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ON THE DESIGN AND EFFECTS OF MONETARY POLICY IN THE MIDDLE EAST

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ABSTRACT

In trying to evaluate the autonomy of central banks in the Middle East, the paper examines the determinants and implications of monetary policy across a sample of countries in the region: Algeria, Egypt, Jordan, Kuwait, Morocco, Saudi Arabia, Syria and Tunisia. Monetary policy is often established as a tool to facilitate government objectives. However, some of the announced objectives – price stability, economic growth, and full employment – may be contradictory. The governments may then set the reaction function for the monetary authority to devote more attention to specific objectives that they judge to be more urgent for economic performance. Models that attempt to identify the reaction function for the monetary authority differentiate between two types of policies: rules or accommodative policies versus discretion or stabilizing policies. An accommodative policy provides a regular supply of credit to an expanding economy. A stabilizing policy, in contrast, varies the money supply to counter shocks that may deviate the economy from its objectives. The present paper seeks to shed some light on the design of monetary policy across countries that have kept a sufficient data record for empirical investigation. The empirical investigation proceeds in two steps. The first step seeks to identify the reaction function for the design of monetary policy. The second step seeks to evaluate the varying effects of monetary policy in the light of variations in the policy design. Specifically, empirical models are estimated to identify the effects of growth in money supply on real output growth and price inflation.

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1. INTRODUCTION

The central bank's activities in developed countries are the center of attention in economic models that attempt to identify the reaction function for the monetary authority. Developing countries, by contrast, do not get the same attention due to the belief that the central banks in these countries were created with the primary objective of financing government deficit. There has been, however, a lessening of neglect of the subject. Investigators have differentiated between two types of policies: accommodative and stabilizing. An accommodative policy is defined as one that provides a regular supply of credit for an expanding economy. A stabilizing policy, by contrast, is used to dampen or offset undesirable changes in aggregate spending. In the first scenario, monetary growth accommodates output growth and price inflation. In the second scenario, the monetary authority varies monetary growth in order to counter the effects of other shocks on output growth and price inflation. Hence, monetary growth determines price inflation and output growth.

This paper is an attempt to shed some light on the design and effects of monetary policy in a group of Arab countries. The empirical investigation focuses on a sample of countries that have maintained a record of sufficient and continuous data over the period of study: Algeria, Egypt, Jordan, Kuwait, Morocco, Saudi Arabia, Syria and Tunisia. The first step of the empirical investigation will seek to identify the objectives of monetary policy by defining a monetary reaction function. The function will aim at identifying the direction of monetary policy based on agent's observations of realized economic variables. The list of variables in the reaction function includes international reserves, the price level, real income and government spending. In a country where the government promotes price stability, the monetary authority is expected to react negatively to inflationary pressures. If the depletion of international reserves is a primary concern, monetary growth is likely to be tightened. However, if the primary objective of the monetary authority is to finance government spending, monetary growth is expected to vary positively with price inflation and government spending. By contrast, if the primary objective of the monetary authority is to maintain a real level of liquidity, monetary growth will vary positively with price inflation and growth of real income.

The results from the first step are expected to shed some light on the design of monetary policy in the Arab countries under investigation. The second step of the empirical investigation will then seek to evaluate the varying effects of monetary policy in light of variation in policy design. Specifically, an empirical model will seek to identify the real and inflationary effects of monetary growth. The results from the time-series estimation will then be evaluated to determine the effects of monetary policy on the trend and variability of output growth and price inflation across the countries under investigation.

The remainder of this paper is organized as follows. Section 2 provides a

brief historical background to the development of the commercial and central banking system in the Arab region. Section 3 describes the empirical models for investigation. Section 4 presents the time-series evidence. Section 5 analyzes the evidence to evaluate the difference in the design of monetary policy and its effects across countries. Finally, section 6 provides a summary and conclusion.

2. A BRIEF HISTORICAL BACKGROUND

The development of the Arab banking system depended primarily upon the political ideology of the ruling institutions which took over after independence.[1] The newly established governments moved fast to eliminate the influence of any foreign forces in the country. Some Arab countries chose the socialist way while others chose more liberal policies.

Among the countries under investigation, Algeria, Egypt and Syria, chose the socialist way of thinking. Accordingly, a wave of nationalization of different institutions spread. Banks were among the targeted institutions taken over by the state in an attempt to put an end to foreign banks' issuing privileges. Egypt was the first Arab country to nationalize its institutions. The Egyptian banking system was fully nationalized in 1961. In the following years, Algeria and Syria moved to nationalize their banking systems. Nationalization was justified as a means to coordinate credit policies and reduce the cost of management and administration.

The next step for the above mentioned countries was the establishment of national currency boards, and subsequently central banks, to supervise the banking system and assume the function of issuing domestic currency. Declared objectives for central banks were to establish national unity, to develop different sectors of the economy and to facilitate the existence and functioning of specialized commercial banks. Specialized commercial banks were set up with the help of the government to finance international and domestic trade, to facilitate agricultural and industrial development, and to develop real estate, savings and other specific institutions. In short, the structure of the banking system in the Arab socialist countries consisted of the central bank and several specialized commercial banks owned by the government.

In the other Arab countries under investigation, namely the Gulf countries, Jordan, Morocco, and Tunisia, foreign institutions were allowed to operate side by side with the domestic sector. After the oil price increase in 1973, the governments of the Gulf countries moved fast to review legislation governing the banking system which was not equipped to cope with the international operations on such a large scale. From that day on, the petrol capital-based Arab banking system has evolved rapidly, adjusting to the new international situation at a remarkable rate. Big government spending created large revenues and liquidity in both the public and private sectors. Foreign banks were allowed to exist and operate freely until the governments decided to take over. The most notable case took place in Saudi Arabia when the government announced

the "Saudization" process. This process was initiated in 1975 by King Faisal and was completed in 1981. The process obliged foreign (non-Saudi) banks to accept 60 percent Saudi ownership. Similar steps were taken in Kuwait where the government obliged foreign institutions to share ownership with local agencies and citizens.

Central banks in the Arab countries took on the task of issuing notes in addition to supervising the growth of different financial institutions. Similar to their counterparts in developed countries, central banks in the Arab countries declared their objectives to be geared towards economic growth, price stabilization, and full employment. I now turn to a formal evaluation of the importance of these objectives in the design of monetary policy and its effects on economic performance.

