

# Debt Sustainability in Lebanon: an Econometric Approach

Carlos A. Abadi

October 16, 2019

## Abstract

Lebanon is one of the most indebted countries in the world. In addition to have an elevated debt/GDP ratio, much of its debt is denominated in dollars and the value of the Lebanese pound has been pegged to the dollar at a fixed rate for the last 20 years. To complicate matters further, this currency peg is not backed by a currency board. Instead, it is being supported by the supply of dollars at the fixed exchange rate by the central bank (Banque du Liban, BDL) to the commercial banking system. Although BDL's gross reserves are sufficient to cover its monetary liabilities (the amount of Lebanese pounds outstanding), its net reserves (BDL USD assets - BDL USD liabilities) is not. Further, Lebanon suffers from low growth relative to the United States, which further challenges the peg. In addition, Lebanon has been consistently running elevated and growing budget deficits, composed almost entirely of debt servicing cost (i.e. the country runs a close to balanced primary result). Also, BDL runs a very elevated quasi-fiscal deficit caused by the interest differential between the CDs it sells to domestic banks and the interest it receives on its gross reserves. Finally, Lebanon is a large net importer which cause its net external financing needs to levels well above those required to finance its budget deficit. We believe that Lebanon's public sector debt is unsustainable per se and that a flotation of the currency (which we view as almost inevitable) will further deepen its insolvency. Unless either the government's and the central bank's balance sheets are reengineered or decisive fiscal adjustment is made, Lebanon's current financial stress could become an economic crisis.

# 1 Introduction

The conduct of fiscal and monetary policy in Lebanon have been intertwined for decades. However, this correlation deepened over the last three years of fiscal policy paralysis, leaving BDL as the only active participant taking policy steps toward the avoidance of a financial (and maybe economic) meltdown. Lebanon's public debt has been accumulating since the early 1990s and its fixed exchange regime has been in place for about as long. The accumulation of fiscal deficits under a fixed exchange regime added to persistent current account deficits over the same period led to the current 150% Debt/GDP ratio, trailing only Japan, Greece, Sudan, and Venezuela. Of those, the first two enjoy 0 or-near 0% interest rates, and the other two are in default. The growth of the proportion of dollar-denominated indebtedness over total public debt resulted in turning the peg into a constraint, without which the debt/GDP ratio would easily exceed 200% leading the government to default à la Argentina 2001. BDL's priority thus turned to defending the peg but at the expense of BDL's ability to sterilize the partial monetization of the government's deficits<sup>1</sup>. The FX peg is further challenged by the real exchange appreciation during the last ten years and an inefficient export sector, which led to a gaping trade deficit resulting in a very large current account deficit. This goal of this article is to determine whether Lebanon's public debt is sustainable, given the country's fiscal and FX policies.

The rest of this article is organized as follows. Section 2 reviews Lebanon's macroeconomic developments over the past two decades. Section 3 reviews Lebanon's government finance structure. Section 4 lays down the theoretical foundation for our analysis. Section 5 reviews the relevant academic literature. Section 6 presents our empirical results. Section 6 concludes.

## 2 Lebanon's Macroeconomic Development

Lebanon is a relatively young state. Since its creation, in 1920, under French tutelage, the Lebanese economy has been characterized by a laissez-faire economic climate which differentiated the country from the nationalist and socialist systems adopted by many of its Arab neighbors. Coupled with the favorable business environment, Lebanon's entrepreneurial culture and educated labor force exposed to both Arab and Western cultures led the country to achieve relative prosperity up to the early 1970s. Then Beirut was "the Paris of the Middle East".

That came to a sudden halt in 1975, which started fifteen years of fighting among factions and resulted in 150,000 dead, 300,000 displaced persons, and 500,000 émigrés. The prosperity that the country had known before the war was destroyed, as was its infrastructure. Efforts to rebuild after the signing of the 1990 T'aif Agreement, which put an end

