foreign investment, and foreign capital inflows, as they are significant and influential factors in determining inflation rates.

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#### Appendix (1): Data for Turkey

Exchange Rate (Lira per USD)	Interest Rate on Deposits (%)	Broad Money Supply	Inflation (Consumer Prices, % annually)	Year
0.00417	47.48333	93313400	60.30387	1990
0.00687	62.68	170698200	65.97857	1991
0.01099	68.73667	304082800	70.0761	1992
0.02961	64.57417	499370800	66.09384	1993
0.04585	87.79083	1222443700	105.215	1994
0.08141	75.9675	2496102600	89.11332	1995
0.15187	80.75167	5405054400	80.41215	1996
0.26072	79.49167	10690979400	85.66936	1997
0.41878	80.1075	20239792000	84.64134	1998
0.62522	78.4325	40882538747	64.86749	1999
1.22559	47.1575	57504545149	54.91537	2000
1.50723	74.69917	1.0947E+11	54.40019	2001
1.50089	50.49167	1.39997E+11	44.96412	2002
1.42554	37.67833	1.60208E+11	21.60244	2003
1.34358	24.25917	1.93518E+11	8.598262	2004
1.42845	20.39667	2.63121E+11	8.17916	2005
1.30293	21.6475	3.21466E+11	9.597242	2006
1.30152	22.55917	3.70411E+11	8.756181	2007
1.54996	22.91333	4.62361E+11	10.44413	2008
1.50285	17.64917	5.20894E+11	6.250977	2009
1.67496	15.26917	6.17503E+11	8.566444	2010
1.796	14.105	7.11388E+11	6.47188	2011
1.90377	17.19333	7.85531E+11	8.89157	2012
2.18854	15.295	9.51693E+11	7.49309	2013
2.72001	16.935	1.05813E+12	8.854573	2014
3.02014	14.91667	1.23287E+12	7.670854	2015
3.64813	14.61	1.45046E+12	7.775134	2016
4.82837	15.28833	1.68764E+12	11.14431	2017
5.67382	23.28333	1.99782E+12	16.33246	2018
7.00861	25.40917	2.5377E+12	15.17682	2019
8.85041	13.35667	3.40668E+12	12.27896	2020
16.5489	20.7	5.19579E+12	19.59649	2021
23.7386	27.04083	8.3309E+12	72.30884	2022
24.3725	51.325	1.41572E+13	53.85941	2023
24.5438	54.437	1.45672E+13	54.54213	2024

#### Appendix (1): Data for Egypt

Exchange Rate (EGP per USD)	Interest Rate on Deposits (%)	Broad Money Supply	Inflation (Consumer Prices, % annually)	Year
1.5	12	82507800000	16.75637	1990
3	12	98463900000	19.74854	1991
3.3	12	1.17594E+11	13.63742	1992
3.4	12	1.33174E+11	12.08979	1993
2.12	11.83333	1.48109E+11	8.154231	1994
3.3	10.91667	1.62766E+11	15.74223	1995
3.14	10.54167	1.80404E+11	7.187104	1996
3.14	9.835417	1.99837E+11	4.625606	1997
3.39	9.3625	2.21372E+11	3.872575	1998
3.4	9.2175	2.33909E+11	3.079499	1999

3.4	9.456667	2.60999E+11	2.683805	2000
3.75	9.458333	2.95491E+11	2.269757	2001
4.6	9.333333	3.32813E+11	2.737239	2002
4.82	8.225	4.03634E+11	4.507776	2003
6.13	7.725	4.69181E+11	11.27062	2004
6.5	7.225	5.23087E+11	4.869397	2005
5.75	6.016667	6.01561E+11	7.644526	2006
5.7	6.1	7.16545E+11	9.318969	2007
5.75	6.583333	7.9166E+11	18.31683	2008
5.8	6.491667	8.66651E+11	11.7635	2009
5.85	6.233333	9.74276E+11	11.26519	2010
5.95	6.741667	1.03921E+12	10.06493	2011
6.36	7.641667	1.16752E+12	7.111729	2012
7	7.683333	1.38808E+12	9.46972	2013
8.8	6.916667	1.60693E+12	10.07022	2014
7.83	6.908333	1.9059E+12	10.37049	2015
7.8	7.858333	2.6589E+12	13.81361	2016
17.69	12.09167	3.20266E+12	29.50661	2017
19.6	12.31667	3.62868E+12	14.40147	2018
16.09	10.95	4.11052E+12	9.1528	2019
15.76	7.783333	4.92052E+12	5.044933	2020
16.1	7.4	5.82265E+12	5.214049	2021
15.75	8.425	7.40274E+12	13.89566	2022
37	12.65	8.87759E+12	33.88478	2023
49.63	12.89	8.87989E+12	35.97643	2024