3. EMPIRICAL MODELS

The first step of the empirical investigation is to determine how the design of monetary policy varies in response to policy makers' observations of economic conditions.[2] It is assumed, therefore, that the monetary authority's reaction function in period *t* is dependent on variables realized in period *t* - 1 as follows:

$$Dmoney_t = \alpha_0 + \alpha_1 Dir_{t-1} + \alpha_2 Dp_{t-1} + \alpha_3 Dy_{t-1} + \alpha_4 Dgov_{t-1} + \alpha_5 dum_t + \eta_m \quad (1)$$

Here, $Dmoney_t$ is the growth of the money supply at time *t*. α_0 is a constant. Agents expect the monetary authority to determine the growth of money supply at time t in response to their observations at time *t*-1 of the growth in international reserves, *Dir;* price inflation, *Dp*; real output growth, *Dy*; and the growth of government spending, *Dgov*.[3] To account for possible structural change in the design of monetary policy, the empirical model accounts for a dummy variable, *dum*, that takes zero values prior to 1973 and 1 thereafter. The term η_m is a random residual with a zero mean and a constant variance.

The growth of international reserves is likely to stimulate monetary expansion. By contrast, the monetary authority is likely to slow down the issuance of domestic currency in response to a decrease in the growth of international reserves.[4] The response of the monetary authority to price inflation is likely to vary depending on the policy objective. An accommodative monetary policy is likely to vary monetary growth positively with price inflation. That is because an increase in price inflation stimulates the demand for money and prompts an accommodating action from the monetary authority. By contrast, a stabilizing monetary policy may slow down the growth of the money supply to counter inflationary pressure and achieve price stability. An increase in real income stimulates money demand. Accordingly, an accommodative monetary policy is likely to vary the money supply positively in response to real output growth. By contrast, a stabilizing monetary policy

attempts to counter fluctuations in real output growth around its trend. Consequently, a recessionary decline in real output growth prompts the monetary authority to increase the money supply in order to stimulate growth back to its natural rate level. On the other hand, the growth of government spending may be relevant to the growth of the money supply. If the monetary authority is obligated to monetize the budget deficit, an increase in the growth of government spending is likely to stimulate an accommodating growth in the money supply.

The empirical investigation will seek to identify the effects of the above mentioned determinants on the growth of the money supply. Assuming rationality, agents are expected to observe variables that may affect the design of monetary policy at time *t*-1. If economic agents are able to utilize this information in wage and price negotiations, anticipated monetary policy is likely to prove inflationary without affecting the real economy. By contrast, if economic agents lack rationality and/or the ability to utilize available information effectively, changes in monetary growth, though anticipated, determine real output growth. That is because agents are unable to observe or react to available information about future changes in monetary growth. Unanticipated changes in the money supply may be induced by variables that do not enter agents' information set at time *t*-1 or in response to random shocks at time *t*. Given agents' inability to anticipate surprises in monetary growth, they are unable to incorporate the information about these surprises in wage and price negotiations. Accordingly, unanticipated changes in monetary growth in time shifts the demand curve along the economy's short-run supply curve, affecting both real output growth and price inflation.[5] The empirical model in (1) will seek then to achieve two objectives. First, to shed some light on the design of monetary policy by approximating the monetary policy reaction function based on economic conditions at time *t*-1. Second, the empirical estimates from model (1) will be used to decompose the growth of the money supply into two components: anticipated and unanticipated growth. The anticipated component is the predicted value from equation (1) that captures the change in monetary growth in response to variables realized at time *t*-1. The residual from equation (1) is the unanticipated component of monetary growth. Having achieved this decomposition, the investigation will then evaluate the real and inflationary effects of each component of monetary policy. The empirical models of real output growth and price inflation account for demand and supply shifts as follows:

$$Dy_t = \beta_{0y} + \beta_{1y} Dmoney_t + \beta_{2y} Dgov_t + \beta_{3y} Dex_t + \beta_{4y} Doilp_t + \beta_{5y} dum_t + \eta_y \tag{2}$$

$$Dp_t = \beta_{0p} + \beta_{1p} Dmoney_t + \beta_{2p} Dgov_t + \beta_{3p} Dex_t + \beta_{4p} Doilp_t + \beta_{5p} dum_t + \eta_p \tag{3}$$

Here, β_{0y} and β_{0p} are constants. The trend components of the logarithm of real output, y, and the price level, *p*, are modelled as stochastic functions of time following the suggestions of Nelson and Plosser (1982), and the results of the nonstationarity test by Dickey (1976) and Dickey and Fuller (1981). This requires estimating the models in first-difference form where *D* (.) is the first-difference operator.

Sources of demand shifts increase real output growth and price inflation. Accordingly, an increase in monetary growth is likely to determine real output growth and price inflation with magnitudes, β_{1y} and β_{1p}. Similarly, the growth of government spending, *Dgov*, is likely to stimulate aggregate demand in two directions: an increase in government purchases of goods and services, and an increase in subsidies to finance private spending. Accordingly, the growth of government spending determines real output growth and price inflation with magnitudes, β_{2y} and β_{2p}. An increase in the domestic currency price of SDRs (a devaluation of the domestic currency) may affect aggregate demand as follows.[6] Devaluation policy is likely to increase exports and curb imports which are stimulating aggregate demand. Further, devaluation increases real expenditures on imported variable inputs. This, in turn, induces firms to demand more money and decreases investment demand. In addition, devaluation is likely to determine aggregate supply by affecting the cost of the output produced. Therefore the change in the domestic currency price of SDRs, *Dex* , affects real output growth and price inflation with magnitudes β_{3y} and β_{3p}. In addition, changes in the oil price are likely to affect the cost of the output produced in oil-importing countries and stimulate aggregate demand in oil-exporting countries.[7] Subsequent effects of the change in the oil price on real output growth and price inflation are measured by β_{4y} and β_{4p}. To account for a possible structural break, the dummy variable dum_t is included in the empirical models for real output growth and price inflation.

