Macroeconomic policy and economic performance in developing countries

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In this article,[1] Maxwell Fry, who became Director of the Bank's Centre for Central Banking Studies (CCBS) in September 1997, examines the relationship between monetary and fiscal policies for a sample of 70 developing countries. He finds that the size of the government's deficit and the methods by which it is financed determine monetary policy reactions to increases in both government credit and net foreign assets. In particular, Maxwell Fry finds that larger deficits and greater reliance by governments on the domestic banking system are associated with more accommodating monetary policies. In turn, such inflationary macroeconomic policies are associated not only with higher inflation, but also with lower economic growth.

Introduction

In many developing countries where I have worked, the fiscal situation dominates other areas of macroeconomic policy, including exchange rate and monetary policies. Specifically, large and sustained government deficits are typically accompanied by inflationary monetary expansion and exchange rate depreciation. In this paper, I put forward the hypothesis that this is systematically the case: a country's monetary policy stance amplifies rather than offsets its fiscal stance, as defined by both the size of its deficit and how it is financed. I further suggest that the reason for this relationship between fiscal and monetary policy is that both are determined by the government's competence in macroeconomic policy-making.

A government can finance its deficit in various ways. For example, the typical OECD country finances about 50% of its deficit from non-bank domestic sources, whereas the typical developing country finances only about 8% from this source (Fry (1997, page 4)). Here, I predict that the larger its deficit and the more a government finances it by borrowing from the domestic banking system, the less monetary policy will counteract the consequent inflationary pressures. So the size of the deficit and the methods by which it is financed together affect the stance of monetary policy.

To examine the relationship between fiscal and monetary policies, I estimate monetary policy reaction functions for groups of countries selected on their fiscal characteristics, drawn from a sample of 70 developing countries. The results support my hypothesis: they suggest that, far from offsetting expansionary fiscal policy, monetary policy tends to compound any inflationary fiscal stance in these countries. Larger deficits and greater reliance by governments on the domestic banking system are associated not only with less monetary policy neutralisation (that is, changes in government borrowing from the domestic banking system are not countered by equal and opposite changes in credit to the private sector), but also with less sterilisation of increases in foreign exchange reserves. In other words, more inflationary fiscal policies are accompanied by more accommodating and so more inflationary monetary policies.[2]

Monetary policy reaction functions

To pursue a monetary target, monetary policy in any open economy acts to control domestic credit expansion. If the government's demands would otherwise produce inflationary domestic credit expansion, monetary policy can react by reducing credit to the private sector.[3]

To examine whether monetary policy in developing countries has neutralised government credit expansion by reducing private sector credit, I estimate monetary policy reaction functions for a variety of countries. This builds on earlier work on monetary policy reaction functions (eg Reuber (1964) and Froyen (1974)), where central bank objectives have typically been modelled to include a balance of payments target, an inflation target, and possibly a response to exogenous shocks such as changes in the terms of trade.

Initially, I specify the monetary policy reaction function in terms of the change in domestic credit scaled by GDP,

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(2) An accommodating monetary policy responds to exogenous shocks such as an oil price increase or extra government borrowing by expanding the money stock to finance and so validate the higher price or increased aggregate demand. The 'real bills' doctrine advocates one form of accommodating monetary policy. Adam Smith (1776) argued that, provided banks confined themselves to lending short on the security of good commercial paper ('real bills' financing trade in real commodities), and provided they were legally obliged to redeem their notes on demand at a fixed price in terms of gold, overissue (and hence inflation) was impossible. Smith's second condition was subsequently ignored during the period 1797–1821, when the Bank of England's obligation to redeem its notes in gold was suspended; advocates of the doctrine still invoked Smith to defend their view that adherence to the policy of lending only against real bills would prevent overissue and so inflation. History has demonstrated the fallacy of this doctrine, at least for currencies not redeemable on demand into gold (Laidler (1992, page 104)).

(3) In the industrialised countries, this is achieved by raising interest rates to influence the demand for credit. In many developing countries, monetary policy is implemented by setting credit ceilings to affect the supply directly.

DDCY, a potential intermediate target of monetary policy in an open economy. The first explanatory variable, *DNFAY*, is the change in net foreign assets of the banking system adjusted for exchange rate changes and scaled by GDP, included to detect any systematic sterilisation of the effects of such asset acquisition on the money supply. Complete sterilisation implies a coefficient of -1 for the variable *DNFAY*. (Because domestic credit plus net foreign assets constitutes the assets backing the money stock, an increase in the latter must be offset by a decrease in the former to prevent any change in money.)

