

ON THE ROOTS OF INFLATION IN MENA: RECENT EVIDENCE FROM THE MONETARIST MODEL

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1. Introduction

The phenomenon of inflation has received immense attention in contemporary macroeconomics primarily due to its profound economic and social costs. The literature has advanced several alternative theories to explain the possible causes of inflation and suggest proper policies to contain it. Within this voluminous literature, the monetarist approach has often been emphasized¹. The monetarist approach ascribes a key role to excessive money growth in the inflationary process and, as such, suggests that Central Banks shoulder heavy responsibility in the fight against inflation. However, the bulk of empirical support for the monetarist explanation of inflation comes from countries that have suffered from exceptionally high inflation rates (e.g., Latin American countries).

This paper focuses on the validity of the monetarist approach for six MENA (Middle East and North Africa) countries; namely, Bahrain, Egypt, Jordan, Morocco, Saudi Arabia and Turkey. Not only that research on the inflation problem has been scant for these countries², but that the selected MENA countries have also undergone a variety of inflationary experiences. Although the average inflation rate in Bahrain and Saudi Arabia has not risen above 5% annually during the period 1970-2003, Egypt and especially Turkey have been plagued with a double-digit inflation which climbed up in Turkey to 80% annually in the 1990s. In contrast, the inflation problem in Jordan and Morocco has been moderate, scoring about 7% per year during 1970-2003.

Testing the role of monetary control in combating inflation in the context of countries with low, moderate, and high inflation rates can provide important insights into the robustness of the monetarist approach. A casual inspection of data from the six MENA countries suggests an interesting similarity between inflation rates (percentage changes in CPI) and money growth rates (percentage changes in M1 stock). For example, over the estimation period 1970-2003, money supply grew in Turkey by 51% annually, which is exactly the same annual growth of its CPI (inflation rate). Other MENA countries also show impressive high and statistically significant correlation coefficients between money growth and inflation rates that range from 0.46 in Bahrain to 0.88 in Saudi Arabia. However, one cannot simply look at the statistics of money growth and inflation rates and discern policy recommendations. Instead, a careful empirical inquiry is warranted to distill the precise role of monetary expansions in the inflationary process in the MENA countries, a task that is undertaken in this paper.

¹ See, for example, Darrat (1985), Beltas and Jones (1993), Salih (1993) and Montiel (1998).

² A recent notable exception is Vuslat (2004) for Turkey.

2. A Monetarist Interpretation of Inflation

The monetary view of inflation begins with the familiar equilibrium condition in the money market (Darrat, 1985):

$$M^s / P = (M/P)^d \quad (1)$$

where M^s is nominal money supply, P is the price level, and $(M/P)^d$ is real money demand. Implicit in this condition is the restriction that asset holders have no money illusion as they are concerned with the holdings of real (not nominal) money balances.

The equilibrium condition (1) can be re-written in logarithms as:

$$\text{Log } P = \text{log } M^s - \text{log } (M/P)^d \quad (2)$$

Taking time derivatives of both sides of Equation (2) and denoting percentage changes for each variable by "D", we have the basic monetarist model of inflation:

$$DP = DM^s - D(M/P)^d \quad (3)$$

Equation (3) states that inflation (DP) occurs if the growth rate of nominal money supply (DM^s) is in excess of the growth rate of real money demand $[D(M/P)^d]$. Inflation is considered a "monetary phenomenon" in that it is related to the supply of and demand for "money". With the typical monetarist assumption of a stable real money demand equation, high inflation rates must be the outcome of similarly excessive nominal money supply growth.