To differentiate between the effects of anticipated and unanticipated monetary policy, monetary growth in equations (2) and (3) is replaced as follows:

$$Dy_t = \beta_{0y} + \beta_{ay} DEm_t + \beta_{uy} Dms_t + \beta_{2y} Dgov_t + \beta_{3y} Dex_t + \beta_{4y} Doilp_t + \beta_{5y} dum_t + \eta_y \tag{4}$$

$$Dp_t = \beta_{0p} + \beta_{ap} DEm_t + \beta_{up} Dms_t + \beta_{2p} Dgov_t \beta_{3p} Dex_t + \beta_{4p} Doilp_t + \beta_{5p} dum_t + \eta_p \tag{5}$$

Here, DEm_t and Dms_t are the anticipated and unanticipated components of monetary growth according to the monetary policy reaction function.[8] The parameters β_a and β_u measure the effects of the anticipated and unanticipated components of monetary policy on real output growth and price inflation. The long-run neutrality of monetary policy is dependent on the effect of anticipated growth of the money supply on real output. If agents are able to

anticipate and react to monetary policy, anticipated monetary growth is absorbed fully in price without determining real output, i.e., money is neutral. By contrast, prices do not adjust fully to unanticipated growth in the money supply in the short-run. Accordingly, monetary surprises are distributed between real output growth and price inflation in the short-run. The allocation is dependent on the flexibility to adjust prices and capacity constraints in the short-run.

4. TIME-SERIES RESULTS

The empirical models (1), (4) and (5) are estimated jointly for each of the countries under investigation to highlight the determinants of monetary policy and the allocation of monetary growth between real output growth and price inflation. Based on data availability, the sample of countries under investigation includes Algeria, Egypt, Jordan, Kuwait, Morocco, Saudi Arabia, Syria, and Tunisia. Table 1 provides a summary statistics for major macroeconomic indicators across these countries. The sample period for investigation varies between 1955 and 1990 across countries based on data availability. Details of the econometric methodology are provided in Appendix A. All data are annual. Data description and sources are provided in Appendix B.

Table 2 presents the results from the estimation of the empirical model that approximates the monetary policy reaction function. Monetary growth appears to increase in response to changes in international reserves. This relationship is statistically significant in Algeria, Saudi Arabia, Syria and Tunisia. In these cases, the monetary authority is more inclined to pursue an expansionary monetary policy in response to increased holdings of international reserves. In contrast, the depletion of international reserves prompts the monetary authority to contract the money supply in an effort to raise the interest rate and attract foreign funds. For other countries, changes in the money supply do not show systematic correlation with international reserves.[9]

The response of monetary policy to price inflation varies across countries. Evidence on accommodative monetary policy is consistent with the positive and statistically significant signs for Jordan, Kuwait, and Saudi Arabia. Monetary policy attempts to counter inflationary pressures in the remaining countries with significant coefficients in Egypt and Tunisia.

The coefficients measuring the response of monetary growth to real output growth is generally insignificant, except for Jordan and Saudi Arabia. The positive response of monetary growth to output growth in Jordan and Saudi Arabia confirms the accommodative nature of monetary policy for these countries.

The positive response of the money supply to the increase in government spending provides evidence on monetizing the budget deficit. This response is statistically significant in Algeria and Tunisia. That is, money supply growth is used to finance the increased government spending in these countries.

Finally, the statistical significance of the dummy variable in the money reaction function is evident for Egypt, Morocco, Syria, and Tunisia. This

TABLE 1
Summary Statistics

Country	Statistics	*Dy*	*Dp*	*Dngnp*	*Dmoney*	*Dgov*	*Dex*
A1geria	mean	0.063	0.082	0.110	0.160	0.110	0.046
	std dev.	0.095	0.034	0.120	0.082	0.170	0.100
	min.	-0.120	0.027	-0.190	-0.009	-0.370	-0.033
	max.	0.360	0.160	0.410	0.280	0.590	0.500
Egypt	mean	-0.059	0.081	0.120	0.120	0.110	0.060
	std dev.	0.061	0.069	0.079	0.097	0.092	0.170
	min.	0.210	-0.032	-0.004	-0.034	-0.150	-0.091
	max.	0.037	0.210	0.300	0.440	0.280	0.680
Jordan	mean	0.042	0.087	0.110	0.130	0.100	0.002
	std dev.	0.077	0.057	0.130	0.075	0.100	0.015
	min.	-0.110	-0.002	-0.340	-0.035	-0.086	-0.028
	max.	0.190	0.230	0.400	0.290	0.350	0.083
Kuwait	mean	-0.015	0.055	0.110	0.130	0.110	0.002
	std dev.	0.100	0.035	0.240	0.300	0.100	0.033
	min.	-0.230	0.006	-0.150	-0.200	-0.089	-0.053
	max.	0.130	0.120	1.029	1.370	0.320	0.120
Morocco	mean	0.044	0.054	0.099	0.110	0.110	0.034
	std dev.	0.041	0.040	0.066	0.053	0.098	0.064
	min.	-0.028	-0.110	-0.028	-0.003	-0.033	-0.038
	max.	0.130	0.160	0.310	0.240	0.440	0.200
Saudi	mean	0.058	0.140	0.220	0.160	0.160	0.010
Arabia	std dev.	0.074	0.260	0.300	0.170	0.220	0.059
	min.	-0.110	-0.250	-0.180	-0.023	-0.100	-0.065
	max.	0.180	0.890	1.010	0.660	0.610	0.180
Syria	mean	0.062	0.150	0.150	0.160	0.140	0.043
	std dev.	0.078	0.110	0.110	0.086	0.100	0.170
	min.	-0.061	0.002	0.001	-0.042	0.004	-0.091
	max.	0.210	0.460	0.470	0.380	0.430	0.990
Tunisia	mean	0.058	0.051	0.120	0.120	0.110	0.035
	std dev.	0.039	0.038	0.055	0.074	0.055	0.068
	min.	-0.014	-0.041	0.014	-0.010	0.014	-0.075
	max.	0.160	0.130	0.270	0.260	0.250	0.210

Notes: *Dy:* real output growth.
Dp: price inflation.
Dngnp: growth in aggregate demand.
Dmoney: growth in money supply.
Dgov: growth in government spending.
Dex: change in the domestic currency price of SDRs.
mean*:* sample average.
std dev.*:* sample standard deviation.
min. and max.*:* sample minimum and maximum values.

