Twin deficits and the sustainability of public debt and exchange rate policies in Lebanon

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ABSTRACT

This paper examines empirically using time series econometric models the sustainability of public debt and exchange rate policies, as well as, the relationship between current account and budget deficits in the emerging small open economy of Lebanon. The empirical results point to unsustainable debt and exchange rate policies. Other empirical results support the existence of a unidirectional causal relationship, in the short run, between the budget and current account deficits, indicating that rising fiscal deficits have started to put even more strain on the current account deficits and on the national public debt. To avoid a future depreciation of the exchange rate and perhaps a fiscal and currency crises, the government will have to timely introduce austerity measures to curb the negative implications of its rising budget and current account deficits and debt on Lebanon’s economy.

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1. Introduction

The conduct of exchange rate and fiscal policies in the emerging economy of Lebanon has recently become critical in determining the country’s future economic and fiscal position, due to the

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accumulation, since the early 1990s, of sizable levels of internal and external debts, and the pursuit of a fixed exchange rate regime since the mid-1990s. Lebanon has been running permanent current account deficits for the past three decades and budget deficits since the early 1990s, resulting in a total public debt estimated at 145 per cent of GDP in 2013. With the more recent accumulation of a sizeable foreign debt, the pursuit of a fixed exchange rate regime became a must in order not only to keep debt service costs under control, but also to insure a steady inflow of foreign capital. Subsequently, monetary policy became subordinated to preserving the exchange rate peg to the United Satets Dollar (US$), and Banque Du Liban (BDL) lost an effective monetary policy tool that constituted an effective mechanism to absorb and neutralize fiscal and macroeconomic imbalances, as well as external/political shocks on the domestic economy.¹

Moreover, there is substantial evidence in the literature stipulating that foreign debt and exchange rate crises are strongly linked in emerging economies. Reinhart (2002), for example, finds that 84 per cent of all default episodes in her 59-country sample over the period 1970–1999 were followed within 24 months by currency crises, while 66 per cent of all currency crises in her developing-country subgroup were followed within 24 months by debt defaults. It remains to understand why the link between the two phenomena should be so strong empirically, as well as why in some cases the two types of crises tend to occur together while in others they do not.

On the other hand, the relationship between budget deficits, current account deficits, public debt and exchange rates policies has attracted a great deal of attention from academics and policy-makers. There exists numerous papers in the macroeconomic literature dealing with the issue of debt sustainability and its implications on exchange rates (see for instance Neaim, 2009, 2010; Chalk, 2000; Mendoza and Ostry, 2008; Ghosh et al., 2013; Bohn, 2005; Hamilton and Flavin, 1986; Trehan and Walsh, 1988, 1991; Smith and Zin, 1991; Buiter and Patel, 1992; Baglioni and Cherubini, 1993; Caporale, 1995; Haug, 1995; Quintos, 1995).

Moreover, the theoretical and empirical literature that has examined the relationship between current account and budget deficits may be divided into two strands. The Keynesian view argues that budget deficits have a statistically significant impact on current account deficits. For example studies by Mundell (1963), and Haug (1996) have argued that government deficits cause trade deficits through the interest and exchange rate channels. In a small open economy IS-LM framework, an increase in the budget deficit would induce upward pressure on interest rates, thus, causing capital inflows. This will lead to an appreciation of the exchange rate through the high demand on domestic financial assets, leading to an increase in the trade deficit. The second strand of the literature falling under the Ricardian Equivalence Hypothesis (Barro, 1989) argues that there is no relationship between the two deficits. In other words, budget deficits do not result in current account deficits. It is shown that changes in government revenues or expenditures have no real effects on the real interest rate, investment, or the current account balance.

Since the early 1990s, Lebanon has emerged to be a major debtor country. A heavy debt service burden, inadequate collection of taxes coupled with heavy government expenditures on infrastructure led subsequently to the emergence of recurrent budget deficits. Increases in the budget deficit have induced upward pressure on domestic interest rates, thus, causing capital inflows seeking investment in Lebanese Treasury Bills (TBs). This had led to the appreciation of the nominal exchange rate in between 1993 and 1995, and an appreciation of the real exchange rate since the mid-1990s, further deteriorating the trade deficit. On the other hand, Lebanon has always been characterized by an inefficient export sector and high levels of imports. Lebanon imports about 80 per cent of the goods consumed locally. The byproduct has been a huge gap between exports and imports and recurrent trade and current account deficits.