To derive an operational model of inflation, researchers usually assume an exogenous (policy-determined) nominal money supply. Real money demand, however, requires a behavioral specification. A conventional real money demand function suggests that real money demand depends positively on real GDP as the scale variable, and depends negatively on measures of opportunity costs to hold alternative assets (both real and financial). Researchers use expected inflation to represent the opportunity cost of holding money instead of real assets, and use interest rates to represent the opportunity cost of holding money rather than financial assets. Prior studies of money demand functions in developing countries typically omit interest rates from their analysis since financial assets in these countries are generally lacking due to the embryonic nature of their financial markets. Even when some financial assets are available, interest rates in developing countries (especially within the banking system) are usually controlled rather than market determined. However, holding foreign (as opposed to domestic) financial assets is still a viable option for

asset holders in developing countries (Darrat, 1990). Indeed, the lack of domestic financial assets in which investors can hold their wealth makes foreign assets especially attractive in developing countries where capital mobility is not totally restricted.

Hence, we propose the following real money demand specification for the six MENA countries:

$$(M/P)^d = X, P^e, rf \quad (4)$$

where X is real GDP, P^e is expected inflation, and rf denotes foreign interest rates. Based on the preceding discussion, the monetary model of inflation is:

$$DP = DM^s - Df(X, P^e, rf) \quad (5)$$

Note that prices do not respond instantaneously to its determinants. There are several theoretical reasons for this price sluggishness, including Keynesian's non-market clearing (Drazen, 1980), and the presence of information and adjustment lags of the neoclassical school (McCallum, 1980). Therefore, when estimating the monetarist inflation model for each of the six MENA countries, we introduce lagged adjustments for each independent variable in model (5) above. We determine the number of appropriate lags in each case by minimizing the final prediction error (FPE).

3. Empirical Results

In this study, we investigate the sources of inflation in six MENA countries that have experienced three different inflation regimes (low, moderate, and high). For this purpose, we compile annual data over 1970-2003 on inflation (I) measured as the percentage change in the CPI; narrow money supply (M) defined as the sum of currency in circulation outside banks plus funds in checking accounts; real GDP (X); and foreign interest rate (FIR) defined as the average of short term interest rates in four major trading partners of the MENA countries (Italy, Germany, the United Kingdom, and France). All variables are measured in logarithms except for inflation and foreign interest rates.

Table 1-A in Appendix reports the empirical results from estimating model (5) for the high inflation countries (Turkey and Egypt); Table 1-B does the same for the moderate inflation countries (Morocco and Jordan), and Table 1-C reports the results for the low inflation countries (Saudi Arabia and Bahrain). Consistent with the predictions of the monetarist model, the sum-coefficients on all proposed explanatory variables have the correct theoretical signs. Equally important is the finding that the

summed coefficients of money growth are statistically significant for all six MENA countries. Thus, in accordance with the monetarist view, money growth exerts a positive and significant impact upon the inflation rate in all MENA countries, and does so across different inflationary regimes.

As to other possible determinants of inflation, growth in real GDP exhibits the correct negative sign in all countries, but achieves statistical significance only in Egypt. Therefore, promotion of real economic growth should prove an important anti-inflation measure in the case of Egypt. As to the acceleration of inflation, it also appears with the correct positive sign in all six MENA countries and proves statistically significant in Turkey, Morocco and Jordan. Therefore, especially in these latter countries, the inflationary process seems to feed on itself as the expectations of higher prices in the future significantly fuel further inflationary pressures. Furthermore, changes in foreign interest rate impact inflation positively in all MENA countries, again as expected by the monetarist model, and its impact is statistically significant in Turkey, Jordan and Saudi Arabia. This finding indicates the importance of external (foreign) factors for determining domestic inflation in these countries³.

4. Conclusions and Policy Implications

This paper uses the monetarist approach to investigate inflation and its determinants in six developing countries in the MENA region giving explicit attention to the roles of money supply and money demand in the inflationary process. The selected countries have undergone three different regimes: high, moderate and low inflation. Focusing on a variety of inflationary experiences can provide important insights into the robustness of the monetarist approach to inflation.