TABLE 2
Estimates of the Monetary Policy Reaction Function

Country	Constant	Dir_{t-1}	Dp_{t-1}	Dy_{t-1}	$Dgov_{t-1}$	dum_t	R^2
Algeria '68-'86	0.13* (2.36)	0.058** (1.320)	-0.46 (-0.62)	0.086 (0.330)	0.63* (1.73)	-0.033 (-0.570)	0.39
Egypt '54-'90	0.22* (3.24)	-0.015 (-0.160)	-1.46** (-l.35)	-0.58 (-0.74)	-0.31 (-0.69)	0.24* (2.19)	0.69
Jordan '68-'90	0.069 (1.680)	-0.021 (-0.550)	0.68* (1.97)	0.39* (1.75)	0.089 (0.600)	0.018 (0.420)	0.46
Kuwait '68-'90	0.020 (0.390)	-0.025 (-0.270)	1.59** (1.32)	0.083 (0.730)	0.28 (0.79)	0.04 (0.08)	0.54
Morocco '63-'90	0.08* (3.98)	-0.0053 (-0.2900)	-0.23 (-0.72)	0.14 (0.63)	0.081 (0.83)	0.07* (2.70)	0.34
Saudi Arabia '66-'90	0.10 (3.45)	0.13* (2.83)	0.064* (6.260)	0.14* (2.07)	0.043 (0.600)	-0.0004 (-0.0130)	0.93
Syria '62-'89	0.12 (4.43)	0.028** (1.540)	-0.30 (-1.11)	-0.044 (-0.260)	0.14 (0.80)	0.10* (2.62)	0.40
Tunisia '67-'90	0.11* (4.92)	0.068* (2.620)	0.078 (-2.610)	0.078 (0.430)	0.35** (1.64)	0.067* (2.880)	0.49

Notes: Empirical Model:

$$Dmoney_t = \alpha_0 + \alpha_1 Dir_{t-1} + \alpha_2 Dp_{t-1} + \alpha_3 Dy_{t-1} + \alpha_4 Dgov_{t-1} + \alpha_5 dum_t + \eta_m$$

t-ratios are in parantheses.
*and ** denote statistical significance at the 5% and 10% levels.

evidence is consistent with a structural shift that led to a significant increase in the average growth of the money supply after the oil price shock in 1973. That is, the monetary policy appears to have accommodated velocity shocks attributed to the inflationary pressure in response to the oil price shock of 1973.

Next, I turn to an evaluation of real inflationary effects of monetary growth in the countries under investigation. Evidence from the monetary policy reaction function is used to decompose monetary growth into two components. The predicted value measures the component of monetary policy that varies in response to economic conditions. Other random fluctuations in monetary growth are captured in the residual of the monetary policy reaction function. The results from estimating the empirical models (4) and (5) evaluate the real

and inflationary effects of anticipated and unanticipated monetary growth. These results are summarized in Table 3.

Anticipated changes in the money supply are statistically significant in determining real output growth in Algeria, Jordan, and Tunisia. That is, anticipated changes in the money supply are capable of inducing non-neutral lasting effects on output growth over time.[10] Similarly, random unanticipated fluctuations in the money supply have statistically significant effects on real output growth in Algeria, Jordan, and Tunisia. In the remaining countries, monetary policy is not statistically significant in determining real output growth.

The inflationary effect of anticipated monetary policy dominates that of unanticipated monetary policy in Jordan, Kuwait, and Saudi Arabia.[11] The inflationary effect of unanticipated monetary policy appears significant only in Jordan. In the case of Algeria, and Syria, the negative coefficients highlight price rigidity in response to anticipated and/or unanticipated monetary growth. This may be attributed to price control policies that prevent inflation from rising in response to expansionary monetary policy. Accordingly, price inflation is decreasing despite the growth in money supply.

Other estimates in the output and price equations can be summarized as follows. The growth of government spending is generally insignificant in determining real output growth. Further, the inflationary effect of the growth in government spending is statistically significant in Kuwait and Tunisia. By contrast, the growth of government spending has a negative and statistically significant effect on price inflation in Egypt.[12] Devaluation appears statistically significant in decreasing output growth in Syria.[13] Consistently, devaluation appears inflationary, and it is statistically significant in Syria. An increase in the oil price has a positive effect on output growth, which is statistically significant in Algeria, Kuwait, Saudi Arabia, Syria, and Tunisia. This is consistent with the positive effect of an increase in the energy price on output growth in oil-producing countries and its positive spill over effect on neighboring economies. By contrast, an increase in the energy price has a negative and statistically significant contractionary effect on real output growth in Jordan.[14] An increase in the oil price has a positive effect on price inflation in Jordan, Kuwait, and Morocco. This is consistent with the positive effect of a rise in petro dollars on aggregate demand in oil-producing countries and its positive effect on the cost of the output supplied in neighboring countries. By contrast, there is some evidence of a reduction in price inflation in Algeria in response to the increase in energy price.[15]

Finally, the statistical significance of the dummy variable in the output and price equations highlights the possibility of a structural break in these equations. Except for Syria, none of the coefficients for the dummy variable is statistically significant in the output equation. In the case of Syria, the negative coefficient on the dummy variable in the output equation is consistent with a significant structural break, decreasing the average rate of growth of real

TABLE 3
Estimates of the Output and Price Equations

Country	Variable	Constant	DEm_t	Dms_t	$Dgov_t$	Dez_t	$Doilp_t$	dum_t	R^2
Algeria	Dy_t	-0.057**	0.56*	0.64*	-0.12	0.11	0.22*	0.014	0.94
‘68-‘86		(-1.520)	(2.59)	(4.94)	(-0.70)	(0.75)	(9.68)	(0.56)	
	Dp_t	0.026	0.058	-0.21*	0.16	-0.069	-0.03**	0.036**	0.62
		(0.790)	(0.30)	(-1.85)	(1.11)	(-0.54)	(-1.52)	(1.57)	
Egypt	Dy_t	-0.11	0.44	0.46	0.68	0.21	0.053	-0.063	0.50
‘54-‘90		(-0.60)	(-0.60)	(0.67)	(0.51)	(0.62)	(0.320)	(0.18)	
	Dp_t	0.14*	-0.18	-0.41	-0.58*	-0.25	-0.027	0.14*	0.95
		(2.43)	(-0.68)	(-1.15)	(-1.95)	(-1.19)	(-0.360)	(3.33)	
Jordan	Dy_t	-0.11*	0.82*	0.52*	0.0028	1.037	-0.066**	0.030	0.58
‘68-‘80		(-1.87)	(2.50)	(1.74)	(0.018)	(1.19)	(-1.680)	(0.57)	
	Dp_t	0.016	0.54*	0.25*	-0.028	-0.26	0.069*	-0.04*	0.84
		(0.65)	(3.76)	(1.89)	(-0.42)	(-0.67)	(3.980)	(-1.72)	
Kuwait	Dy_t	0.078	-0.62	-0.31	-0.19	0.53	0.62*	0.04	0.79
‘68-‘90		(0.82)	(-0.92)	(-0.57)	(-0.39)	(0.57)	(5.32)	(0.08)	
	Dp_t	0.012	0.16*	0.071	0.13*	0.051	0.027*	0.04	0.84
		(0.99)	(1.93)	(1.088)	(2.13)	(0.44)	(1.880)	(0.08)	