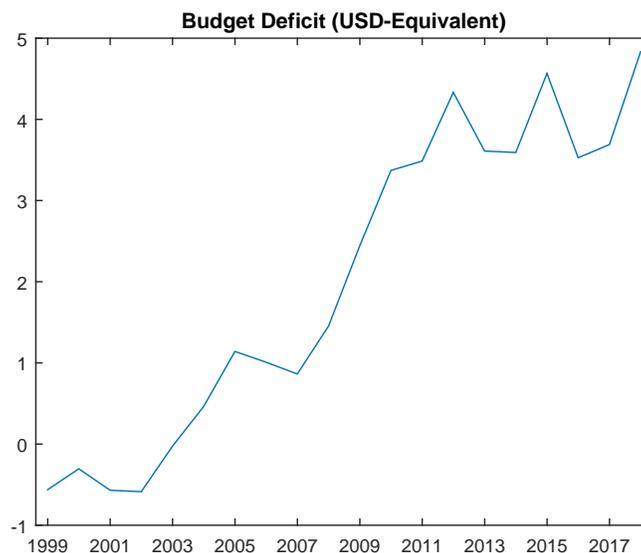
---

<sup>1</sup>In fact, BDL faced the "impossible trinity" of defending a fixed exchange rate under an open capital account with a limited monetary policy toolkit.

to the war, were frustrated by the outbreak of the First Gulf War (1991) which led rich Gulf states to back out from the \$2 billion financial commitments they had made toward Lebanon's reconstruction.

Left to its own devices, Lebanon conceived a financing plan which would fund its \$12 billion reconstruction from expected future revenues: a combination of expected future budget surpluses, and internal and foreign borrowing; i.e., the reconstruction would be deficit-financed. The expected budget surpluses never materialized. Although the reconstruction goals were pared down because of financial constraints, its higher than anticipated cost, coupled with ineffective tax collection resulted in a widening gap between government revenues and expenditures (Fig.1)<sup>2</sup>. This deficit financing led to increased government expenditures in the form of interest<sup>3</sup> which led to persistent and growing budget deficits, currently at \$6 bb (Fig.2), or 11% of GDP (Fig. 3), and the accumulation of government debt to its current level of \$82 bb (Fig.4), or 151% of GDP (Fig.5)<sup>4</sup>

Figure 1:



<sup>2</sup>Another large contributor to Lebanon's deficit cum debt are the transfers to Électricité du Liban (EDL), the state-owned electric utility which consumes transfers approaching 4% of GDP

<sup>3</sup>Interest expense has not grown monotonously with the country's debt/GDP ratio. The Paris I (2001), Paris II (2002), and Paris III (2007) conferences resulted in grants and concessionary loans to Lebanon from a group of over 40 donor countries led by the World Bank which temporarily lowered financing costs and the debt/GDP ratio

<sup>4</sup>This figure represents strictly the government's documented debt and excludes, for example the debt owed by Banque du Liban (BDL), the country's central bank, in the form of CDs, to the Lebanese banking system. Consolidating BDL's liabilities, results in consolidated public sector liabilities of \$136 bb, or 252% of GDP. Monthly GDP was interpolated based on yearly GDP.

Figure 2:

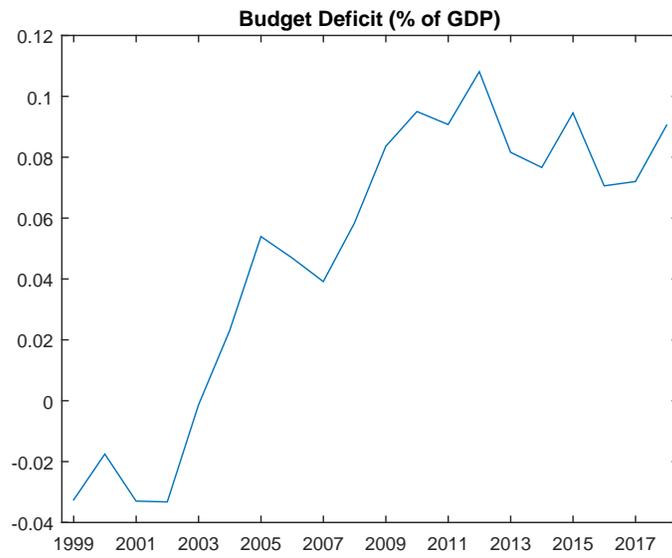


Figure 3:

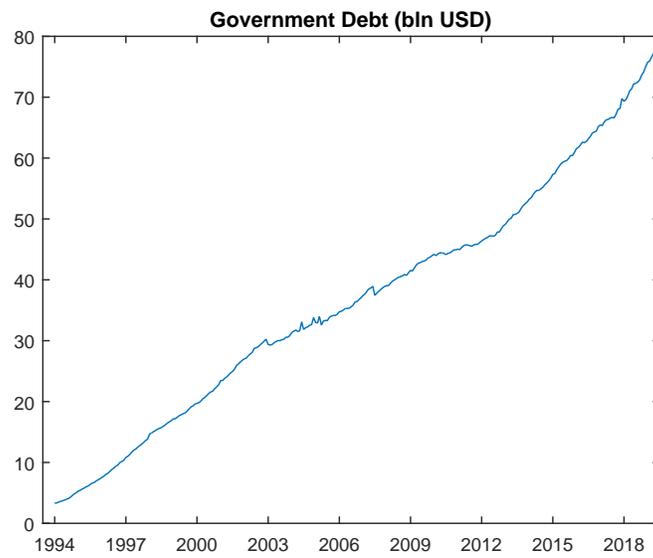
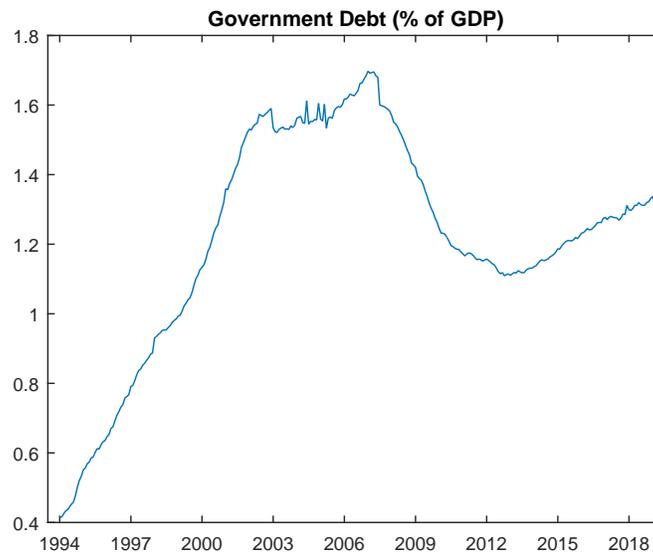


Figure 4:



### 3 Lebanon’s Public Finance Structure

The way these deficits have been financed have been *sui generis*. Lebanon has a gigantic financial sector, with bank deposits equivalent to 300% of GDP, which represents the best-situated liquidity pool to finance Lebanon’s budget deficit. In fact, Lebanese banks own over 50% of Lebanon’s public debt, with claims on the government representing approximately 60%<sup>5</sup> of the asset-side of the system’s balance sheet. A further, fluctuating, portion of Lebanon’s debt is held by BDL directly. In turn, the banks are almost exclusively funded by deposits, a significant portion of which belong to foreigners (diaspora Lebanese and other Arab investors).

Regardless of our main research question about whether the sovereign’s debt is sustainable, at current market prices the Lebanese banking system is insolvent on a mark-to-market basis and the resilience of the deposit base is explained by a combination of increasing interest rates to levels sufficient to roll over deposits, and the system’s abundant liquidity. Indeed, Lebanese banks lend very little (about 25% of their assets) to their customers, with the remainder of their assets being liquidity. The fact that Lebanese banks can survive, and indeed be profitable, by lending only 25% of their assets opens a secondary line of research which reveals that the liquid portion of the Lebanese banking system’s consolidated balance sheet is almost exclusively comprised of high-yielding government

---

<sup>5</sup>This figure considers only claims against the government. If we add claims against BDL, the Lebanese banking system finances well over 80% of Lebanon’s consolidated public sector debt

Eurobonds and T-bills and excess reserves (substantially all unlent deposits) invested in BDL CDs,, with the latter representing a multiple of the former. Therefore, to simplify, deposits in the Lebanese system are being used to finance 1) the Lebanese government, and 2) BDL.