An alternative reaction to an increase in net foreign assets is to increase domestic credit. Porzecanski (1979) finds that higher net foreign assets led to more rapid domestic credit expansion in Mexico and Venezuela. I discover the same phenomenon in Sri Lanka (Fry (1990)) and Turkey (Fry (1988)). Indeed, Turkey's two bouts of double-digit inflation in the 1950s and 1970s originated in rapid increases in foreign exchange receipts. Rather than sterilising the effect of higher net foreign assets on the money supply, Turkish monetary policy responded by expanding domestic credit to finance a greater volume of imports of capital equipment and raw materials. Although this reduced rapidly the level of net foreign assets, it sustained the expansionary monetary impulse. Turkey then followed its own version of the 'real bills' doctrine towards domestic credit expansion, accommodating with a lag demand pressures generated by the accelerating rise in nominal GNP.

Other possible explanatory variables are the gap between domestic inflation and inflation in the industrial countries, the gap between actual and potential output as a proxy for unemployment, economic growth, and the rate of change in international oil prices. Fry, Lilien, and Wadhwa (1988) find that monetary policy in their sample of developing countries outside the Pacific Basin accommodated domestically generated inflationary pressures, the government's credit requirements, and the increase in oil prices. Porzecanski (1979) also finds that Argentina and Chile accommodated domestically generated inflation either to supplement government revenue through monetary expansion or to maintain a certain level of real liquidity in the economy.

The monetary policy reaction function estimated here takes the form:

$$DDCY = f(DNFAY, X_i) \qquad \textbf{(1)}$$

where X_i represents all the explanatory variables other than *DNFAY*.

Equation **(1)** implicitly assumes a zero coefficient for the change in net domestic credit to the government scaled by GDP, *DDCGY* (since any increase in the government borrowing requirements is completely neutralised). In this case, the expansion of domestic credit is wholly unaffected by any changes in the government's borrowing needs.

I now subtract *DDCGY* from both sides of equation **(1)** to produce the monetary policy reaction function that I estimate for various country groups:

$$DDCPY = f(DNFAY, X_i) - DDCGY \qquad \textbf{(2)}$$

where *DDCPY* is the change in domestic credit to the private sector deflated by GDP. Note that $DDCY \equiv DDCPY + DDCGY$. Complete neutralisation of the government's extra borrowing requirements implies a coefficient of -1 for *DDCGY*. Partial neutralisation, however, produces a coefficient less than zero but greater than -1, and no neutralisation entails a coefficient of zero.

While monetary control dictates complete neutralisation of increased government borrowing from the banking system, the factors influencing the government's credit requirements may affect the private sector's credit demands in a similar way. A passive or accommodating monetary policy would then sanction increases in private sector domestic credit along with increased government borrowing. In this case, the estimated neutralisation coefficient would be positive.

The neutralisation and sterilisation coefficients, together with the monetary policy reaction to inflation itself, measure the extent to which monetary policy is accommodating or used systematically for monetary control.

Estimates of monetary policy reaction functions

To examine the relationship between deficit finance and monetary policy, I obtained data for 70 developing countries for the period 1972–95.(1) This sample includes all developing countries with a reasonable number of observations for the relevant fiscal variables. Even so, the relatively small number of observations per country necessitated parsimonious specifications of the monetary policy reaction function. I therefore include only current and lagged *DNFAY* and *DDCGY*, and the gap between domestic inflation and inflation in the industrial countries, *INFGAP*, measured as the continuously compounded rate of change in the GDP deflator minus the continuously compounded consumer price index for industrial countries.(2)

To select the countries for each estimate, I first ranked them on the basis of various potential discriminating variables. I

(1) Details of the country sample and the data definitions are contained in Fry (1997).
(2) The variable *INFGAP* is defined as $\Delta\log(P_D) - \Delta\log(P_{OECD})$, where P_D is the domestic GDP deflator (nominal GDP divided by GDP at constant prices) and P_{OECD} is the average level of consumer prices in industrial countries. If monetary authorities squeeze domestic credit in response to a widening gap, the coefficient of *INFGAP* would be negative. The choice of GDP deflator rather than consumer price index was dictated by the fact that CPI data for a number of countries were available for only a short time period. Though a traded-goods price index would have been preferable to consumer prices in industrial countries, no alternative average price index for industrial countries is available in *International Financial Statistics* CD-ROM, the main data source used here. I treat the variables *DNFAY*, *DDCGY* and *INFGAP* as endogenous; the instruments I use are the remaining explanatory variables, lagged *INFGAP*, lagged money and economic growth rates, the rate of change in oil prices, the OECD growth rate, and the world real interest rate. In fact, treating the government borrowing requirement *DDCGY* as exogenous to the monetary policy process produces virtually identical results.