TABLE 3 (Continued)

Country	Variable	Constant	DEm_t	Dms_t	$Dgov_t$	Dez_t	$Doilp_t$	dum_t	R^2
Morocco	Dy_t	-0.043	1.11	0.23	-0.04	-0.11	0.027	-0.066	0.21
'63-'90		(-0.51)	(1.13)	(0.92)	(-0.36)	(-0.57)	(0.780)	(-1.080)	
	Dp_t	-0.018	0.44	0.056	0.013	0.082	0.057	0.029	0.74
		(-0.40)	(0.84)	(0.420)	(0.23)	(0.800)	(3.110)	(0.880)	
Saudi Arabia	Dy_t	0.12	-0.081	-0.26	-0.058	-0.055	0.56*	-0.074	0.68
'66-'90		(1.15)	(-0.26)	(-0.23)	(-0.20)	(-0.082)	(4.13)	(-0.740)	
	Dp_t	-0.051**	0.52*	0.24	-0.013	0.027	0.045	-0.0062	0.81
		(-1.59)	(5.19)	(0.69)	(-0.14)	(0.130)	(1.053)	(-0.200)	
Syria	Dy_t	-0.11	0.92	0.094	0.22	-0.60*	0.14**	-0.10**	0.60
'62-'89		-(0.94)	(1.07)	(0.22)	(1.002)	(-1.87)	(1.70)	(-1.46)	
	Dp_t	0.23*	-1.61*	-0.21	0.093	0.83*	0.057	0.22*	0.62
		(2.24)	(-2.12)	(-0.56)	(0.48)	(2.94)	(0.770)	(3.64)	
Tunisia	Dy_t	0.037	0.36**	0.41*	-0.17	-0.11	0.081*	-0.014	0.67
'67-'90		(1.150)	(1.58)	(2.098)	(-l.12)	(-0.84)	(2.860)	(-0.760)	
	Dp_t	0.020	-0.018	0.091	0.19*	0.076	-0.0082	0.027*	0.67
		(1.240)	(-0.15)	(0.92)	(2.51)	(1.170)	(-0.570)	(2.900)	

Notes: Empirical Models:

$$Dy_t = \beta_{0y} + \beta_{\omega y} DEm_t + \beta_{\omega y} Dms_t + \beta_{2y} Dgov_t + \beta_{3y} Dex_t + \beta_{4y} Doilp_t + \beta_{5y} dum_t + \eta_y$$

$$Dp_t = \beta_{0p} + \beta_{\omega p} DEm_t + \beta_{\omega p} Dms_t + \beta_{2p} Dgov_t \beta_{3p} Dex_t + \beta_{4p} Doilp_t + \beta_{5p} dum_t + \eta_p$$

t-ratios are in parantheses.

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

output in the post-1973 period compared to the pre-1973 period. This is consistent with the adverse effect of a rise in the energy price on output growth in Syria, a non-oil-producing country. In the price equation, the statistical significance of the dummy variable highlights the change in the rate of inflation in the post-1973 period compared to the pre-1973 period. The coefficient on the dummy variable is statistically significant in Algeria, Egypt, Jordan, Syria and Tunisia. In all these cases, except for Jordan, the evidence is consistent with a significant increase in average price inflation following the dramatic rise in energy price in the post-1973 period in Algeria, an oil-producing country, and several neighboring non-oil-producing countries.

5. CROSS-SECTION EVIDENCE

From the time-series evidence, there appears to be a trade-off between the real and inflationary effects of monetary policy. Indeed, the correlation coefficient between the inflationary and real effects is -0.25 for anticipated monetary policy and -0.37 for unanticipated monetary policy, across countries. The remainder of the empirical investigation will seek to evaluate variations in the effects of monetary policy in response to policy design across countries. The effects of monetary policy on major indicators of economic performance will also be investigated across countries. The estimates from the time-series regressions are employed in cross-section regressions that evaluate the difference in those estimates across countries.

5.1 POLICY DESIGN AND THE EFFECTS OF MONETARY POLICY

The evidence in this section seeks to evaluate the importance of the design of monetary policy to the real and inflationary effects of monetary growth across the countries under investigation. Table 4 presents correlation coefficients between parameters of the monetary policy reaction function and the real and inflationary effects of monetary growth.

In line 1, an increase in the response of monetary growth to international reserves decreases the real effects of monetary shifts. This is evident from the negative correlation coefficients, -0.17 and -0.19, between the response of monetary policy to international reserves and the real effects of anticipated and unanticipated monetary policy across countries. In contrast, an increase in the response of monetary growth to international reserves appears somewhat inflationary. This is evident from the positive correlation coefficients, 0.045 and 0.24, between the response of monetary policy to international reserves and the inflationary effects of anticipated and unanticipated monetary policy across countries.

In line 2, the policy response to price inflation appears important to the real effects of anticipated and unanticipated monetary policy, as evidenced by the negative correlation coefficients, -0.45 and -0.58. That is, where monetary policy is accommodating price inflation, the real effect of this policy is smaller.

TABLE 4
Correlation Coeffficients between Parameters of the Policy Reaction Function and the Real and Inflationary Effects of Monetary Policy

Parameters of the Policy		β_{ay}	β_{uy}	β_{ap}	β_{up}
Reaction Function		$\frac{\partial Dy_t}{\partial DEm_t}$	$\frac{\partial Dy_t}{\partial Dms_t}$	$\frac{\partial Dp_t}{\partial DEm_t}$	$\frac{\partial Dp_t}{\partial Dms_t}$
1.	α_1	-0.17 (0.68)	-0.19 (0.65)	0.045 (0.920)	0.24 (0.57)
2.	α_2	-0.45 (0.26)	-0.58 (0.14)	0.27 (0.52)	0.57 (0.14)
3.	α_3	0.059 (0.890)	-0.11 (0.79)	0.40 (0.33)	0.84 (0.0092)
4.	α_4	-0.11 (0.80)	0.14 (0.74)	0.02 (0.96)	0.16 (0.70)