Against this backdrop, this paper aims to achieve two broad objectives. The first is to determine whether Lebanon’s fiscal policy has become unsustainable, and subsequently, whether the current

¹ With a fixed exchange rate regime and an open capital account, monetary policy becomes ineffective, as the central bank of a small open economy will be subordinated to keep the interest rate under the control and close to the foreign interest rate to which the currency is pegged. This phenomenon is known as the impossible trinity in the literature. That is a fixed exchange rate, an open capital account and an effective monetary policy cannot coexist.
fixed exchange rate regime is still a viable alternative for the central bank. The second is to study whether the recurrent budget deficits have started to put even more strains on the chronic current account deficits, rendering debt and exchange rate policies unsustainable. And if that is the case, what are the implications on the exchange rate, interest rates and the rate of growth of Gross Domestic Product (GDP). Our empirical results are expected to guide policymakers to fine tune prudent fiscal and monetary policies to avert further budget and current account deficits, with the purpose of providing the appropriate recommendations to mitigate the potential of a future fiscal or currency crisis.

The rest of the paper is divided as follows. The next section highlights Lebanon’s recent macroeconomic developments over the last four decades. Section 3 lays down the theoretical motivation of the paper. Section 4 presents a review of related literature. The empirical methodology and empirical results are outlined in Section 5. Finally, the last section offers some conclusion and policy implications.


Since the early 1990s, and in its efforts to rebuild its devastated infrastructure, the Lebanese government resorted to deficit financing from the domestic and international financial markets through the issue of TBs. Inadequate collection of taxes and heavy government expenditures on infrastructure, coupled with corruption and uncontrolled spending led to the widening of the gap between government revenues and expenditures (Fig. 1(a)). A heavy debt service burden coupled with low government revenues and high expenditures led subsequently to the emergence of recurrent budget deficits reaching US$ 8 billion in 2013, or about 10 per cent of GDP (Fig. 1(b)). The bulk of the Lebanese public debt has been accumulated via domestic borrowing, and the proceeds of which have been used to finance spending on infrastructure projects. By the end of 2013, total public debt stood at about US$ 63 billion (Fig. 1(d)); about 150 per cent of GDP.

During the 1975–1990 period, the Lebanese government was unable to collect taxes. With no fiscal revenues to finance spending, the government had to resort to deficit financing through seigniorage especially during the 1989–1991 time period. BDL had to resort to printing money for the purpose of financing the budget deficit. This subsequently led to hyperinflation. The rate of inflation was at its highest historical levels of 490 per cent and 100 per cent in 1989 and 1991 respectively (Fig. 1(e)). This was coupled with several episodes of exchange rate depreciation, culminating into the 1989–1990 currency crisis, when the central bank had to abandon its pegged exchange rate regime and allowed the Lebanese Pound (LP) to float. In 1991, the LP experienced a steep depreciation to about LP1900/US$ (Fig. 1(f)). A highly volatile exchange rate and high inflationary pressures induced the central bank subsequently to shift its monetary policy targets and objectives, adopting price and exchange rate stability as its main goal. This was achieved through considerable hikes in interest rates exceeding in 1992 the 25 per cent threshold (Fig. 1(c)). Despite the containment of inflationary pressures of the late 1980s and early 1990s, Lebanon continued to experience real appreciations of its exchange rate, even after 1995 when the nominal rate was fixed at LP1500/US$.

Developments in the external sector indicate that Lebanon’s exports have never exceeded the US$ 7 billion level in between 1970 and 2013, at a time when Lebanon is a heavy importer of goods and services, reaching US$ 23 billion in 2013, and further widening the gap between both exports and imports (Fig. 2(a)). Between 2006 and 2013, Lebanon’s exports have almost doubled to reach about US$ 7 billion in 2013, while its imports increased from US$ 10 billion in 2006 to US$ 23 billion in 2013 (Fig. 2(a)). This has translated into a huge gap between exports and imports, and recurrent trade balance and current account deficits (Fig. 2(b) and (e)). When grouped together, exports and imports appear to be diverging quite significantly over time (Fig. 2(a)). Subsequently, Lebanon has experienced chronic current account deficits since the mid-1980s.

However, and despite the recurrent trade and current account deficits, Lebanon has maintained and since the early 1970s a surplus in its capital account. After registering levels below the US$ 2 billion in between 1970 and 1985, Lebanon’s capital account started registering significant surpluses since

