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By Invitation:

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The question we would like to address is whether fiscal policy in Lebanon, since 1991, was sustainable with the benefit of hindsight. If this is the case the decision to default may have been hurried. Sustainability means the absence of a Ponzi scheme. In objective terms, sustainability requires that the present value of terminal debt is zero as the horizon, or the maturity number of years of the bond, tends to infinity.

We start with the government's budget constraint:

$$(1) \quad \Delta B = G_t - T_t + rB_{t-1}$$

Where Δ is the first-difference operator, B is the debt, G is government expenditures, net of interest payments, T are total taxes and revenues, and r is the rate of interest of the debt or the discount rate in percent.

The purpose of the analysis is to estimate the value of r , and to compare it with the growth rate of the debt which is denoted as g . If r is less than g , then the discount rate r is lower than the rate of growth of the debt, and the present value of the debt does not converge asymptotically to zero. (Or, in other terms, the future value is higher than one; and it should be found to be statistically significantly different from 1). To elaborate, equation (1) can be rewritten as:

$$(2) \quad \Delta B / B_{t-1} = (G_t - T_t) / B_{t-1} + r B_{t-1} / B_{t-1}$$

$$(3) \quad g = (G_t - T_t) / B_{t-1} + r$$

Equation (3) clearly shows that r is less than g when the primary balance is in deficit or $(G_t - T_t) / B_{t-1}$ is positive. Hence the importance of achieving primary surpluses so as to make r greater than g and let the present value of the debt converge to zero.

Turning to equation (1), it can be reformulated to a statistical model, as follows:

$$(4) \quad \Delta B = \beta_0 + \beta_1 (G_t - T_t) + \beta_2 B_{t-1}$$

Where β_0 is the estimated intercept, which is expected to be positive, β_1 is the estimate of the effect of the negative of the primary surplus, and this estimate is expected to be no different from minus one, as equation (1) specifies, and finally β_2 is our estimate of r .

We have subjected equation (4) to three econometric procedures², and the results are as follows:

Econometric procedure	Estimate of β_0	Estimate of β_1	Estimate of β_2	Estimate of g
A & B	2029.79	-0.9415	0.051024	0.053893
C	2111.55	-0.7654	0.049131	0.056180

The estimation results for procedures A and B are the same, but they do not have the same statistical precision, as will be seen below. The estimates of g are obtained by a geometric trend function, again with the same three econometric procedures.

² These 3 procedures are: (A) System Ordinary Least Squares (OLS), (B) System Weighted Least Squares (WLS), and (C) Seemingly Unrelated Regression (SUR). The data is annual and runs from 1991 to 2020.

As is evident from the above table the estimates of β_1 are close to -1. In fact, if a statistical test is applied, these estimates are inferred to be no different from -1. This is proof that the model is well specified, and no variable has been left out inadvertently.

We are going to compare the estimates of β_2 and g . Overall, the values of β_2 are estimated to be lower than the values of g . This means that, as time passes by, the net effect of both is towards infinity. However, the findings of the tests of equality between β_2 and g produce p-values of 0.8097, 0.7996, and 0.3561 for the three econometric procedures respectively. Because these p-values are much higher than the usual marginal confidence levels, the hypothesis of equality is not rejected. Hence, and although, according to the point estimates $\beta_2 < g$, the difference between the two is immaterial and trivial. This implies that fiscal policy was borderline sustainable and, at the same time, borderline unsustainable. However, this also implies that fiscal policy will be vulnerable to adverse shocks, which may destabilize the status quo. In effect such a shock occurred in October 2019, with the civil unrest. Therefore, the authorities cannot be absolved of the outcome but they also cannot be accused of mismanagement. Nonetheless, the borderline bubble could sooner or later burst because one cannot preclude shocks from taking place, and the particularity of shocks is that they are unpredictable.

Additional evidence can be derived by comparing the future values. If one takes the ratio of the future level of the debt, computed by the growth rate g , to the future value of the compounded rate at r , the result will be higher than one because $g > r$. The research hypothesis is whether this ratio is statistically higher than 1. As an example, if one supposes a horizon of 25 years, the net future value (FV) is computed as follows, for the econometric procedures A and B:

$$(5) FV = [(1 + 0.053893)/(1 + 0.051024)]^{25} = 1.0705$$

In this formula g equals 0.053893 or 5.3893%, and r equals 0.051024, or 5.1024%. The resulting figure (1.0705) is higher than one which is what is expected because $g > r$. There is a way to test for the hypothesis that this figure is indeed higher than 1. This test produces p-values of 0.8158, for the econometric procedure A, 0.8061, for the econometric procedure B and 0.3561, for the last econometric procedure C. Since these p-values are higher than the usual marginal confidence levels then the conclusion is that 1.0705 is no different from 1. Selecting three values for the horizon of the indenture: 20, 25, and 30 years, and using the three econometric procedures the following table can be constructed for the net Future Value (FV):

² These 3 procedures are: (A) System Ordinary Least Squares (OLS), (B) System Weighted Least Squares (WLS), and (C) Seemingly Unrelated Regression (SUR). The data is annual and runs from 1991 to 2020.

Econometric procedure	20 years	25 years	30 years
A & B	1.0560	1.0705	1.0852
C	1.1433	1.1822	1.2225

When these 6 figures are tested that they are no different from 1, the smallest p-value is 0.3874, well above the usual risk that is tolerated. The conclusion is the same as above: the fiscal policy is borderline unsustainable, and is vulnerable to any major shock, like the civil unrest that began on October 2019.

Overall, one cannot rule out major shocks. Within a long run perspective, they will happen for sure. But their timing remains uncertain, they may occur suddenly, and they cannot, by definition, be anticipated. Strictly speaking, the authorities have not produced a Ponzi game. Neither have they produced a sustainable path. Their only game was to buy time, and bet on favorable shocks, while dismissing irresponsibly unfavorable shocks which, however, were ultimately destined to happen: in the words of the late Donald Rumsfeld, an ex US Secretary of Defense, "they were the known unknowns". In short, in hindsight, the Lebanese sovereign default was inevitable and was bound to take place, sooner or later.

² These 3 procedures are: (A) System Ordinary Least Squares (OLS), (B) System Weighted Least Squares (WLS), and (C) Seemingly Unrelated Regression (SUR). The data is annual and runs from 1991 to 2020.

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