Note: Empirical Models:

$$Dmoney_t = \alpha_0 + \alpha_1 Dir_{t-1} + \alpha_2 Dp_{t-1} + \alpha_3 Dy_{t-1} + \alpha_4 Dgov_{t-1} + \alpha_5 dum_t + \eta_m$$

$$Dy_t = \beta_{0y} + \beta_{ay} DEm_t + \beta_{uy} Dms_t + \beta_{2y} Dgov_t + \beta_{3y} Dex_t + \beta_{4y} Doilp_t + \beta_{5y} dum_t + \eta_y$$

$$Dp_t = \beta_{0p} + \beta_{ap} DEm_t + \beta_{up} Dms_t + \beta_{2p} Dgov_t \beta_{3p} Dex_t + \beta_{4p} Doilp_t + \beta_{5p} dum_t + \eta_p$$

Reported statistics measure correlation coefficients between parameters of the monetary policy reaction function, α_i, i=1...4, and the real and inflationary effects of monetary policy, β_{ai}; and β_{ui}, $i = y, p$.
The probability of zero correlation is in parentheses.

In contrast, where monetary policy aims at price stability, the real effect of this policy is larger. Consistently, the inflationary effects of anticipated and unanticipated monetary growth vary positively with the response of monetary policy to price inflation with correlation coefficients 0.27 and 0.57 respectively. That is, where monetary policy is accommodating price inflation, the inflationary effect of monetary policy is larger across countries. Similarly, disinflationary monetary policy decreases the inflationary effect of monetary policy across countries.

According to the evidence in line 3, the response of monetary policy to output growth does not appear to differentiate the real effect of monetary policy. This is evident from the small correlation coefficients, 0.059 and -0.11, between the response of monetary policy to output growth and the real effects of anticipated and unanticipated monetary growth. In contrast, an increase in the response of monetary policy to output growth raises the inflationary effects of anticipated and unanticipated monetary policy, as evident

from the positive correlation coefficients, 0.40 and 0.84, across countries.

In line 4, accommodating the growth in government spending does not appear to have a large correlation with the real effects of anticipated and unanticipated monetary growth, as evident from the correlation coefficients, -0.11 and 0.14 respectively. Similarly, monetizing the increase in government spending does not appear to be an important factor that increases price inflation. This is evident from the small correlation coefficients, 0.02 and 0.16, between the response of monetary policy to the growth of government spending and the inflationary effects of anticipated and unanticipated monetary growth.

Overall, cross-section correlation highlights the importance of the inflationary component in the design of monetary policy. Across countries, an increase in monetary growth in response to economic conditions appears particularly important in highlighting the inflationary effect of monetary policy.

5.2 MONETARY POLICY AND ECONOMIC PERFORMANCE

The analysis of this section will seek to establish some evidence across countries on correlations between the effects of monetary policy and major indicators of economic performance. Given the time-series evidence, anticipated and unanticipated monetary growth are likely to differentiate the average and variability of real output growth. The contribution of monetary policy to trend output growth and price inflation is measured by the policy effects times the average realized value of monetary growth over time. By construction, monetary surprises cancel each other out, averaging over time to a zero value. Consequently, trend output growth and price inflation are likely to be affected by only the anticipated component of monetary policy. By contrast, both anticipated and unanticipated monetary growth determine the variability of real output growth and price inflation. The contribution of monetary policy to output and price variability is measured by the policy effects times the standard deviation of realized monetary growth values over time.

Cross-section correlations in Table 5 are divided into three segments. The first segment presents correlation coefficients between the parameters measuring the effects of anticipated and unanticipated monetary policy in the empirical models and indicators of economic performance across countries. In line I.a., trend real output growth is positively correlated with the effect of anticipated monetary growth on output with a large magnitude, 0.51, across countries. That is, the non-neutral effect of anticipated monetary policy appears to be an important component that differentiates trend real output growth across the countries under investigation. The increase in money supply is necessary to provide credit for growing economies, especially in oil-producing countries. In contrast, the effect of anticipated monetary growth on real output is negatively correlated with output variability with a small magnitude, -0.059, across countries. That is, the non-neutral effect of anticipated monetary policy does not appear to be an important component of output variability across countries.

TABLE 5
Correlation Coefficients Between the Effects of Monetary Policy and Indicators of Economic Performance

The Effects of Monetary Policy	$\overline{Dy}$	$\overline{Dp}$	*VDy*	*VDp*
I. Real and Inflationary Effects				
I.a. β_{ay}	0.51		-0.059	
	(0.19)		(0.89)	
I.b. β_{uy}			-0.58	
			(0.13)	
I.c. β_{ap}		0.31		0.10
		(0.45)		(0.81)
I.d. β_{up}				-0.17
				(0.68)
II. Contributions to Trend				
II.a. $\beta_{ay}\overline{DEm}$	0.66			
	(0.077)			
II.b. $\beta_{ap}\overline{DEm}$		0.34		
		(0.41)		
III. Contributions to Variability				
III.a. $abs(\beta_{ay})VDEm$			-0.05	
			(0.91)	
III.b. $abs(\beta_{uy})VDms$			-0.61	
			(0.11)	
III.c. $abs(\beta_{ap})VDEm$				0.51
				(0.19)
III.d. $abs(\beta_{up})VDms$				-0.025
				(0.95)

Notes: Empirical Models: see notes to Table 4.
Reported statistics measure correlation coefficients where the numbers in parantheses denote probability of zero correlation.
$\overline{DEm}$, $\overline{Dy}$, and $\overline{Dp}$ denote the sample average of anticipated monetary growth, output growth and price inflation.
VDEm, *VDms*, *VDy*, and *VDp* denote the standard deviation of anticipated monetary growth, unanticipated monetary growth, output growth, and price inflation.

Line I.b. presents the correlation coefficient between the effect of unanticipated monetary growth on output and the variability of output growth across countries. The real effect of unanticipated monetary growth is negatively correlated with output variability with a correlation coefficient that equals -0.58 across countries. That is, the larger the response of output to unanticipated monetary growth, the smaller the output variability across countries. This provides some evidence on the stabilizing function of monetary policy in the short-run. That is, unanticipated monetary growth aims at countering random shocks in the economic system, moderating output variability across countries. For example, an increase in monetary growth moderates output contraction during economic dowturns and, therefore, output variability around its target growth path.