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2 With the exception of the 1989–1992 period, the Lebanese government has not resorted to financing budgetary deficits through seigniorage revenues or through monetization of the deficit.
Fig. 1. Evolution of Lebanon’s Macroeconomic Fundamentals, 1970–2013.
(a) Government Tax Revenues and Expenditures, (b) budget balance, (c) TBs rates (%), (d) total public debt, (e) inflation rates (in %; 1995 = 100), (f) exchange rate LP/US$. Notes: All figures are in US$ billion unless otherwise indicated.
Fig. 2. Evolution of Lebanon's balance of payment components, 1970–2013. (a) Exports and imports, (b) trade deficit, (c) real GDP growth (%), (d) balance of payments, (e) current account, (f) foreign reserves, (g) remittances, (h) external debt. Notes: All figures are in US$ billion unless otherwise indicated. Source: IMF’s Direction of Trade Statistics and International Financial Statistics, BDL, Lebanese Ministry of Finance, and the World Bank’s World Development Indicators.
the early 1990s. These capital inflows have averaged at US$ 5 billion per year since the mid-1990s. Remittances from Lebanese working abroad constitute a significant portion of these capital inflows averaging yearly at US$ 6 billion since 2005 (Fig. 2(g)), coupled with a dynamic banking system which has attracted significant bank deposits from the rich Gulf countries, as well as Arab capital seeking investment in Lebanon’s TBs. In 2004, capital inflows registered significant increases to US$ 7.5 billion per year and have remained at that level. These continued capital account surpluses have offset the recurrent current account deficits and translated into no significant balance of payments (BOP) deficits over the period under consideration. The highest BOP deficit was registered in 1980 at US$ 1.5 billion, but was quickly offset by significant capital inflows in subsequent years, to resume its upward trend in the early 2000s (Fig. 2(d)). Despite the recurrent trade deficits, BDL has been able to accumulate foreign reserves starting early 1990s from capital inflows, offsetting thus the current account deficits by corresponding capital account surpluses. By the end of 2013, foreign reserves amounted to about US$ 30 billion (Fig. 2(f)). The balance of payment can, however, swiftly move into a deficit if for whatever reason there is a capital flow reversal. While Lebanon was not affected by the 2008 US financial crisis, the latest political turmoil led to some capital outflows. However, these outflows were short lived and were swiftly contained.

External debt started to become significant since the mid-1990s. This is due to: (1) the government tapping international financial markets to raise funds; and (2) the conversion of portions of the government’s short maturity domestic debt with high rates of interest, into a longer maturity foreign debt with lower interest rates, for the purpose of reducing the cost of debt service in US$ (Fig. 2(h)).

Given the presence of structural current account deficits and significant levels of internal and external debt, Lebanon’s future fiscal and exchange rate policies should focus on containing any future real exchange rate appreciation, preserve a political and economic environment that is conducive to additional capital inflows, keep government expenditures under control, and further stimulate domestic savings and investment.

3. Theoretical motivation

The theoretical and empirical analysis of the sustainability of both internal and external public debts is structurally identical. In fact, both frameworks are based on the study of government inter-temporal budget constraints. While the former rests on the financing constraint of the public sector, which relates the primary deficit plus nominal debt service to changes in outstanding debt, the latter relies on the external constraint which relates external debt to debt service and next exports.

Empirical studies dealing with the sustainability of public debt start with the financing constraint of the public sector. This constraint relates the primary deficit plus nominal debt service to changes in outstanding debt. Specifically, the following dynamic equation relates the stock of debt in period \( t \), \( B_t \) to last period’s debt \( B_{t-1} \) plus debt service \( rB_{t-1} \), and the primary surplus \( Z_t \).

\[
B_t = (1 + r)B_{t-1} - Z_t, \tag{1}
\]

where \( B_t \) is the outstanding debt at the end of period \( t \), and \( r_t \) equals the ex post return on government debt during period \( t \). \( Z \) will be negative when it represents a deficit and will constitute an addition to the stock of debt, and will be positive when it represents a surplus. Given the time paths for \( r_t \) and \( Z_t \), the government financing constraint in (1) describes the time path of the stock of debt, i.e., the dynamics of debt accumulation or decumulation. Eq. (1) indicates that if the government runs a primary surplus equal to zero \( (Z_t = 0) \), the stock of debt will grow at a rate equal to the interest rate: \( \Delta B_t = rB_{t-1} \). If the government runs a primary deficit \( (Z_t < 0) \), the stock of debt will grow at a rate exceeding the interest rate. If the government runs a primary surplus \( (Z_t > 0) \), the stock of debt will grow more slowly than the interest rate. If the surplus more than offsets payments on existing debt (i.e. the conventional surplus, \( Z_t + r_t B_{t-1} \) is positive), then debt will actually shrink over time.

Iterating Eq. (1) forward \( n \) periods and summing up we get:

\[
B_{t-1} = \sum_{j=0}^{n} \frac{T_{t+j}}{(1 + r)^{j+1}} - \sum_{j=0}^{n} \frac{G_{t+j}}{(1 + r)^{j+1}} + \frac{B_{n+1}}{(1 + r)^{n+1}}, \tag{2}
\]
where $G$ is defined to exclude interest payments. Seigniorage revenues have been rarely used in Lebanon to finance budget deficits; and in poorer countries grants and concessional lending might also constitute a source for the financing of budget deficits.