then selected the ten countries with the highest average values of the discriminating variable and the ten countries with the lowest average values of this variable during the period 1972–95. Finally, I estimated a system of 20 monetary policy reaction functions with appropriate cross-equation restrictions.(1)

To distinguish effects between 'low' and 'high' country groups, I estimate shift parameters for countries in the 'low' country group, ie the countries scoring low values on the particular discriminating variable. So I assign countries in the 'low' group a value of 1 for the dummy variable *L*; countries in the 'high' group take a value of 0 for *L*. The monetary policy function I estimate is therefore:

$$DDCPY = b_1\, DNFAY + b_2\, DNFAY_{t-1} + b_3\, DDCGY + b_4\, DDCGY_{t-1} + b_5\, INFGAP + b_6\, L.DNFAY + b_7\, L.DNFAY_{t-1} + b_8\, L.DDCGY + b_9\, L.DDCGY_{t-1} + b_{10}\, L.INFGAP \quad \textbf{(3)}$$

The coefficient of *DDCGY* for the 'low' country group is $b_3 + b_8$; it is simply b_3 for the 'high' country group. Full neutralisation of additional government borrowing implies $b_3 + b_4\ (+\ b_8 + b_9) = -1$, while full sterilisation of changes in net foreign assets requires $b_1 + b_2\ (+\ b_6 + b_7) = -1$.

Size of deficits

Table A presents summary results of the monetary policy reaction functions estimated using fiscal variables to select the countries in each estimate; Table 1 in the Appendix reports the complete estimates. For the estimate in the column labelled 'Government deficit/GDP', I select 20 countries using the average government deficit in the period 1972–95. The ten countries in the 'high' group had the largest average deficit ratios, while the ten countries in the 'low' group had the smallest average deficit ratios during this period. This estimate indicates that sterilisation (of external flows) and neutralisation (of budget deficits) coefficients in low-deficit countries are both significantly higher than they are in high-deficit countries. Indeed, this result suggests that, far from counteracting increases in net foreign assets and expansionary fiscal policy, monetary policy in high-deficit countries compounds the inflationary effects of both net inflows of foreign assets and large government deficits. In low-deficit countries, however, monetary policy exhibits some systematic monetary control: in any two-year period, monetary policy in low-deficit countries sterilises 17% of increases in net foreign assets and 41% of increases in domestic credit to the government.

Table A
Summary results of monetary policy reaction function *DDCPY* estimates by fiscal indicators, 1972–95

Explanatory variable	Coefficients (equation **(3)**)	Fiscal indicator: Government deficit/GDP	Δ Reserve money/GDP	Reserve/deposit ratio
		Coefficients for 'high' country group		
DNFAY	$b_1 + b_2$	0.051	0.173	0.003
DDCGY	$b_3 + b_4$	0.176	-0.137	0.218
		Implied coefficients for 'low' country group		
DNFAY	$b_1 + b_2 + b_6 + b_7$	-0.169	-0.198	-0.239
DDCGY	$b_3 + b_4 + b_8 + b_9$	-0.410	-0.392	-1.007

Methods of financing deficits

For the remaining estimates in Table A, I select countries based on the method by which governments finance their deficits. The estimate in the column labelled 'Δ Reserve money/GDP' uses the average change in reserve money expressed as a proportion of GDP to choose 20 countries that finance their deficits to a greater or lesser extent from seigniorage revenue. The estimated equation is similar to that in the previous column: no sterilisation and very little neutralisation in high-seigniorage countries, but 20% sterilisation and 39% neutralisation in the low-seigniorage country group.

One method of financial repression that extracts revenue for the government is to impose high reserve requirements on the commercial banks. On average, the required reserve ratio in developing countries is three times higher than in industrial countries. Substantial use of inflationary monetary expansion tends to be accompanied by high required reserve ratios. In contrast to the textbook discussion of higher required reserve ratios as a monetary policy instrument to restrict monetary growth, a comparison across developing countries indicates that monetary growth or inflation and the ratio of bank reserves to deposits are positively correlated (Agénor and Montiel (1996, pages 154–57), Brock (1989), and Fry (1995, pages 5–6)). Evidently, countries using inflationary monetary expansion tend to combine higher tax rates with a larger tax base in the form of higher required reserve ratios.

