CENTRAL BANK OF TRINIDAD AND TOBAGO

CARIBBEAN CENTRE FOR MONETARY STUDIES

XXVIIIth ANNUAL CONFERENCE ON MONETARY STUDIES

MONETARY TRANSMISSION MECHANISMS AND OUTPUT IN TRINIDAD AND TOBAGO

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ST. AUGUSTINE, TRINIDAD

October 28 - November 1, 1996
Conference Facilities - 16th Floor, Central Bank of Trinidad & Tobago

THE MONETARY TRANSMISSION PROCESS IN A SMALL OPEN ECONOMY

THE CASE OF TRINIDAD & TOBAGO

by

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October 1996

Research for this paper was funded by Republic Bank of Trinidad & Tobago

Introduction

One of the better known controversies in macroeconomics revolves around the link between monetary policy and real sector activity. See Bernanke and Blinder (1988, 1992), Dale and Haldane (1995) and Sims (1992). There are two aspects of the problem: firstly, does monetary policy impact on real activity (and to what extent) and, secondly, what are the channels of transmission? Of particular interest in this transmission process is the role of commercial bank money and credit.

In this paper, an attempt is made to answer these questions empirically in the case of a small open economy, Trinidad & Tobago. The framework employed is a small unrestricted VAR model of the Trinidad & Tobago economy of the form:

$$y_t = \Pi_1 y_{t-1} + \Pi_2 y_{t-2} + ... + \Pi_n y_{t-n} + Bx_t + \varepsilon_t \quad (1)$$

where y_t is a vector of p endogenous variables, x_t is a vector of exogenous variables, Π_1, Π_2, ..., Π_n and **B** are matrices of coefficients to be estimated, and ε_t is a vector of innovations that are correlated with each other but uncorrelated with their own lagged values and uncorrelated with y_{t-1} and x_t. The assumption that the disturbances are not serially correlated is unrestrictive because any serial correlation could be absorbed by adding more lagged ys.

The main objective of the paper is to evaluate the impact of a monetary shock on monetary and, more importantly, real variables (like prices, employment, income and so on). Following Bernanke and Blinder (1992), an instrument of monetary policy in Trinidad & Tobago, the Treasury Bill Rate, is isolated and its innovations interpreted as policy shocks. Under the assumptions governing (1), "the reduced-form responses of the economy to observed policy shocks would correctly measure the dynamic structural effects of a monetary policy change" (Bernanke and Blinder, p. 902). This allows us to determine the nature and extent of the monetary transmission mechanism.

Monetary policy in the context of the VAR model considered in this paper is partly exogenous and partly endogenous. It is exogenous because the policy instrument is, in the final analysis, perfectly controllable by the monetary authority and innovations to this instrument are generated autonomously. But it is endogenous because there are also "within-period" feedbacks so that unpredictable movements in the monetary policy variable are generated in part by disturbances originating elsewhere in the economy. This endogenous response occurs through the monetary authority's reaction function which is also the subject of inquiry in this paper.

The rest of this paper is organised as follows: in the following section, the data used and the methodology of analysis used are discussed. The results are then presented and analysed in another section after which the paper is concluded.

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Data and Methodology

The system to be used as the basis of the investigation must comprise a monetary policy instrument (already identified as the treasury bill rate), potential channels of monetary transmission (commercial bank balance sheet data like loans and deposits as well as associated "prices" like interest rates) and, finally, target variables like employment, income and prices. The monetary authority's reaction function is likely as well to be influenced by movements in the exchange rate and this, too, should be included.

The estimated VAR is based on quarterly data on eight (8) variables from 1970:1 to 1995:4. These variables, which summarize the concerns raised in the previous paragraph, are the treasury bill rate; the exchange rate and the loan rate of interest; total bank deposits and loans (which are, respectively, "money" and "credit" items) and, finally, income, unemployment and the price level.

The treasury bill and loan rates appear in the model in their raw form, but all the other variables appear in logarithmic form. The exchange rate used is a crude measure of the real effective exchange rate, obtained by deflating the nominal rate of the US dollar (expressed in TT dollars) by the US consumer price index. Data sources are given in Appendix.