Lebanese banks invest an aggregate \$55 bb excess reserves because it is profitable: pound-denominated BDL CDs have a zero risk-weighting, while the risk-weighting of BDL dollar CDs is the same as the government's, with both being lower than risk weightings for conventional loans. In addition, BDL CDs are far more liquid than conventional loans and are priced to attract the targeted volume of excess reserves. In fact, BDL *needs* to borrow the banks' dollar deposits to the extent that the central bank needs a significant headline reserve figure (currently \$38 billion) as the support to its monetary liabilities if the peg is to be maintained. At the same time, BDL needs to sterilize pounds to increase their demand and avoid further FX reserve erosion. Thus, BDL's \$38 bb reserves are supporting not only the central bank's monetary liabilities, but an even bigger amount (\$55 bb) in documented (in the form of CDs), high-yielding liabilities with the Lebanese banking system. Thus, BDL's monetary policy is as orthodox as it is unique: *even ignoring the totality of the Lebanese pounds in circulation*, BDL's dollar liabilities (\$23 bb) significantly decrease its gross dollar assets (\$38 bb) for a historically-low net figure of \$15 bb, or less than 40% of the money supply. This state of affairs would not be worrisome under either of two scenarios: either the Lebanese government has enough treasury reserves to recapitalize BDL (which is the primary research question we address in the following chapter), or the central bank is making money at such a rapid pace that net reserves can revert to the historical 75% of the money supply within a reasonable amount of time.

Unfortunately, the latter is not the case. Although BDL has not published an income statement for years, we can make certain assumptions to estimate its profitability and, thus, its ability to continue supporting both the peg and the government's finances. As detailed in Table 1, below, we estimate that BDL lost over \$3.5 bb over the past twelve months.

Table 1: BDL Historical Net Financial Results

<b>BDL NET INTEREST INCOME</b>		
FX Reserves	USD	38,000,000,000
Contractual Rate on FX Reserves (Assumed)		1.00%
Gross USD Interest Income	USD	380,000,000
USD CDs Outstanding	USD	22,706,100,000
Weighted Average Contractual Rate on USD CDs		6.49%
USD CD Interest Expense	USD	1,474,578,550
<b>USD Net Interest Income</b>	<b>USD</b>	<b>(1,094,578,550)</b>
LBP M0 Expansion	LBP	489,100,000,000
FX Rate		1,507
USD- Equivalent Seignorage	USD	324,552,090
LBP CDs Outstanding (USD-Equivalent)	USD	32,303,553,648
Weighted Average Contractual Rate on USD CDs		8.89%
USD- Equivalent LBP CD Expense	USD	2,872,615,079
<b>USD-Equivalent Net Seignorage Income</b>	<b>USD</b>	<b>(2,548,062,989)</b>
<b>BDL USD-Equivalent Net Interest Income</b>	<b>USD</b>	<b>USD (3,642,641,539)</b>

In addition, due to the current strains to retain deposits in the consolidated financial sector (Lebanese banks plus BDL) and defend the peg, we expect the central bank deficit to worsen in the year ahead. As shown in table II(a), below, the main drivers of such worsening are the expected higher CD rates (both in USD and LBP) and the tightening of the money supply. On the other hand, we expect such adverse changes to be partially offset by an increase in the remuneration on BDL's offshore gross reserves. Assuming that the peg holds, keeping BDL CD rates constant at current levels (14% for USD and 20% for LBP), and holding constant the rate of creation of high-powered money at 2019 levels, BDL would be projected to suffer a financial loss in excess of \$8.5 bb, equivalent to 15% of GDP, and exceeding the government's 11% budget deficit.

Table 2a: BDL Projected Net Financial Results (Base Case)

<b>BDL NET INTEREST INCOME</b>		
FX Reserves	USD	38,000,000,000
Contractual Rate on FX Reserves (Assumed)		2.00%
Gross USD Interest Income	USD	760,000,000
USD CDs Outstanding	USD	22,706,100,000
Weighted Average Contractual Rate on USD CDs		14.00%
USD CD Interest Expense	USD	3,178,854,000
<b>USD Net Interest Income</b>	<b>USD</b>	<b>(2,418,854,000)</b>
LBP M0 Expansion	LBP	489,100,000,000
FX Rate		1,507
USD- Equivalent Seignorage	USD	324,552,090
LBP CDs Outstanding (USD-Equivalent)	USD	32,303,553,648
Weighted Average Contractual Rate on USD CDs		20.00%
USD- Equivalent LBP CD Expense	USD	6,460,710,730
<b>USD-Equivalent Net Seignorage Income</b>	<b>USD</b>	<b>(6,136,158,639)</b>
<b>BDL USD-Equivalent Net Interest Income</b>	<b>USD</b>	<b>(8,555,012,639)</b>

As shown in Table II(b), below, even allowing for a relaxation in financial conditions where  $M_0$  is allowed to grow by LBP600 bb and rates on BDL CDs drop to 10% and 15% for USD and LBP, respectively, the cost of maintaining the peg and the liquidity of the banking system would create a quasi-fiscal deficit of nearly \$6 bb, still in excess of 10% of GDP.