The final column in Table A, labelled 'Reserve/deposit ratio', selects countries using the average ratio of bank reserves to bank deposits. Although the estimated equation produces results similar to the other two, the difference between monetary policy reactions in 'high' and 'low' country groups in this equation is most substantial. In countries with high reserve/deposit ratios, monetary policy does not sterilise and actually accentuates credit expansion to the government. In low reserve/deposit ratios countries, however, monetary policy sterilises 24% of increases in net foreign assets and neutralises 101% of any increase in net domestic credit to the government. In other words, monetary policy in low reserve/deposit countries exhibits complete monetary control when government borrowing from the banking system changes.

Monetary policy, inflation, and growth

The results in Table A suggest that lax fiscal discipline in developing countries tends not to be accompanied by

(1) Each regression estimate reported here consists of country equations estimated simultaneously using iterative three-stage least squares (3SLS) with cross-equation restrictions on all slope coefficients, but with shift parameters for the lowest-scoring group; country intercepts are not constrained. The 3SLS estimation procedure is, asymptotically, full-information maximum likelihood. This estimation technique requires that the minimum number of observations exceeds the number of equations, which is why I include only 20 countries in each system of equations.

Table B
Summary results of monetary policy reaction function *DDCPY* estimates by alternative indicators, 1972–95

Explanatory variable	Coefficients (equation **(3)**)	Alternative indicator: Inflation	Alternative indicator: Growth
		Coefficients for 'high' country group	
DNFAY	$b_1 + b_2$	0.273	-0.674
DDCGY	$b_3 + b_4$	0.498	-0.868
		Implied coefficients for 'low' country group	
DNFAY	$b_1 + b_2 + b_6 + b_7$	-0.096	-0.116
DDCGY	$b_3 + b_4 + b_8 + b_9$	-0.673	-0.025

monetary policy aimed at controlling monetary expansion. The two additional estimates of equation **(3)** in Table B show that such accommodating monetary policy is associated with high inflation, and monetary control with high growth.(1) For the estimate in the 'inflation' column, I chose the 20 countries on the basis of lowest and highest inflation rates. The monetary policy behaviour of these two groups is quite different. Monetary policy in high-inflation developing countries neither sterilises increases in net foreign assets nor neutralises increased government borrowing. Indeed, increases in both net foreign assets and net domestic credit to the government are associated with greater expansion in domestic credit to the private sector. In contrast, monetary policy in low-inflation countries sterilises 10% of any increase in net foreign assets and neutralises 67% of any increase in government borrowing.

The 'growth' column in Table B displays the largest difference in monetary policy behaviour between country groups. For this estimate, I selected the ten fastest-growing and the ten slowest-growing developing countries. In the high-growth countries, monetary policy sterilises 67% of any increase in net foreign assets and neutralises 87% of any increase in government borrowing, while monetary policy in low-growth countries sterilises 12% of any increase in net foreign assets and neutralises only 3% of any increase in government borrowing.

The results in Table B support the view that the discriminating fiscal variables used in Table A are capturing competence among the country's macroeconomic policy-makers: competent macroeconomic policy-makers eschew the inflation tax and financial repression to finance government deficits, and understand the concepts of monetary control. The monetary control exhibited in the highest-growth country group tends to be associated with all-round competent economic policy-making.(2) Moreover, growth is closely related to the fiscal variables. Table C compares the mean values of the fiscal variables when countries are selected on growth rates with their mean values when countries are selected on the fiscal variables themselves. The numbers represent means of all annual values for the country group. So the annual government deficit in the ten highest-growth countries averaged 1.4%, compared with 9.5% in the ten lowest-growth countries. The ten lowest-deficit countries averaged surpluses of 1.6% (ie deficits of -1.6%), compared with an average deficit of 12.8% in the ten highest-deficit countries.