In a model like this one, the effects of policy shocks can be unambiguously identified with the *impulse response function* which traces the response of an endogenous variable to a change in the policy innovations. Specifically, it traces the effect on current and future values of the endogenous variable of a shock to one of the innovations. If the innovations are not correlated with each other, interpretation is straightforward; but the ambiguity in interpreting impulse response functions arises from the fact that the errors are never totally uncorrelated. When the errors are correlated they have a common component which cannot be identified with any specific variable. A somewhat arbitrary method of dealing with this problem is to attribute all of the effect of any common component to the variable that comes first in the VAR system.

More technically, the errors are orthogonalized by a Choleski decomposition so that the covariance matrix of the resulting innovations is diagonal. While the Choleski decomposition is widely used, it is a rather arbitrary method of attributing common effects. Changing the order of equations can dramatically change the impulse responses but, provided that there is no contemporaneous feedback from the non policy variables onto the policy variables, there is a theoretical justification for placing the monetary policy instrument at the top of the system. The (recursive) mapping between the policy and non-policy variables then constitutes a valid representation of the monetary transmission process. If attention is restricted to the responses of the non-policy variables to shocks to the policy instrument, then ordering of the non-policy variables is not an issue since these responses are invariant to any such ordering. See Dale and Haldane (1995).

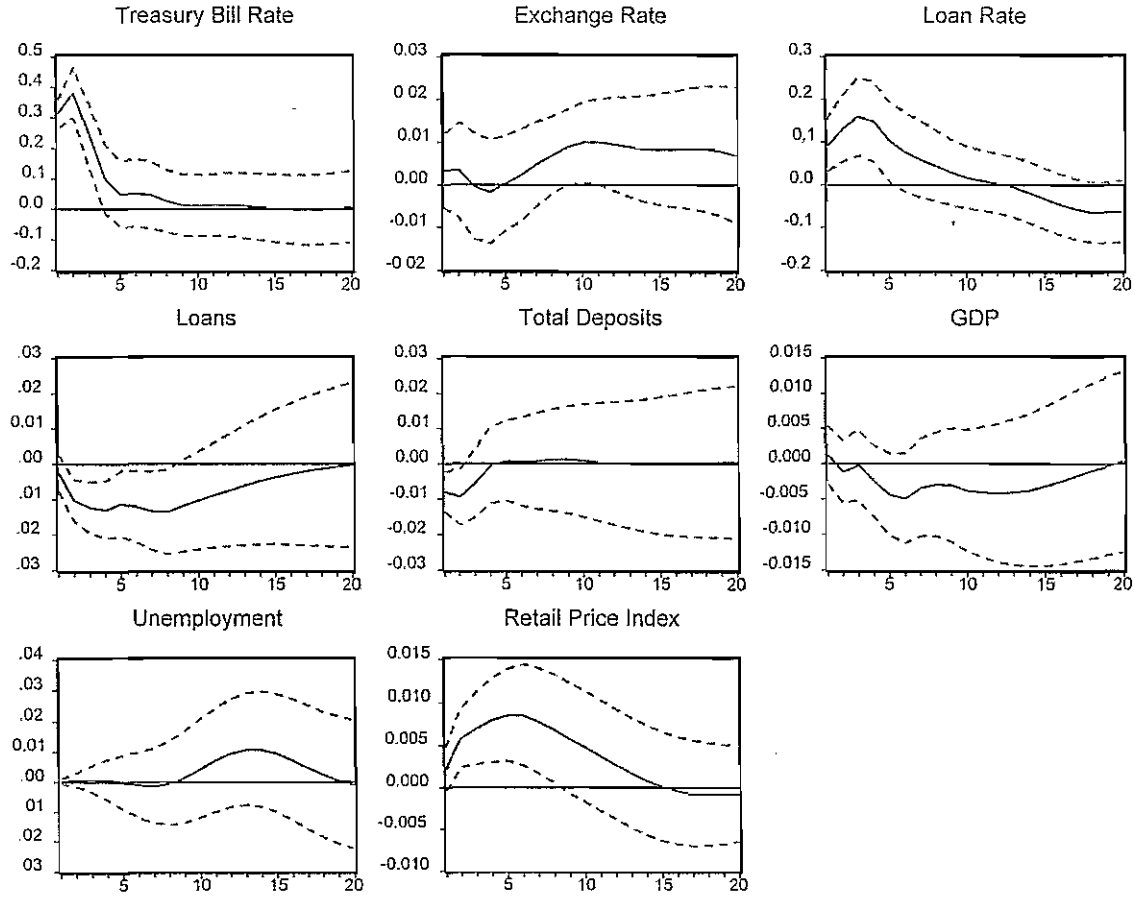
Results

All 8 variables were pre-tested for unit roots and they were all established as I(1). The VAR equations were all fitted by Ordinary Least Squares using the levels of the variables after it was verified, using the method proposed by Johansen (1988), that the variables were cointegrated (there were in fact 5 cointegrating vectors). The optimal lag length was established as three (3) quarters using likelihood ratio "redundant variable" tests.

The results of the VAR estimation are not in themselves interesting and are not shown here. Figure 1 below shows the impulse response functions over a five year period (20 quarters) resulting from a one standard deviation shock to the policy innovations.

Figure 1

Impulse Response Functions Based on One Standard Deviation Shock to Treasury Bill Rate Innovations



Confidence interval bands (95%) for the responses are clearly shown. For the variables expressed in logarithmic form, these responses trace out a cumulative growth rate relative to the base period when the shock occurred while for the interest rates (which are expressed as percentages), the responses trace out the percentage point changes relative to

the base period. The order shown in Figure 1 (treasury bill rate, exchange rate, ..., retail price index) reflects the ordering of the VARs in the model.