The empirical results are unanimous in suggesting that excessive money supply growth is the prime exogenous culprit behind the inflation problem in the six MENA countries. Such unequivocal support for the monetarist view of inflation receives added weight from the fact that money supply growth proves statistically significant in the inflation model irrespective of whether the country has experienced low, moderate, or high inflation. Clearly, these findings lend credence to Milton Friedman's famous monetarist cliché that "inflation is always and everywhere a monetary phenomenon".

³ As a robustness check, we test for the exogeneity of money supply and real GDP to prices across the six countries. The test results (available upon request) suggest that our results do not suffer from simultaneity bias.

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Appendix

Table 1: Regression Estimates of the Monetarist Inflation Model for Six MENA Countries
Estimation Period: 1970-2003

Panel A: High-inflation Countries

| Variable | Turkey | | | Egypt | | |
|----------------------|--------|------------|---------|--------|------------|---------|
| | Coeff. | t-value | p-value | Coeff. | t-value | p-value |
| Intercept | 15.31 | 0.72 | 0.4773 | 3.17 | 1.42 | 0.1706 |
| ΔM | 0.26 | 2.48 | 0.0222 | 0.26 | 1.65 | 0.1142 |
| Lag1(ΔM) | 0.19 | 1.43 | 0.1669 | -0.27 | -1.43 | 0.1671 |
| Lag2(ΔM) | 0.12 | 1.20 | 0.2861 | 0.37 | 2.48 | 0.0215 |
| ΔX | -0.32 | -0.86 | 0.4025 | -0.77 | -3.97 | 0.0007 |
| Lag1(ΔX) | | | | 0.10 | 0.53 | 0.6030 |
| Lag2(ΔX) | | | | -0.28 | -1.75 | 0.0939 |
| ΔI | 0.38 | 5.41 | 0.0000 | 0.01 | 0.58 | 0.5703 |
| Lag1(ΔI) | 0.12 | 2.05 | 0.0535 | 0.01 | 0.49 | 0.6280 |
| ΔFIR | 3.31 | 2.13 | 0.0454 | 0.71 | 1.44 | 0.1643 |
| Lag1(ΔFIR) | -1.71 | -1.12 | 0.0001 | | | |
| Adj R. Square | 0.89 | | | 0.81 | | |
| LM Test | 1.11 | | 0.34 | 1.98 | | 0.15 |
| Summed Coefficients | | | | | | |
| | | Chi-square | p-value | | Chi-square | p-value |
| $\Sigma \Delta M$ | 0.57 | 3.98 | 0.04 | 0.36 | 3.13 | 0.03 |
| $\Sigma \Delta X$ | -0.32 | 0.73 | 0.39 | -0.95 | 12.98 | 0.00 |
| $\Sigma \Delta I$ | 0.50 | 20.28 | 0.00 | 0.02 | 0.45 | 0.50 |
| $\Sigma \Delta FIR$ | 1.60 | 0.61 | 0.04 | 0.71 | 2.08 | 0.15 |

Panel B: Moderate-inflation Countries

| Variable | Morocco | | | Jordan | | |
|----------------------|---------|------------|---------|--------|------------|---------|
| | Coeff. | t-value | p-value | Coeff. | t-value | p-value |
| Intercept | 0.37 | 0.11 | 0.9131 | -1.77 | -0.58 | 0.5710 |
| ΔM | 0.29 | 2.19 | 0.0411 | 0.10 | 1.33 | 0.2011 |
| Lag1(ΔM) | 0.22 | 1.63 | 0.1186 | 0.18 | 2.31 | 0.0347 |
| Lag2(ΔM) | 0.05 | 0.41 | 0.6869 | 0.04 | 0.39 | 0.7010 |
| ΔX | -0.12 | -0.87 | 0.3958 | -0.16 | -1.91 | 0.0744 |
| Lag1(ΔX) | -0.22 | -1.23 | 0.2321 | 0.02 | 0.20 | 0.8441 |
| Lag2(ΔX) | -0.12 | -0.91 | 0.3721 | | | |
| ΔI | 0.01 | 3.34 | 0.0034 | 0.01 | 3.21 | 0.0055 |
| ΔFIR | 0.01 | 0.50 | 0.6219 | 0.86 | 2.26 | 0.0383 |
| Lag1(ΔFIR) | 0.05 | 2.04 | 0.0555 | -0.21 | -0.48 | 0.6372 |
| Adj R. Square | 0.75 | | | 0.89 | | |
| LM Test | 0.61 | | 0.55 | 0.53 | | 0.59 |
| Summed Coefficients | | | | | | |
| | | Chi-square | p-value | | Chi-square | p-value |
| $\Sigma \Delta M$ | 0.56 | 4.50 | 0.03 | 0.32 | 7.83 | 0.00 |
| $\Sigma \Delta X$ | -0.45 | 1.27 | 0.26 | -0.14 | 1.24 | 0.26 |
| $\Sigma \Delta I$ | 0.01 | 11.18 | 0.00 | 0.01 | 10.30 | 0.00 |
| ΣFIR | 0.06 | 2.29 | 0.13 | 0.65 | 3.37 | 0.07 |