Line I.c. presents correlation coefficients between the response of price inflation to anticipate monetary growth and trend price inflation as well as its variability. The response of price inflation to anticipated monetary growth is correlated with an increase in trend price inflation across countries. This is evident from the positive correlation coefficient, 0.31, between the inflationary effect of anticipated monetary growth and trend price inflation across countries. The effect of anticipated monetary growth appears smaller on the variability of price inflation across countries, as evident from the smaller positive correlation coefficient, 0.10. That is, anticipated monetary growth appears more important to the difference in trend price inflation compared to its variability across countries.

The evidence in line I.d. presents the correlation coefficient between the inflationary effect of unanticipated monetary policy and the variability of price inflation across countries. The inflationary effect of unanticipated monetary growth is negatively correlated with price variability across countries with a correlation coefficient, -0.17. That is, the larger the effect of monetary shocks on price inflation, the smaller is price variability across countries. The implication is that unanticipated monetary growth aims at countering random shocks in the economic system and, therefore, moderates price variability across countries. For example, a decrease in monetary growth moderates price inflation and, therefore, price variability around targeted inflation path.

Additional evidence on the implications of monetary policy to economic performance across countries is provided in segments II and III of Table 5. The contribution of monetary policy to trend output growth is measured by the real effect of anticipated monetary growth, β_{ay}, times the sample average of this growth, $\overline{DEm}$. In line II.a., the correlation between this contribution and trend output growth is positive with a large magnitude, 0.66, across countries. This correlation provides further evidence concerning the non-neutrality of monetary policy across countries. That is, anticipated monetary growth combined with its effect on real output appears to be an important component of trend real output growth across countries.

The contribution of anticipated monetary policy to trend price inflation is

measured by the inflationary effect of this policy, β_{ap}, times the average of anticipated monetary growth, $\overline{DEm}$. In line II.b., the correlation between this contribution and trend price inflation, 0.34, provides additional evidence on the importance of monetary policy to trend price inflation. However, it is interesting to note that, based on correlation magnitudes, anticipated monetary growth appears to be more important to the difference in trend output growth compared to the difference in trend price inflation across countries.

The contribution of anticipated monetary growth to real output variability is measured by the absolute value of the real effect of this policy, β_{ay}, times the standard deviation of the change in policy over time, *VDEm*. Line III.a. presents the correlation coefficient between this contribution and the standard deviation of output growth across countries. This correlation is negative and small in absolute magnitude, -0.05, discounting the importance of anticipated monetary policy to output variability. The contribution of unanticipated monetary growth to output variability is approximated by the absolute value of the real effect of unanticipated policy, β_{uy}, times the standard deviation of unanticipated monetary growth, *VDms*. Line III.b. presents the correlation coefficient between this contribution and the standard deviation of output growth across countries. This correlation is negative and large in absolute value, -0.61. The sign and magnitude of this correlation provide additional evidence on the stabilizing function of monetary policy across countries. That is, unanticipated monetary growth moderates output variability around its trend growth across countries.

The contribution of anticipated monetary policy to the variability of price inflation is measured by the absolute value of the inflationary effect of this policy, β_{ap} times the standard deviation of the change in policy over time, *VDEm*. Line III.c. presents the correlation coefficient between this contribution and the standard deviation of price inflation across countries. The contribution of anticipated monetary policy appears particularly important to the variability of price inflation. That is, an increase in the variability of anticipated monetary policy increases the variability of price inflation, as evident from the positive correlation coefficient, 0.51, in line III.c. The contribution of unanticipated monetary policy to the variability of price inflation is measured by the absolute value of the inflationary effect of this policy, β_{up}, times the standard deviation of the change in policy over time, *VDms*. Line III.d. presents the correlation coefficient between this contribution and the standard deviation of price inflation across countries. The variability of unanticipated monetary policy appears less important to the variability of price inflation, as evident from the small negative correlation coefficient, -0.025, in line III.d.

Overall, the evidence across countries highlights the importance of monetary policy in differentiating trend output growth and price inflation. Further, the variability of monetary policy exacerbates price variability while stabilizing output variability across countries.

6. SUMMARY AND CONCLUSION

The analysis of this paper has attempted to shed some light on the design and effects of monetary policy across a sample of Arab countries that have kept a sufficient record of data for investigation, namely Algeria, Egypt, Jordan, Kuwait, Morocco, Saudi Arabia, Syria, and Tunisia. The monetary authority was assumed to vary the money supply in response to economic conditions. The list of variables in the monetary policy reaction function included international reserves, the price level, real income, and government spending. The investigation sought to shed some light on the direction, accommodating or stabilizing, of monetary policy in response to variables that enter this function. Further, the estimation of the policy reaction function decomposed monetary growth into two components: (i) an anticipated component which accounts for the predicted values of monetary growth, and (ii) an unanticipated component that accounts for random fluctuations in monetary growth. Based on this decomposition, the investigation focused on the real and inflationary effects of each component of monetary policy.

The time-series estimation of the monetary policy reaction function highlighted the following directions: Monetary growth appeared to increase in response to the change in international reserves, in Saudi Arabia, Syria, and Tunisia. The response of monetary growth to price inflation appeared accommodative in Jordan, Kuwait, and Saudi Arabia and stabilizing in Egypt and Tunisia. Further, the monetary authority was accommodating real output growth in Jordan and Saudi Arabia. Finally, the evidence was consistent with the importance of monetary policy in monetizing the budget deficit in Algeria and Tunisia.

Decomposing monetary growth into anticipated and unanticipated components revealed the significance of each component in determining real output growth and price inflation. Anticipated changes in the money supply were statistically significant in determining real output growth in Algeria, Jordan, and Tunisia. This evidence is consistent with the ability of the monetary authority to include non-neutral lasting effects on output growth over time. In addition, random unanticipated fluctuations in the money supply had statistically significant effects on real output growth in Algeria, Jordan and Tunisia. Further, the inflationary effect of anticipated monetary policy dominated that of unanticipated monetary policy in Jordan, Kuwait, and Saudi Arabia. The inflationary effect of unanticipated monetary policy appeared significant only in Jordan.

Based on the time-series evidence for each country, the investigation turned to an evaluation of variation in the effects of monetary policy in response to the policy design across countries. Overall, cross-section correlations highlighted the importance of the inflationary component in the design of monetary policy. That is, an increase in monetary growth in response to economic conditions appears particularly important in highlighting the inflationary effect of monetary policy across countries.