There appears to be some superficial evidence that the monetary transmission mechanism works more through the credit (loans) rather than through the money (deposits) channel. The loan rate increases immediately as a result of the initial shock and this is followed by a marked and sustained fall in the demand for loans. We would normally expect, in a situation of rising interest rates, that bank deposits would rise. In the current context, however, they fall and at best hover around "zero change" some time thereafter. One plausible explanation is that economic agents respond to the initial shock by drawing down on accumulated deposits rather than through raising loans. The resulting fall in loans and in the money supply is reflected in falling production (GDP) levels, increasing unemployment and rising prices but these real variables seem to shadow more closely movements in the credit rather than the money variable. Below, however, when the variance decompositions are examined in some more detail, some more convincing evidence for the greater importance of money (as opposed to credit) will become more apparent.

Monetarists would usually argue that a fall in the money supply should be accompanied by falling rather than rising prices and that the national currency should be strengthened. But the opposite seems to be happening here. One possible explanation, following Sims (1992), is that the monetary authority has information about inflationary pressures which is not normally available. The shock, then, appears to result in increasing prices in the presence of monetary contraction but in reality these increases would have occurred anyway and might in fact be smaller than they would be in the absence of the monetary shock. These rising prices are also consistent with falling demand (GDP) and with devaluation of the currency.

Another explanation, perhaps more plausible than the first, is that prices are set on a cost-plus basis (Dale and Haldane (1995)). Price increases therefore result from a mark-up on increased variable costs which themselves result from the initial increase in interest rates. Demand (GDP) subsequently falls as a result of higher prices.

The responses of the real sector variables (income, unemployment and prices) to the policy shock present some evidence of long-run money neutrality: they tend to taper off over time and seem to have all but disappeared by the end of the 5 year period. As for the policy reaction function of the monetary authority, the response of the treasury bill rate to a shock in its own innovations seem to indicate a gradual movement back to its original position which is consistent with an adjustment of monetary policy to the (once-for-all) shock.

It is also interesting to look at the variance decomposition of a VAR which gives information about the relative importance of the random innovations. Table 1 below shows a separate variance decomposition for each endogenous variable based on the policy shock to the treasury bill rate. The first column is the forecast error of the variable for different forecast horizons (up to 15). The source of this forecast error is variation in

the current and future values of the innovations. The remaining columns give the percentage of the variance due to specific innovations. One period ahead, all of the variation in a variable comes from its own innovation, so the first number is always 100 percent. Again, this decomposition of variance depends critically on the ordering of equations.