Table 2b: BDL Projected Net Financial Results (Optimistic Case)

<b>BDL NET INTEREST INCOME</b>		
FX Reserves	USD	38,000,000,000
Contractual Rate on FX Reserves (Assumed)		2.00%
Gross USD Interest Income	USD	760,000,000
USD CDs Outstanding	USD	22,706,100,000
Weighted Average Contractual Rate on USD CDs		10.00%
USD CD Interest Expense	USD	2,270,610,000
<b>USD Net Interest Income</b>	<b>USD</b>	<b>(1,510,610,000)</b>
LBP M0 Expansion	LBP	600,000,000,000
FX Rate		1,507
USD- Equivalent Seignorage	USD	398,142,004
LBP CDs Outstanding (USD-Equivalent)	USD	32,303,553,648
Weighted Average Contractual Rate on USD CDs		15.00%
USD- Equivalent LBP CD Expense	USD	4,845,533,047
<b>USD-Equivalent Net Seignorage Income</b>	<b>USD</b>	<b>(4,447,391,043)</b>
<b>BDL USD-Equivalent Net Interest Income</b>	<b>USD</b>	<b>(5,958,001,043)</b>

We conclude from this section that, faced with the "impossible trinity", BDL has a very limited scope of response to finance the deficit, since meaningful expansion of the monetary base (either through the purchase of T Bills or the reduction in BDL CD interest rates) could result in decreased demand for pounds leading to further reserve drain which could, in turn, jeopardize the peg.

## 4 Theoretical Foundation

The theoretical and empirical debt sustainability analyses for both internal and external public debt is structurally identical. In fact, both frameworks are based on the intertemporal budget constraint. The only major difference is that, for domestic public debt, the intertemporal constraint rests on the public sector's financing constraint (primary deficit plus nominal debt service over changes in outstanding debt), while for foreign public debt is a function of the stock of debt,  $B_t$  in period  $t$  relative to the previous period's stock  $B_{t-1}$  plus debt service  $rB_{t-1}$ , and the primary surplus,  $Z_t$ .

$$B_t = (1 + r)B_{t-1} - Z_t \quad (1)$$

where  $B_t$  is the stock of outstanding debt at the end of period  $t$ , and  $r_t$  is the ex-post return on government debt over period  $t$ . The primary balance,  $Z_t$ , will be negative when it represents a deficit and positive when it represents a surplus. Given the time paths for  $r_t$  and  $Z_t$ , the government financing constraint in Eq. (1) describes the time path of the stock of debt; i.e., the dynamics of debt accumulation or decumulation. Eq. (1) tells us that whenever the government primary balance is zero ( $Z_t = 0$ ) the stock of debt will grow at a rate equal to the interest payment  $\Delta B_t = (1+r)B_t$ . On the other hand, if the government runs a primary deficit ( $Z_t < 0$ ), the stock of debt will grow at a rate exceeding the interest payment. Finally, if the government operates at a primary surplus ( $Z_t > 0$ ) the stock of debt will grow at a rate which is lower than the interest payment. If that primary surplus is large enough ( $Z_t + r_t B_{t-1} > 0$ ), then the stock of debt will actually decrease in nominal terms.

By iterating Eq. (1) over  $n$  periods, we get:

$$B_{t-1} = \sum_{j=0}^n \frac{T_{t+j}}{(1+r)^{j+1}} - \sum_{j=0}^n \frac{G_{t+j}}{(1+r)^{j+1}} + \frac{B_{t+1}}{(1+r)^{n+1}} \quad (2)$$

where  $T$  is tax revenue and  $G$  is government expense exclusive of interest payments.

While the traditional stock of debt equation would also include seignorage revenues, those revenues have tended to be small in Lebanon because of the price level anchor provided by the peg. However, Lebanon is unique in that its central bank carries considerable dollar-denominated liabilities in the form of Lebanese law CDs (BDL CDs) issued to the banking system and, thus, BDL generates *negative seignorage* represented by the differential in interest rate BDL pays the banks and the interest rate it receives on its reserves abroad.

