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#### *By Invitation:*

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The purpose of this study is to answer the following two empirical questions: was the public debt monetized, and did the public save more in Lebanese pounds, and set aside more money, to pay for the future taxes that the origination of the debt entails? The first question considers the effect of the public debt on the money supply creation. If the debt explains money supply creation with a positive and statistically significant relation, then the debt is monetized. The second question involves the effect of the public debt on money demand. If the debt explains money demand with a positive and statistically significant relation, then Ricardian equivalence is validated, meaning that the public is saving more, in Lebanese pounds, to repay the debt with future taxes<sup>1</sup>.

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In Keynesian money demand functions, the demand for money is undertaken for transaction, <sup>1</sup> precautionary, and speculative purposes. Though transaction balances relate to consumption, precautionary and speculative balances relate to savings, with the former more so and in line with Ricardian Equivalence.

Obviously the money supply and money demand functions must be well and appropriately specified. The null hypothesis is that the two money functions are independent of the public debt, whether domestic or foreign. Otherwise there is monetization and extra saving behavior. The two results do not hinge on each other. One may hold and the other may not. Evidence shows that the debt is monetized in the short run, and in the long run, and that Ricardian equivalence is not supported. The latter finding indicates that the debt in Lebanon might have been regarded as a Ponzi game, was never to be repaid, and that debt was forever financed with more debt. Since the reward in terms of interest rates was hefty, reaching double-digit levels, deposit holders had an enhanced risk appetite (as it was the rich deposit pool in Lebanese banks that was used to finance part of the deficits). However, another possibility is that the public expects the debt to be repaid in the far distant future, and that it is not an urgent concern and can be postponed or delayed. This is ascertained by the fact that the financial crisis that started in October 2019 was an unprecedented and a sudden shock that the economy did not anticipate, and that precipitated and led eventually to the burst of the debt bubble.

Besides being an interesting theoretical topic the investigation of this paper has a paramount monetary importance. First, it estimates a parsimonious and stable money supply and money demand relations that could be useful for policy-making, and that disentangle short run from long run effects. Up to now such empirical relations have scarcely been researched in the literature for Lebanon, and the reduced form structure that is adopted is novel. Secondly, it sheds the light on the issue of fiscal consolidation that necessitates the sustainability of public finances, which, with hindsight, was extremely challenging. Thirdly, it creates awareness that the monetary authorities relied to some extent on the inflation tax to finance the debt, although this is a common practice in worldly affairs. Finally, it reveals the dangers and pitfalls of a strategy of buying time and of postponing painful economic adjustments, amid an inherently fragile economic situation, that is vulnerable to adverse events.

First, the money supply process is specified and estimated. The function depends on the level of foreign reserves, and 4 interest rates, which are the interbank rate, the rate on bank loans, the rates on bank domestic and on foreign deposit rates.<sup>2</sup> It is expected that money supply will be positively related to foreign exchange reserves, because when the central bank usually accumulates foreign reserves, it pays for them by crediting banks' reserve accounts at Banque du Liban. This excess reserve will be used by the banking system to finance loans. Hence there is an increase in the monetary base and money supply is created through the money multiplier. The margin between the interbank rate and the loan rate is expected to be negatively related to money supply. This is required because if this margin increases excess bank reserves will become more attractive relative to loans, and result in a lower money multiplier, and a lower money supply. The margin between the interest on loans and interest rates on deposits in Lebanese pounds is expected to be positive. This is true because the higher this margin is the higher the attractiveness of loans relative to deposits, and banks are likely to increase their loans, generating more money supply. Finally, the margin between the interest rate on loans and interest rates in foreign currency deposits is expected to be also positive, for the same reason. These coefficients should have the same sign in the short run and in the long run. The results are mostly in conformity to these expectations except for some minor and surprising wrong coefficient signs.

Once the money supply process is determined the public debt variables are included in the estimation. Four cases are worthwhile. The first case is for total debt, the second is for domestic debt, the third is for foreign debt, and the last one is for the total debt by incorporating the sum of both the domestic and the foreign debts. If monetization is present, then these four cases should yield positive and statistically significant coefficients.

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It can be argued that the US loan rate on foreign currencies is to be included in the list.<sup>2</sup> However, doing this results in making other rates statistically insignificant. It is clear that this is due to a multicollinearity problem as all interest rates move conspicuously together. While it is not advisable to remove one of the rates in order to alleviate the problem, this is practically what is usually done.