Table 1

Variance Decompositions of Model Variables

Variance Decomposition of Treasury Bill Rate (TBR):

Period	S.E.	TBR	ER	LR	LOANS	TOT.DEP	GDP	UNEMP	RPI
1	0.312889	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.506603	95.15812	0.044832	0.222080	1.592333	1.606951	0.108959	0.004661	1.262065
3	0.583708	88.95144	0.876352	0.371164	3.760871	1.582285	0.313031	0.003582	4.141271
4	0.615165	82.72481	2.463249	0.717674	4.981570	2.286964	0.895794	0.039733	5.890207
5	0.644263	76.01285	2.744628	2.714501	5.461480	4.704541	1.641267	0.138490	6.582246
6	0.679794	68.84670	2.507580	5.046599	5.653361	9.010613	2.355101	0.246163	6.333883
7	0.714334	62.74723	3.026150	6.393600	5.762288	12.90324	2.889038	0.295642	5.982807
8	0.741902	58.28531	4.001978	6.984759	5.670647	15.28510	3.673407	0.307060	5.791738
9	0.765374	54.79283	5.080048	7.442855	5.506215	16.46650	4.689247	0.328249	5.694054
10	0.788602	51.63233	6.188238	7.877763	5.328133	17.24357	5.760282	0.417981	5.551703
11	0.812062	48.71888	7.230787	8.226848	5.197692	17.99723	6.606361	0.666733	5.355467
12	0.835611	46.03577	8.097049	8.364894	5.093201	18.87105	7.281104	1.142116	5.114813
13	0.859399	43.53753	8.785229	8.331845	4.990998	19.79541	7.854431	1.846070	4.858491
14	0.884020	41.15186	9.400331	8.159075	4.860713	20.69492	8.424805	2.710754	4.597540
15	0.909523	38.87710	10.08104	7.888573	4.702461	21.47102	9.001970	3.633605	4.344231

Variance Decomposition of Exchange Rate (ER):

Period	S.E.	TBR	ER	LR	LOANS	TOT.DEP	GDP	UNEMP	RPI
1	0.042873	0.616300	99.38370	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.057870	0.689638	98.24874	0.682017	0.000286	0.103431	0.111520	0.035851	0.128517
3	0.065186	0.548119	96.76905	0.540005	0.235735	0.387297	1.355454	0.037621	0.126719
4	0.068178	0.564341	95.55028	0.551344	1.274824	0.375613	1.461169	0.041314	0.181115
5	0.069343	0.547587	94.44934	0.775763	2.096627	0.376401	1.429464	0.066561	0.258256
6	0.070375	0.635875	92.53383	1.355727	3.147529	0.393369	1.586375	0.092269	0.255025
7	0.071642	1.068634	90.04115	2.264569	3.857183	0.411366	1.886662	0.094034	0.376403
8	0.073377	1.909687	86.61215	3.497881	4.317780	0.448070	2.416722	0.276382	0.521333
9	0.075605	3.164781	82.41451	4.603136	4.384717	0.944914	2.896423	0.899247	0.692270
10	0.078630	4.508876	76.87094	5.711488	4.225389	2.438906	3.492666	1.966360	0.785380
11	0.082158	5.625260	70.76798	6.642826	3.948485	4.823472	4.115146	3.215475	0.861360
12	0.086058	6.336502	64.56473	7.471531	3.665377	7.743823	4.979709	4.320861	0.917469
13	0.090056	6.746353	58.98239	8.107055	3.401474	10.63173	6.006111	5.133121	0.991763
14	0.094239	6.944275	54.17414	8.575247	3.160713	13.23155	7.213024	5.625242	1.075810
15	0.098551	7.047016	50.33197	8.838763	2.927526	15.37582	8.404675	5.891359	1.182864

Research for this paper was funded by Republic Bank of Trinidad & Tobago

Variance Decomposition of Loan Rate (LR):