Eq. (2) can thus be expanded to capture the (pound) seignorage revenues and the (dollar) seignorage expenses, as follows:

$$B_{t-1} = \sum_{j=0}^n \frac{T_{t+j}}{(1+r)^{j+1}} + \sum_{j=0}^n \frac{\Delta M_{t+j}}{P_{t+j}} + \sum_{j=0}^n \frac{CD_{t+j}(r_{L,t+j} - r_{U,t+j})}{(1+r)^{j+1}} - \sum_{j=0}^n \frac{G_{t+j}}{(1+r)^{j+1}} + \frac{B_{n+1}}{(1+r)^{n+1}} \quad (3)$$

where  $\Delta M_t$  is the change in the nominal stock of high-powered money ( $M_0$ ),  $P_t$  is the consumer price index,  $CD_t$  is the stock of outstanding BDL CDs,  $r_{L,t}$  the interest paid by BDL CDs, and  $r_{U,t}$  the rate earned by BDL on reserves. The debt is sustainable if and only if the No-Ponzi Hypothesis (NPH) is satisfied; i.e.:

$$\lim_{n \rightarrow \infty} \frac{B_{n+1}}{(1+r)^{n+1}} = 0 \quad (4)$$

Satisfaction of the NPH requires that the present value of government debt in the indefinite future tends to zero. This can occur only if the stock of debt,  $B$ , grows more slowly than

the sovereign interest rate,  $r$ . In the alternative, the government would be continuously financing interest payments through the issuance of new debt.

Therefore, when Eq. (4) (NPH) is satisfied, Eq. (2) becomes:

$$B_{t-1} = \sum_{j=0}^n \frac{T_{t+j}}{(1+r)^{j+1}} - \sigma_{j=0}^n \frac{G_{t+j}}{(1+r)^{j+1}} \text{ and} \quad (5)$$

Eq. (3) becomes:

$$B_{t-1} = \sum_{j=0}^n \frac{T_{t+j}}{(1+r)^{j+1}} + \sum_{j=0}^n \frac{\Delta M_{t+j}}{P_{t+j}} + \sum_{j=0}^n \frac{CD_{t+j}(r_{L,t+j} - r_{U,t+j})}{(1+r)^{j+1}} - \sum_{j=0}^n \frac{G_{t+j}}{(1+r)^{j+1}} \quad (6)$$

## 5 Literature Review

Empirical studies on the relationship of debt sustainability date back to Hamilton and Flavin (1986), who tested the validity of the No-Ponzi Hypothesis on US data and found that, for the public debt to be sustainable, government deficit and public debt were required to be stationary. Kremers (1988) and Trehan and Walsh (1991) replicated the research over different time periods and reached the same empirical conclusion.

Cointegration techniques were used in other empirical debt sustainability analyses. These studies found that public debt is sustainable if a long-term relationship exists between government revenues and expenditures (see, e.g., Tanner and Liu, 1994; Haug, 1995; Quintos, 1995; Ahmed and Roger, 1995; Payne, 1997; Crowder, 1997; Athanasios and Sidiropoulos, 1999).

In addition to studying the relationship between debt sustainability and budget deficits and current account deficits, respectively, the literature has also studied the relationship between the twin deficits (as in the case of Lebanon) and debt sustainability. For example, Islam (1995) empirically used Granger causality tests to examine the causal relationship between budget deficits and trade deficits in Brazil for the period 1973 - 1991 and concluded that the existence of bilateral causality between budget deficits and trade deficits. Khalid and Guan (1999) empirically examined the causal relationship between budget and current account deficits for developed and developing countries and found a higher statistical significance for the association between deficits for developing countries than for developed ones. The results from Indonesia and Pakistan indicate that the causality runs from current account deficits to budget deficits, the reason being that the public indebtedness incurred to finance the current account deficit increased the cost of debt, therefore leading to higher budget deficits.