These coefficients, which are elasticities, can be readily retrieved, and would measure the extent of the relations, together with their impact signs. In Table 1 the first row records the coefficient size, and the second row the probability of occurrence. This is repeated for all four cases, and for both the short and long runs. When probability is lower than 5% (0.05) then it indicates that the included variable has a strong effect on money supply creation. In other words, there is a small probability that the positive relation is due to chance or to sampling error. One notices that all coefficients are positive, except one, and all p-values are less than 5% except for the same variable. One can conclude in general that monetization did occur. The magnitude of the monetization in the short run is at least 13.25% of the debt, and gets at most 44.07%, while the long run monetization is between 2.04% and 7.47% of the debt. This means that monetization in the short run is strong, and that monetization in the long run is rather subdued, maybe because money illusion does not hold in the long run. All in all, there was a significant monetization of the debt, which had an impact on even the foreign debt.

Table 1: M2 Money supply & public debt

	Total debt		Domestic debt		Foreign debt		Sum of both debts	
	short	long	short	long	short	long	short	long
Impact	0.4407	0.0747	0.1325	0.0576	0.0326	0.0204	0.3557	0.0743
P-value	0.0000	0.0003	0.0000	0.0021	0.3756	0.0365	0.0000	0.0005

Sample 1998M12 2018M01 (230 observations). Source: Banque du Liban. Computation by EViews 11. The econometric model is an unconstrained Error-Correction Regression, estimated by OLS.

The money demand function is specified as follows. The function depends on the level of the coincident indicator, as compiled by the Banque du Liban, and 2 interest rates, which are the rates on domestic and foreign deposits. A variable that enters the demand function but is not routinely modeled in the literature is the cyclical portion of the coincident indicator. It is expected that money demand will be positively related to the proxy of economic activity, and negatively on its cyclical portion, positively related to the own interest rate and negatively to the cross rate. If the own rate increases deposits in Lebanese pounds will become more attractive and they will become even more attractive if the cross rate on US dollar deposits falls. These coefficients should have the same sign in the short run and in the long run. The results are mostly in conformity to these expectations except for some minor coefficient signs.

The next phase is to estimate the money demand. Once this process is determined the public debt variables can be included in the estimation. As previously, four cases are worthwhile. The first case is for total debt, the second is for domestic debt, the third is for foreign debt, and the last one is by accounting for both the domestic and the foreign debts. If Ricardian equivalence is supported, then each of these four cases should yield positive and statistically significant coefficients. These coefficients, which are again elasticities, can be readily retrieved, and would measure the extent of the underlying relations together with their impact signs. Similarly, in Table 2 the first row records the coefficient size, and the second row the probability of occurrence. One notices that 3 coefficients are positive, and 5 coefficients are negative, contrary to expectations, and all p-values are much higher than 5%, the minimum being 0.0811. One can conclude in general that Ricardian equivalence does not bind. There is evidence that the debt was regarded as a Ponzi game, or there was no forward-looking behavior among economic agents, or, that parents are not altruistic when it comes to the future welfare of their children as they shift the burden of paying back the debt unto them.

What transpires from all the above is that the sovereign debt was financed partly by the inflation tax. Nonetheless, this did not

generate galloping inflation. Recall that during the period of the study inflation was under control, and the minimum wage was not adjusted upward. However, the ability of the authorities to use the inflation tax was impaired, because of the positive link between the market-determined borrowing rates and inflation, resulting in a subdued long run monetization. The absence of money illusion may be also a culprit as market participants changed diligently their inflation expectations.

Another conclusion is that the public did not increase its savings in Lebanese pounds in reaction to the debt. The public may have increased savings in other venues like foreign currencies, or may have invested in real estate. It is as if the public did not care about the debt, and its urgency, and believed that the status quo will remain indefinitely. Hopefully, the current crisis and the burdens it is imposing on everyone will be a learning experience not to repeat the same behavior!

Table 2: M2 Money demand & public debt

	Total debt		Domestic debt		Foreign debt		Sum of both debts	
	short	long	short	long	short	Long	short	long
Impact	0.0620	0.0062	0.0418	0.0223	0.0185	0.0005	0.0607	0.0039
P-value	0.4929	0.8456	0.0811	0.1675	0.4568	0.9788	0.5361	0.7786

Sample 1998M12 2018M01 (230 observations). Source: Banque du Liban. Computation by EViews 11. The econometric model is an unconstrained Error-Correction Regression, estimated by OLS.

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