Period	S.E.	TBR	ER	LR	LOANS	TOT.DEP	GDP	UNEMP	RPI
1	0.301608	9.276409	1.594688	89.12890	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.407933	15.54648	2.614567	76.04756	2.161430	0.029765	0.059612	0.002711	3.537869
3	0.487413	21.49127	5.465038	64.73031	2.655036	0.071750	0.535264	0.106143	4.945185
4	0.533004	25.59982	5.954854	59.64445	2.317004	0.310966	0.464280	0.548734	5.159887
5	0.564693	26.07207	6.253020	56.53417	2.228960	2.159189	0.418166	0.836659	5.497771
6	0.586609	25.83048	6.362915	54.44029	2.276284	3.920464	0.396624	0.903599	5.869341
7	0.601346	25.51805	6.096019	53.02013	2.272317	5.827045	0.386148	0.860451	6.019839
8	0.611060	25.23672	5.989367	51.74321	2.341667	7.029041	0.375904	0.937430	6.346660
9	0.618753	24.82583	6.237344	50.62826	2.400254	7.636963	0.375852	1.264880	6.630608
10	0.625347	24.37547	6.680090	49.57129	2.514089	7.785209	0.370498	1.773920	6.929433
11	0.630949	23.96327	7.061059	48.73604	2.661095	7.790772	0.379484	2.292323	7.115952
12	0.636261	23.56720	7.243718	48.18455	2.937857	7.732011	0.475178	2.669560	7.189923
13	0.641514	23.19170	7.240287	47.91522	3.293142	7.669169	0.663384	2.884410	7.142694
14	0.647817	22.82253	7.119274	47.81585	3.701467	7.561695	0.987502	2.974858	7.016824
15	0.655129	22.56745	6.961296	47.79666	4.040630	7.412030	1.353268	3.004865	6.863803

Variance Decomposition of LOANS:

Period	S.E.	TBR	ER	LR	LOANS	TOT.DEP	GDP	UNEMP	RPI
1	0.025233	0.988683	0.410974	4.551238	94.04910	0.000000	0.000000	0.000000	0.000000
2	0.031115	11.70402	0.299347	9.245187	75.89396	1.442804	0.739296	0.029251	0.646138
3	0.039636	16.98531	0.378963	9.594349	55.42949	4.760216	12.30561	0.068837	0.477228
4	0.046109	20.44465	1.484826	11.64096	43.47703	7.035732	14.40520	0.093319	1.418284
5	0.053753	19.41835	1.837879	14.62580	35.24192	10.65003	16.52660	0.069891	1.629533
6	0.059892	19.78257	1.788373	14.37458	30.25261	15.06934	16.64210	0.095510	1.994918
7	0.067061	19.77052	1.426613	13.52328	25.43193	20.57404	17.24569	0.227332	1.800596
8	0.073737	19.74474	1.318649	12.36514	21.48944	25.87388	17.01379	0.487742	1.706613
9	0.080862	18.59109	1.470321	11.32505	18.24933	30.71726	17.27489	0.828373	1.543685
10	0.087619	17.24325	1.955297	10.20428	15.73293	34.70741	17.44964	1.285429	1.421765
11	0.094934	15.55137	2.866071	9.053794	13.55804	38.07467	17.84125	1.808477	1.246319
12	0.102339	13.92704	4.232793	7.962935	11.74022	40.64633	18.01591	2.384999	1.089764
13	0.110177	12.32340	5.951171	7.000186	10.19043	42.40869	18.23390	2.950883	0.941353
14	0.118037	10.90852	7.917636	6.174601	8.915121	43.40065	18.35662	3.506647	0.820208
15	0.126102	9.647074	10.00757	5.469786	7.844666	43.75754	18.51973	4.030320	0.723315

Variance Decomposition of Total Deposits (TOT.DEP):