Finally, and especially relevant for Lebanon, given the longevity of its foreign exchange peg, the literature has addressed the link between debt sustainability and the exchange rate regime. For example, Edwards (1984) and Cline (1985) studied the link between

sovereign debt defaults and exchange rate policy by considering how the exchange rate regime prevailing prior to a sovereign debt crisis contributed to such crisis. The main concept was that a flexible exchange rate may provide a means to adjust to external shocks, thus reducing the likelihood that such a shock would result in a sovereign default. In fact, they concluded that, when the exchange rate is fixed, the monetary policy priority is the defense of the peg (see Argentina, 2001) and cannot be effectively used to absorb external shocks, thus increasing the likelihood of a sovereign debt crisis.

## 6 Empirical Methodology and Results

This section empirically examines the sustainability of Lebanon's public debt as well as the sustainability of its exchange rate regime, using time series covering the period 1999-2019. Our data was collected from the World Bank, the International Monetary Fund, Banque du Liban, and the Lebanese Ministry of Finance.

As stated above, two empirical frameworks have been used in the literature to test for fiscal sustainability. The first rests mainly on testing the stationarity of the various fiscal variables, while the second employs cointegration techniques and explores the existence of a long-run equilibrium between those fiscal variables.

The empirical literature argues that if the budget series are non-stationary they are growing over time without bound, which results in public debt also growing without bound, thus rendering fiscal policy unsustainable. This would, in turn, breach the Eq.(4) NPH. Moreover, the meaning of the public debt series being non-stationary is that public debt is growing without bound and is, therefore, unsustainable. This would also violate the Eq. (4) NPH.

We performed our analysis using Augmented Dickey-Fuller (ADF) and Phillips-Perron unit root tests. Table III reports the ADF and PP tests for government expenditures ( $G$ ), tax revenues ( $T$ ), budget deficit, and total public debt. It is clear that all four variables are non-stationary I(1) series. Since both the public debt and the deficit are non-stationary, the Eq. (4) NPH is breached, leading to the conclusion that Lebanon's public debt is not sustainable.

Table 3: Unit Root Test Results

	Panel A: ADF			Panel B: PP		
	Unit Root	Stat.	P-value	Unit Root	Stat.	P-value
Budget balance	Yes	-2.0995	0.2593	Yes	-1.4423	0.5266
Government Debt	Yes	-2.8583	0.1781	Yes	-2.7461	0.2248
External Debt	Yes	-0.8576	0.958	Yes	-0.8802	0.9558
Internal Debt	Yes	-2.9452	0.1499	Yes	-2.8697	0.1742
Government Revenues	No	-9.8527	0.001	No	-13.7731	0.001
Tax Revenue	Yes	-2.1692	0.2293	Yes	-1.9788	0.3077
Debt service	Yes	-3.1643	0.128	Yes	-3.1643	0.128

*All the variables are in terms of GDP. The null hypothesis is that the variable contains a unit root, and the alternative is that the variable was generated by a stationary process. ADF estimates an OLS model where the first difference of the time series at time  $t$  is regressed on the level at time  $t-1$ , augmented with lag terms of the dependent variable. Then the stationarity is checked based on the significance of the level term. Phillips and Perron's test statistics generalization of Dickey-Fuller test (without augmenting by lag terms) using the Newey–West heteroskedasticity and autocorrelation standard errors.*

## 7 Conclusions and Policy Implications

We empirically examined, using time series econometric models, the sustainability of Lebanon's public debt and exchange rate policy. The empirical results indicate that Lebanon's public debt is not sustainable. Although this article did not address Lebanon's current account deficit, we submit that rising fiscal deficits have been straining the current account, thus jeopardizing the existing exchange rate regime.

Although not performed for this article, other studies show Granger causality tests supporting the existence of a uni-directional causal relationship between budget deficits and current account deficits. In the case of Lebanon, the intuition is as follows. Public debt started to accumulate in the early 1990s, when the government first issued T Bills to finance its expenditures, but never to cover its current account deficit. In other words, Lebanon's recurrent trade deficits were never financed via internal or external borrowings, but rather through diaspora remittances and bank deposits attracted from GCC countries. However, remittances are relatively inelastic and GCC residents' willingness to place their deposits in Lebanese banks may now be limited given those banks' exposure to a stressed sovereign, which implies that Lebanon may have to start relying more on external financing, thus leading to further deterioration in its twin deficits. In addition, future reliance on external financing may aggravate the deteriorating current account deficit, and put additional pressure on the peg.