Table C
Fiscal attributes in high and low-growth countries

Average annual percentages, 1972–95

Fiscal attribute	Low fiscal	High fiscal	Low growth	High growth
Government deficit/GDP	-1.6	12.8	9.5	1.4
Reserve money/GDP	0.7	6.6	4.1	1.4
Reserves/deposits	6.6	46.9	29.2	12.5

All the differences between high and low-growth countries are highly significant. In all cases, high-growth countries exhibit low averages for fiscal variables, ie low deficits, low reserve-money growth, and low reserve/deposit ratios. In other words, countries with good fiscal characteristics perform better economically than those with poor fiscal characteristics. After conducting formal causality tests, Fischer (1993, page 510) concludes that 'small deficits are good for growth'. So the fact that growth is the best discriminating variable for detecting monetary control is quite consistent with the policy competence hypothesis.

Conclusion

I detect clear differences in monetary policy reaction functions based on fiscal, inflation, and growth attributes of 70 developing countries. The estimated monetary policy reaction functions reported here show that larger deficits and greater reliance by governments on the inflation tax and financial repression are associated both with less sterilisation of increased net foreign assets and with less neutralisation of increased government borrowing requirements. Furthermore, monetary policy exhibiting greatest monetary control occurs in high-growth countries. My interpretation of all this is that competent macroeconomic policy-making, ie both fiscal and monetary policy, fosters both low inflation and high growth.

(1) The full estimates are reported in Table E of the Appendix.
(2) That policy rather than behavioural differences are more important in explaining differences in economic performance in developing countries is also suggested in Fry (1995, pages 229–54), Fry (1998), Fry and Lilien (1986), and Fry, Lilien, and Wadhwa (1988).

Appendix

Table 1
Iterative 3SLS monetary policy reaction function *DDCPY* estimates by fiscal indicators, 1972–95

Explanatory variable	Coefficients (equation **(3)**)	Fiscal indicator		
		Government deficit/GDP	Δ Reserve money/GDP	Reserve/deposit ratio
$\widehat{DNFAY}$	b_1	0.025 (1.725)	0.153 (7.184)	0.003 (0.255)
$DNFAY_{t-1}$	b_2	0.026 (3.050)	0.020 (1.516)	-0.000 (-0.010)
$\widehat{DDCGY}$	b_3	0.087 (3.026)	-0.060 (-1.739)	0.248 (9.206)
$DDCGY_{t-1}$	b_4	0.089 (3.722)	-0.077 (-4.404)	-0.031 (-1.234)
$\widehat{INFGAP}$	b_5	-0.005 (-3.014)	0.062 (16.482)	0.015 (7.609)
			‘Low’ shift parameters	
$\widehat{DNFAY}$	b_6	-0.221 (-8.530)	-0.538 (-19.501)	-0.352 (-10.092)
$DNFAY_{t-1}$	b_7	0.001 (0.069)	0.167 (7.541)	0.110 (4.056)
$\widehat{DDCGY}$	b_8	-0.266 (-5.722)	-0.419 (-8.319)	-1.067 (-18.365)
$DDCGY_{t-1}$	b_9	-0.320 (-8.471)	0.164 (6.019)	-0.158 (-3.777)
$\widehat{INFGAP}$	b_{10}	-0.057 (-4.988)	-0.017 (-3.644)	-0.041 (-2.319)
$\bar{R}^2$		0.393	0.465	0.644

Table 2
Iterative 3SLS monetary policy reaction function *DDCPY* estimates by alternative indicators, 1972–95

Explanatory variable	Coefficients (equation **(3)**)	Alternative indicator	
		Inflation	Growth
$\widehat{DNFAY}$	b_1	0.154	-0.512
		(5.971)	(-16.589)
$DNFAY_{t-1}$	b_2	0.119	-0.162
		(7.605)	(-7.359)
$\widehat{DDCGY}$	b_3	0.535	-0.550
		(19.438)	(-16.381)
$DDCGY_{t-1}$	b_4	-0.037	-0.318
		(-1.559)	(-13.130)
$\widehat{INFGAP}$	b_5	-0.002	0.035
		(-1.407)	(6.877)
		‘Low’ shift parameters	
$\widehat{DNFAY}$	b_6	-0.489	0.408
		(-13.319)	(12.120)
$DNFAY_{t-1}$	b_7	0.121	0.150
		(4.720)	(6.485)
$\widehat{DDCGY}$	b_8	-1.077	0.542
		(-23.594)	(13.918)
$DDCGY_{t-1}$	b_9	-0.093	0.301
		(-2.481)	(10.222)
$\widehat{INFGAP}$	b_{10}	0.019	-0.021
		(0.657)	(-3.706)
$\bar{R}^2$		0.395	0.500

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