Period	S.E.	TBR	ER	LR	LOANS	TOT.DEP	GDP	UNEMP	RPI
1	0.028640	7.615718	0.284848	0.020167	0.347563	91.73170	0.000000	0.000000	0.000000
2	0.040878	9.139831	1.969193	0.240799	0.631276	86.97740	0.596437	0.012757	0.432308
3	0.050171	7.274123	2.295158	0.724499	0.669346	85.75401	2.768565	0.193229	0.321068
4	0.057543	5.542289	2.841622	0.636691	0.862136	83.91287	5.403781	0.545283	0.255329
5	0.065137	4.337630	3.548093	0.498969	1.164509	80.67490	8.382308	1.183769	0.209823
6	0.072917	3.465882	5.371590	0.409816	1.200058	77.19442	10.06687	2.033281	0.258087
7	0.080927	2.822037	7.751825	0.332721	1.220309	73.37277	11.31791	2.807992	0.374430
8	0.088372	2.379011	10.25412	0.290849	1.242045	69.50626	12.38902	3.467495	0.471203
9	0.095571	2.046984	12.69966	0.287439	1.299359	65.55707	13.54013	4.010709	0.558649
10	0.102451	1.787451	15.08262	0.293500	1.331713	61.85655	14.52551	4.509147	0.613502
11	0.109237	1.573844	17.30196	0.321644	1.343054	58.45678	15.34436	4.994505	0.663857
12	0.115854	1.399180	19.29931	0.363551	1.323418	55.47660	15.92846	5.504019	0.705462
13	0.122409	1.254093	21.00731	0.423860	1.289224	52.86787	16.37308	6.036427	0.748141
14	0.128881	1.133373	22.47183	0.489401	1.239459	50.60682	16.68007	6.590749	0.788305
15	0.135353	1.029602	23.74059	0.560790	1.183857	48.61734	16.89858	7.139464	0.829787

Variance Decomposition of GDP:

Period	S.E.	TBR	ER	LR	LOANS	TOT.DEP	GDP	UNEMP	RPI
1	0.020201	0.344863	1.197657	0.056629	0.330072	1.997520	96.07326	0.000000	0.000000
2	0.023034	0.511291	1.306842	1.803613	0.934996	1.576473	89.27310	2.289086	2.304598
3	0.026769	0.386825	1.207005	2.586890	1.698100	9.735509	75.63629	7.038337	1.711044
4	0.029482	1.045187	2.862873	2.143134	1.582895	13.22052	64.52490	13.20994	1.410538
5	0.034384	2.440493	4.584749	2.398280	1.547060	17.26763	54.08553	16.10526	1.570987
6	0.038262	3.653297	6.451428	2.350557	1.255391	19.22007	47.45565	18.34057	1.273040
7	0.042728	3.574701	7.830877	3.177552	1.101883	20.94058	43.63647	18.71432	1.023613
8	0.046543	3.418105	9.740326	3.479166	0.955066	21.79553	40.66854	19.04463	0.898632
9	0.051068	3.198686	11.97587	3.855339	0.893928	22.58560	38.33374	18.40646	0.750371
10	0.055362	3.199190	14.54537	3.950319	0.773623	23.08979	35.92832	17.84319	0.670203
11	0.059936	3.186318	16.74122	4.181775	0.677038	23.56744	33.95703	17.09986	0.589310
12	0.064197	3.206803	18.62276	4.251179	0.590146	23.97222	32.15067	16.65460	0.551621
13	0.068531	3.158192	20.06987	4.273931	0.518194	24.51675	30.66380	16.29696	0.502306
14	0.072710	3.076579	21.35646	4.148290	0.475197	25.13520	29.21109	16.13566	0.461519
15	0.076951	2.920085	22.49553	3.984856	0.443940	25.82953	27.91108	16.00006	0.414915

Variance Decomposition of Unemployment (UNEMP):

