Determinants of the Money Supply in Lebanon

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By Invitation:

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After having covered the demand side of the money market in Lebanon[1] this note will cover the supply side. A common misperception by students is that demand is a function of supply, while, in fact the two are independent. For those economists who believe in a stable money supply creation their view is that there is a direct transmission channel from the reserves of the banking system at the central bank to the money stock, taken here to be M2. Briefly, the money supply is considered by these economists to be a function of these reserves and of the money multiplier, the latter being the ratio of the total money supply M2 over the monetary base. The monetary base consists of the bank reserves and currency in circulation. Nonetheless, this is not sufficient to define a stable money supply function. Additionally, the central bank must have either a complete or a partial control over the monetary base. This is in essence the traditional model of the money supply function.

[1] Azar, Samih Antoine (2022). "A Note on Money Demand and Monetary Policy in Lebanon", *Lebanon Briefs*, *BLOMINVEST Blog*, March 4, 2022, pp. 1-7.

This note extends the analysis by looking at the causes of the change in bank reserves. These are said to be determined either by open market operations by the central bank or foreign exchange market operations, or both. Open market operations occur when the central bank purchases or sells Treasury bonds by crediting or debiting bank reserves. Foreign exchange market operations occur when the central bank buys or sells part of its foreign exchange reserves principally to banks, and credits or debits the bank reserves. Of course it is understood that positive bank reserves changes lead to positive changes in the money supply. This approach that assumes a link from central bank assets towards bank liabilities like M2 has not been studied adequately enough for no known reason. To complete the picture various interest rates will be included in the money supply function that helps explain and "cause" money supply in an indirect way. Four rates are chosen: the interbank rate, the bank loan rate, and the deposit rates on domestic and foreign assets. If the interbank rate is higher than the loan rate banks will tend to hold more excess reserves, hence money creation is slowed down or delayed. If the rate on loans is higher than either the domestic or the foreign deposit rates, banks will in all likelihood increase their loan exposure, and hence multiple deposit money creation results. This happens because the enlargement of margins between the loan rate and the deposit rates, either because of a higher interest rate revenue or because of the reduced cost of funds encourage banks to benefit from the issuance of loans on a net basis. Finally, the money supply function should be specified in nominal and not in real terms, meaning that the monetary authorities have no control over current inflation rates that deflate money, but have some control over the size of the money stock.

The computer output of the log-log multiple linear regression is relegated to the appendix, and may be skipped without the loss of details. The estimated impact elasticities will be for both the short run and the long run. It is expected that long run elasticities will be higher than the short run ones, because the typical person has more time to adjust to a given shock, or because there is a slow learning process, or else because a fundamental inertia is built in theoretically. Since elasticities have so much importance in economics, one should be careful about the interpretation of the percent changes in interest rates. A 1% percentage rate rise from a basis of 6%, is not an impact elasticity of 7%, but it is that of 6.06%[2]. As for the interpretations of the statistical findings they are as follows:

- ✓ The impact of the central bank foreign exchange reserves (FERLL) on the money stock M2 is statistically significant: it is 0.2162 in the short run, and 0.4363 in the long run. This means that a 1% increase in reserves increases the money stock M2 by 0.2162% in the short run, and by 0.4363% in the long run. Expectations are for a unitary

[2] To elaborate: it is 6% + 0.01x 6%=6.06%. In other words it is the percent of the percent.

coefficient. Maybe the reason for this anomaly is that the central bank, when buying foreign exchange for example debits its account of foreign exchange reserves, and credits, or reduces, the account of bank loans at the central bank. Since balances in this discount window are not published neither by the central bank nor by banks, it was not possible to have a net amount of the monetary base, also called a non-borrowed monetary base.