The investigation then turned to an evaluation of the effects of monetary policy on major indicators of economic performance across countries. Overall, the evidence across countries highlighted the importance of anticipated monetary policy in differentiating trend output growth and price inflation across countries. However, it is interesting to note that, based on correlation magnitudes, anticipated monetary growth appeared more important to the difference in trend output growth compared to trend price inflation across countries. Both anticipated and unanticipated monetary policy contributed to the variability of real output growth and price inflation. Based on cross-country correlation, the variability of monetary policy exacerbated price variability while stabilizing output variability across countries.

Overall, the paper's empirical results do not indicate that central banks enjoy a high degree of autonomy in the countries under investigation. Anticipated changes in monetary growth appear to be an important component in the design of monetary policy that affects real output growth and price inflation. Through this component, monetary policy is capable of inducing long-lasting non-neutral effects that differentiate trend output growth across countries over time. Thus, while agents may be able to anticipate the direction of monetary policy based on realized economic conditions, the institutional structure prevents agents from utilizing this information effectively to counter the effects of anticipated monetary policy on the real economy. Consequently, changes in monetary policy, though anticipated, affect real output and hence, trend growth. Monetary policy appears, therefore, to be an important component of economic growth in the economies under consideration. It remains, however, necessary to relax supply-side constraints that limit capacity and increase the inflationary pressure of expansionary monetary policy. By relaxing these constraints, monetary policy will guarantee a smooth flow of credit that is necessary to sustain output growth.

ENDNOTES

1. For more details, see Wohlers-Scharf (1982).

2. For some discussion on the views governing the design of monetary policy, see Hoskins (1993).

3. The list is not intended to be inclusive. Instead, it aims at identifying major determinants of monetary policy based on data availability.

4. A reduction in international reserves prompts the monetary authority to slow down the growth of domestic credit to raise the domestic interest rate and attract foreign funds.

5. These implications are shared by standard macroeconomic models that assume rationality to decompose demand shifts into anticipated and unanticipated changes. These include imperfect information models of the variety of Lucas (1973, 1975) and

New Keynesian sticky-wage models or sticky-price models (see, e.g., Ball, Mankiw, and Romer, 1988).

6. The effects of devaluation in less developed countries are expected to vary from the standard implications for advanced countries. For more details, see Porter and Ranney (1982).

7. As explained in Appendix B, the oil price is measured by the export price of crude oil for Kuwait. This approximates the international price of oil that is expected to be highly correlated with domestic oil prices, especially for oil-importing countries. For oil-exporting countries, the export price of oil is used in estimation where data are available.

8. By construction, *DEm* is a function of the lagged values of output growth and price inflation. This eliminates the need to include the lagged dependent variables to account for possible persistence in the empirical models.

9. This may be indicative of a systematic policy of sterilization in these countries. The paper's evidence is robust with respect to a modification that measures the design of monetary policy in terms of domestic credit rather than the money supply.

10. Unlike monetary surprises, anticipated changes in monetary policy are not pure random fluctuations that cancel out over time. This evidence is consistent with earlier studies that considered the introduction of real money balances in the production function.

11. This evidence is consistent with the findings of previous investigations. Salih (1993) investigates the determinants of inflation in the Arab oil-exporting states of the Gulf. He finds that an excessive growth in monetary aggregates results in doubling the inflation rate. Beltas and Jones (1993) study the direction of causality between the inflation rate and the growth of money supply in Algeria. They found a causal relationship between the inflation rate and the growth of money supply.

12. Increased government spending may be consistent with the increased spending in the form of subsidies that aim at countering inflation in the market price of basic consumption items.

13. This signals the failure of devaluation to stimulate export growth while raising the cost of necessary imports for which domestic substitutes are not available.

14. This evidence appears a bit surprising given the large number of Jordanian citizens working in neighboring oil-producing countries. These workers transfer remittances to their home country that contribute positively to real output growth. Nonetheless, this factor appears to be dominated by an increase in the cost of the output produced, which is evident from contraction of real output growth in response to the increased energy price in Jordan.

15. This evidence may be attributed to the increase in oil production which stimulates the supply side of the economy and, in turn, decreases price inflation in Algeria, an oil-

producing country.

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APPENDIX 1
Econometrics Methodology

The first step towards the estimation of the empirical models (4) and (5) is the development of the money supply process. According to the model specification in (1), anticipated growth in the money supply is approximated using one lag of the change in available variables that determine monetary growth in theory: international reserves, real output, the price level, and government spending. Monetary growth shocks are then approximated by the residual series from the money growth process. The results are robust in experiments that vary variables and/or the lag length in the information set.

Having obtained the necessary shocks, the output and price equations could be estimated. The estimates provide the starting values of a joint non-linear estimation, 3SLS, of the empirical models for each of real output and the price level together with monetary growth. The paper's conclusions are robust when considering the results of the two-step procedure to evaluate the real and inflationary effects of monetary growth. The advantages of the joint estimation procedure were discussed by Mishkin (1992) to deal with the "generated regressor" problem implied by the two-step procedure. The joint estimation allows for efficient estimates and assures correct inferences (i.e., consistent variance estimates). Following Mishkin (1992), it is assumed for the joint estimation that the disturbance in the money growth equation includes two lags of the log value of real output, the price level, the money supply, government spending, the interest rate, the exchange rate, and the oil price.

The results of Engle's (1982) test for serial correlation present evidence of first-order autoregressive errors for some countries. To maintain comparability across countries, it is assumed in all cases that the errors of the output and price equations follows an AR(1) process. After transformation to eliminate serial correlation, the estimated residuals have zero means and are serially uncorrelated.

APPENDIX 2
Data Description and Sources

- Aggregate Demand: output of GDP for Algeria and Syria, and output of GNP for Egypt, Jordan, Kuwait, Morocco, Saudi Arabia, and Tunisia.
- Real Output: real output of GDP or GNP, as listed above.
- Oil Price Level: the export price of oil for Algeria and Morocco. For all other countries, the oil price is measured by the export price of oil for Kuwait.
- Short-term Interest Rate: the discount rate or representatives of short-term market rates.
- The Money Supply: currency, checkable deposits, and time and saving deposits, all in nominal values.
- Domestic Currency Price of Foreign Currency: the end of period national currency value of SDRs.
- Government Spending: nominal value of all payments by the government.
- International Reserves: nominal value of domestic holdings of international reserves.

The sample period for the estimation varies across countries based on data availability. All data are taken from *International Financial Statistics* yearbooks, issued by the International Monetary Fund, Washington, D.C.