Period	S.E.	TBR	ER	LR	LOANS	TOT.DEP	GDP	UNEMP	RPI
1	0.003889	0.527231	0.289716	0.491355	0.022408	14.78208	3.222411	80.66480	0.000000
2	0.011516	0.460418	0.320901	0.577406	0.177780	22.11643	3.041909	73.02886	0.276291
3	0.022267	0.325883	0.315529	0.552977	0.293123	27.12933	3.431494	67.15701	0.794652
4	0.034636	0.175953	0.161390	0.855937	0.295630	30.64100	4.431199	62.21702	1.221867
5	0.047003	0.097588	0.203074	1.493948	0.206357	32.79079	5.943953	57.85045	1.413846
6	0.058437	0.105403	1.069089	2.504067	0.137673	33.37339	8.069067	53.34850	1.392812
7	0.068804	0.121798	3.337167	3.839428	0.195371	32.31297	10.59575	48.37813	1.219397
8	0.078458	0.099214	7.016042	5.380438	0.369580	29.97839	13.12498	43.04708	0.984275
9	0.087665	0.106963	11.35905	6.940249	0.556579	27.09600	15.21112	37.94127	0.788766
10	0.096439	0.280640	15.37188	8.346342	0.660239	24.39435	16.64340	33.60953	0.693617
11	0.104633	0.700691	18.41726	9.463940	0.654268	22.32154	17.43322	30.31625	0.692837
12	0.112200	1.316638	20.36227	10.22019	0.584505	21.04452	17.71106	28.02359	0.737220
13	0.119261	1.966619	21.41261	10.59041	0.520605	20.57721	17.61673	26.53942	0.776389
14	0.126014	2.469158	21.90831	10.60545	0.508539	20.83239	17.28485	25.60850	0.782809
15	0.132595	2.724131	22.20512	10.34301	0.551092	21.60861	16.83744	24.97469	0.755916

Variance Decomposition of Retail Price Index (RPI):

Period	S.E.	TBR	ER	LR	LOANS	TOT.DEP	GDP	UNEMP	RPI
1	0.012853	2.929493	2.426165	0.041703	0.356630	0.005188	13.21963	1.674578	79.34661
2	0.018094	11.74764	3.619819	0.042652	1.042534	0.204967	11.42505	1.043106	70.87423
3	0.022597	17.09770	6.385761	0.536312	2.332044	0.696979	9.357101	0.740414	62.85369
4	0.027091	20.48308	9.197013	0.799833	4.088635	0.982539	6.968805	0.607098	56.87299
5	0.031207	22.88082	11.47179	0.961150	5.115298	1.536022	5.487431	0.598340	51.94915
6	0.034885	24.30723	12.51484	0.812080	6.336462	1.952513	4.414530	0.653014	49.00933
7	0.037905	24.86746	12.79178	0.688551	7.516951	2.457100	3.747444	0.732015	47.19870
8	0.040461	24.71282	12.62910	0.714792	8.890940	2.893566	3.292182	0.788743	46.07785
9	0.042591	24.16396	12.30473	0.935165	10.22675	3.387816	2.975212	0.807903	45.19847
10	0.044469	23.33868	11.87605	1.439865	11.63274	3.846257	2.746387	0.785233	44.33479
11	0.046094	22.38562	11.43211	2.147961	12.97159	4.310411	2.572057	0.742712	43.43753
12	0.047544	21.36677	10.98289	3.060772	14.26262	4.678913	2.441883	0.698487	42.50766
13	0.048799	20.40247	10.56092	4.068174	15.41264	4.949085	2.336740	0.664927	41.60504
14	0.049905	19.53576	10.16396	5.144563	16.43604	5.071309	2.254274	0.642367	40.75174
15	0.050855	18.81302	9.811939	6.194823	17.30510	5.072742	2.186055	0.627411	39.98891

Ordering: TBR (Teasury Bill Rate) ER (Exchange Rate) LR (Loan Rate) LOANS TOT.DEP (Total Deposits) GDP UNEMP (Unemployment) RPI (Retail Price Index)

The nature of the monetary transmission mechanism can be traced through the figures in this table and there is considerable evidence of dynamic feedback among the variables comprising the model. There also appears to be some more tangible evidence in favour of the relative importance of money as opposed to credit in the monetary transmission process. Take, for instance, the contribution of money (total deposits) to forecast errors in production (GDP): it rises steadily from 2% in the first quarter to almost 26% in the 15th quarter. The contribution of credit (loans) to the same process never rises above 1% over the same period. A similar story can be told about the effect of these two variables on unemployment but, in the case of prices, it is somewhat different. The credit variable accounts for about 17% of the error in prices by the 15th quarter while the money variable accounts for about 5%.