- ✓ The impact of the domestic debt (DOMDEBT) on money is statistically significant: it is 0.2072 in the short run and 0.9431. The latter coefficient is not different statistically from +1, and this is as expected. Hence a 1% increase in domestic debt holdings by the central bank increases the money stock M2 by 0.2072% in the short run, and 0.9431% in the long run. It is surprising that the short run impacts of foreign reserves and of the domestic debt are immaterially different from each other. This ascertains that in the short run proceeds of the purchase/sale of debt and proceeds from the purchase/sale of foreign exchange reserves are partially credited to the discount loan account of banks at the central bank.
- ✓ A higher spread between the interbank rate (IINTER) and the bank loan rate (ILOANS) augments investment in excess reserves. Holdings of excess reserves affect detrimentally deposit creation, and therefore it is expected that the coefficient on this spread be negative. The short run elasticity is -0.03187 and the long run one is -0.2426. In the short run a 1% increase in the spread reduces the money stock by 0.03187% and in the long run by 0.2426%.
- ✓ A higher premium between the loan rate and the domestic currency deposit rate IDEPLL) has an elasticity of 0.2370 in the short run and -0.7000 in the long run. This means that a 1% increase in the profit margin enhances and increases the initiation of loans by 0.2370% in the short run but decreases it by -0.7000% in the long run. The elasticity for the short run has the expected sign, but not the one for the long run. It is as if in the long run the profit margin is less biting, and the increase in the loan rate serves to dampen credit demand from firms and households, and to lead to a lower money supply deposit creation.
- ✓ A higher premium between the loan rate and the foreign currency deposit rate (IDEPUSD) has an elasticity of -0.2076 in the short run and 0.4852 in the long run. This means that a 1% increase in the profit margin decreases the initiation of loans by 0.2076% in the short run and increases money supply by 0.4852% in the long run. The elasticity for the short run does not have the expected sign, but the one for the long run does. It is as if in the long run and because the profit margin improves, there is an increase in loans in Lebanese pounds and an increase in the foreign exchange rate exposure that leads to a higher money supply.

- ✓ The implied adjustment speed in reaching the long run equilibrium is 5.06 months. In other words, the long run is reached within a period less than half of a year. Obviously this is very prompt. This proves that the aggregate behavior of the economy is characterized by a rapid adaptation to monetary supply shocks.

What are the implications of the above evidence on monetary policy? The major conclusion is that there is a causality running from the foreign exchange reserves and from the debt portfolio of the central bank towards money supply, and that this causality is stable, is quasi parsimonious, and is statistically highly significant. Moreover, the fit of the regression, or R-Square, being around 60%, is high for monthly data, and adds value to the predictability of the money supply function and its stability. Nonetheless, it is difficult to infer that the Lebanese central bank has total control over the money supply for managing its financial assets, as the above causality implies. This is true because the results are consistent with the opposite conclusion that the central bank mechanically increases and decreases the money supply by responding passively to outside events, especially from the imbalance of the balance of payments. However, this does not explain the economic and statistical significance of the debt portfolio of the central bank on money supply. Hence, one can safely say that the central bank of Lebanon has only a partial control upon money supply developments.

What about the out-of-sample predictions of the money supply function for the period after January 2018? It is difficult to form an opinion not only because policy and conduct have changed and shifted, but also because there is not enough data to validate the statistical experiment. It is important to remind the reader that capital controls were irregularly put in place, and these create a wedge between supply and demand of funds. But what is less difficult to argue is that, during the period under study the exchange rate regime was a fixed one, so if in the post-crisis period the regime is turned into a flexible one then we should expect more control on the money supply by the central bank -- at least at theoretically!

Appendix:

Dependent Variable: D(LOG(M2))
Method: ARMA Maximum Likelihood
Sample: 1998M12 2018M01
Included observations: 230
Convergence achieved after 82 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.793353	0.118446	-6.697991	0.0000
D(LOG(FRESLL))	0.216211	0.025200	8.579954	0.0000
D(LOG(DOMDEBT))	0.207219	0.037652	5.503518	0.0000
D(LOG(INTER))-D(LOG(ILOANS))	-0.031869	0.004424	-7.203493	0.0000
D(LOG(ILOANS))-D(LOG(IDEPLL))	0.236992	0.052175	4.542223	0.0000
D(LOG(ILOANS))-D(LOG(IDEPUSD))	-0.207554	0.055627	-3.731164	0.0002
LOG(M2(-1))	-0.197767	0.035210	-5.616796	0.0000
LOG(FRESLL(-1))	0.086282	0.020300	4.250365	0.0000
LOG(DOMDEBT(-1))	0.186508	0.026577	7.017619	0.0000
LOG(INTER(-1))-LOG(ILOANS(-1))	-0.047984	0.007337	-6.539533	0.0000
LOG(ILOANS(-1))-LOG(IDEPLL(-1))	-0.138440	0.036307	-3.813082	0.0002
LOG(ILOANS(-1))-LOG(IDEPUSD(-1))	0.095953	0.017862	5.371923	0.0000
AR(1)	0.263169	0.059299	4.437969	0.0000
SIGMASQ	0.000318	2.32E-05	13.67307	0.0000

R-squared	0.603193	Mean dependent variable	0.006745
Adjusted R-squared	0.579311	S.D. dependent variable	0.028365
S.E. of regression	0.018397	Akaike information criterion	-5.093958
Sum squared residuals	0.073109	Schwarz criterion	-4.884683
Log likelihood	599.8051	Hannan-Quinn criterion	-5.009541
F-statistic	25.25735	Durbin-Watson statistic	1.939715
Prob. (F-statistic)	0.000000		

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