Panel C: Low-inflation Countries

| Variable | Saudi Arabia | | | Bahrain | | |
|----------------------|--------------|------------|---------|---------|------------|---------|
| | Coeff. | t-value | p-value | Coeff. | t-value | p-value |
| Intercept | -0.71 | -0.50 | 0.6240 | -2.95 | -0.88 | 0.3911 |
| ΔM | 0.34 | 5.08 | 0.0001 | 0.04 | 0.55 | 0.5871 |
| Lag1(ΔM) | 0.08 | 1.08 | 0.2904 | 0.07 | 1.32 | 0.2050 |
| Lag2(ΔM) | -0.10 | -1.61 | 0.1220 | 0.11 | 2.20 | 0.0429 |
| ΔX | -0.3 | -0.54 | 0.5930 | -0.10 | -1.04 | 0.3134 |
| ΔI | -0.001 | -0.78 | 0.4429 | 0.00 | 0.20 | 0.8453 |
| Lag1(ΔI) | | | | 0.001 | 0.92 | 0.3695 |
| ΔFIR | 0.008 | 1.76 | 0.0938 | 0.34 | 0.64 | 0.5321 |
| Lag1(ΔFIR) | 0.05 | 1.19 | 0.2478 | 0.10 | .17 | 0.8634 |
| Adj R. Square | 0.89 | | | 0.78 | | |
| LM Test | 1.96 | | 0.13 | 0.63 | | 0.61 |
| Summed Coefficients | | | | | | |
| | | Chi-square | p-value | | Chi-square | p-value |
| $\Sigma \Delta M$ | 0.32 | 32.82 | 0.00 | 0.22 | 3.58 | 0.05 |
| $\Sigma \Delta X$ | -0.30 | 0.29 | 0.59 | -0.10 | 1.08 | 0.29 |
| $\Sigma \Delta I$ | -0.001 | 0.61 | 0.43 | 0.001 | 0.53 | 0.47 |
| $\Sigma \Delta FIR$ | 0.058 | 5.81 | 0.02 | 0.44 | 1.53 | 0.22 |

Notes: Δ denotes first-differences, M is the log of the narrow money stock, X is the log of real GDP, I is the inflation rate, FIR is the average short-term interest rates in four major trading partners of the MENA region, and LM is the LM test of serial correlation.

Abstract

We use the monetarist approach to investigate possible sources of inflation in six MENA countries that have undergone a variety of inflationary experiences. Our results provide uniform evidence across the different regimes supportive of the key role of money growth in determining inflation. The main message from the empirical analysis is that, regardless of whether inflation is influenced by external factors and/or by the expectations of higher inflation, and irrespective of the intensity of the inflationary process, domestic inflationary pressures in the MENA countries can be effectively controlled from within through restrictive monetary policies.

Keywords: Inflation, monetarist model, monetary policy, MENA - JEL Codes: E31, E58