The monetary authority's reaction function can also be studied in some detail through these variance decompositions. In the case of the policy instrument itself (the treasury bill rate), the "own" contribution to forecast error shrinks from 100% to 38.8% over 15 quarters while money (deposits) increases its contribution from 0 to 21.5% over the same period and credit goes from 0 to 4.7%. In the case of the exchange rate, the money variable increases its importance from 0% to over 15% while the credit variable accounts eventually for about 3% of the variation.

Conclusion

There emerges from this study the tentative conclusion that both money and credit matter in the monetary transmission process but that money may play a much more important role. There are, however, some limitations, principally in the data used, that may attenuate this conclusion.

In the first place, largely because of the absence of pertinent data, the model uses aggregates and, in particular, it aggregates all sectors of the economy. Dale and Haldane (1995) have found that, in the United Kingdom, the monetary transmission process in the "personal" sector may differ from that of the "corporate" sector. In particular, they found that the players in the personal sector increased their holdings of bank deposits following an increase in interest rates while those in the corporate sector hold less. It is possible that the Trinidad & Tobago data used in this paper are dominated by the corporate sector but it may also mean that the personal sector responds differently in Trinidad & Tobago from the United Kingdom.

The "money" variable used here may also be problematic. First of all, it comprises total deposits which are made up of demand, savings and time deposits for which responses to interest rates may differ (and this can be complicated by the sectoral aggregation already discussed). Secondly, there is the problem that this definition of money does not take into account the "Base Money" (M_0) under the direct control of the monetary authority.

It is, however, an interesting start to a debate on a well known subject within the framework of a small open economy where the endogeneity of money and monetary

Research for this paper was funded by Republic Bank of Trinidad & Tobago

policy is often taken for granted. The next step will be to look at similar economies where data scarcity may be an even greater constraint. But the questions posed need to be answered as there are obvious implications for monetary and more, general economic policy in countries like these.

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Appendix
Data Sources

Data Capture

The data collected for this exercise are from three (relatively reliable) sources. These are:

(i) The Quarterly Statistical Digest (QSD) of the Central Bank of Trinidad and Tobago.

(ii) The Annual Statistical Digest, the Annual Labour Force Report and the Retail Price Index Bulletin of the Central Statistical Office.

(iii) The International Financial Statistics (a monthly publications of the International Monetary Fund).

The Table A1 below lists the raw series as they were "captured" from the above publications. All the data are quarterly and cover the period 1970Q1 - 1995Q4.

Table A1
Raw data series: sources and description

Data Item	Source
Total Deposits	QSD, Table A2, TT$/Mn.
Gross Domestic Product	The original series in annual format is drawn form the CSO publication "The National Income Accounts of Trinidad & Tobago". It is converted into quarterly data following a procedure outlined below.
Commercial Bank Loans	QSD, Table C9, TT$/Mn.
Interest Rate (Weighted Average Loan Rate)	QSD, Table G1.
Exchange Rate	The nominal rate (TT$/US$) is sourced from IFS, 369 rf (quarterly average). Deflated by US consumer price index to obtain real effective rate
Retail Price Index	CSO: Retail Price Index Bulletin.
Treasury Bill Rate	IFS, 369, 60c.
Unemployment Level	Annual Labour Force Report.
US Consumer Price Index	IFS, 111, 64.

QSD = Quarterly Statistical Digest of the Central Bank of Trinidad & Tobago
IFS = International Financial Statistics
CSO = Central Statistical Office of Trinidad & Tobago

The Special Case of GDP

The quarterly series is computed in two steps. In a first step, annual data obtained from the CSO are converted to quarterly data by the Lisman and Sandee routine. Secondly, GDP

growth rates calculated from the Central Bank Quarterly (real) GDP index were applied to these figures from 1982Q1. This allowed for the generation of a quarterly GDP series from 1982-1995. The series retained for use in the models is a combination of the series generated from Lisman and Sandee (1971Q1-1981Q4) and from application of the Central Bank index (1982Q1-1995Q4).