Eq. (2) can thus be modified to account for seigniorage revenues,

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

(3)

where $\Delta M_t$ is the change in the nominal stock of high powered money, and $P_t$ is the consumer price index.

If the last term in (2) or (3) approaches zero as the number of periods increases, then the No-Ponzi-Game (NPG) constraint will be satisfied, i.e.,

$$\lim_{n \to \infty} \frac{B_{n+1}}{(1+r)^{n+1}} = 0. $$

(4)

The NPG constraint in (4), also known in the literature as the transversality condition is stating that the present value of the government’s debt in the indefinite future converges to zero. For this to occur, debt $B$ in the numerator must grow more slowly than the rate of interest $r$. The government cannot finance interest payments on debt by continuously issuing new debt. This will happen when Eq. (4) is not violated, and Eq. (2) reduces to

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

(5)

while Eq. (3) becomes:

$$B_{t-1} = \sum_{j=0}^{n} \frac{T_{t+j}}{(1+r)^{j+1}} + \sum_{j=0}^{n} \frac{\Delta M_{t+j}}{P_{t+j}} - \sum_{j=0}^{n} \frac{G_{t+j}}{(1+r)^{j+1}}.$$ 

(6)

Under the second framework, the government inter-temporal external constraint relates external debt accumulation in period $t+1$, denoted by $B_{t+1}$, to debt service and net exports as follows:

$$B_{t+1} = (1+r)B_t - NX_{t+1},$$

(7)

where $NX_{t+1}$ represents net exports in period $t+1$, $r$ is the nominal interest rate, and $rB_t$ is external debt service in period $t$. Iterating Eq. (7) forward $n$ periods and summing up we get the government’s external inter-temporal constraint:

$$B_t = \sum_{j=1}^{n} \frac{NX_{t+j}}{(1+r)^{j+1}} + \lim_{n \to \infty} \frac{B_{n}}{(1+r)^{n}}.$$ 

(8)

If the last term in (8) approaches zero as the number of period increases, then the NPG constraint will be satisfied, i.e.,

$$\lim_{n \to \infty} \frac{B_{n}}{(1+r)^{n}} = 0. $$

(9)

The NPG constraint in (9) is stating that the present value of external debt in the indefinite future converges to zero. For this to occur, external debt $B$ in the numerator must grow more slowly than the rate of interest $r$. The government cannot finance interest payments on external debt by continuously issuing new external debt. This will happen when Eq. (9) is not violated, and Eq. (8) reduces to

$$B_t = \sum_{j=1}^{n} \frac{NX_{t+j}}{(1+r)^{j+1}}.$$ 

(10)

This is the solvability condition that has to be satisfied for external debt sustainability.
4. Related literature

Empirical studies on the sustainability of debt in developed economies are numerous and were initiated by the paper of Hamilton and Flavin (1986). Using yearly data for the US, covering the period 1962–1984, they tested the validity of the NPG constraint or the budget constraint. In their study, if the government deficit and debt series are stationary then debt is sustainable which was indeed the case for the US data sample used. Using also yearly data for the US economy over a larger sample covering respectively the periods: 1890–1983 and 1960–1984, Trehan and Walsh (1991) studied the stationarity of the public deficit and debt, and concluded that since they were stationary for both sample periods, then debt is sustainable. Running the same empirical tests, Kremers (1988) used a different sample period: 1920–1985, and found debt to be sustainable until 1981, 1986.

Other empirical studies have used cointegration techniques to test whether debt is sustainable. These cointegration techniques were used to test whether a long run relationship exists between government revenues and expenditures. If such relationship exists, then one can conclude that debt is sustainable (see for instance, Tanner and Liu, 1994; Haug, 1995; Quintos, 1995; Ahmed and Roger, 1995; Payne, 1997; Crowder, 1997; Athanasios and Sidiropoulos, 1999).

More recently, Neaime (2009, 2010) analyzed the sustainability of public debt in the Middle East and North Africa (MENA) in the post US financial crisis period. Using time series econometric tests and the NPG constraint, the empirical results show strong evidence of sustainability of fiscal policies in Tunisia given the country’s fiscal discipline. The weak sustainability in Egypt is explained by the successful privatization plan introduced during the 1990s. Morocco’s mixed results are explained by the recently introduced fiscal recovery reforms. The unsustainable debt and fiscal policies for Jordan and Turkey were explained by the size of the government causing major fiscal imbalances for Jordan’s economy, and by the weakness of the financial and banking sectors in Turkey.

The empirical literature concerned with external debt sustainability studied the stationarity of the external debt, export and import series. If the external debt series is non-stationary, then it means that it is growing without bound over time, which means that subsequent debt will also grow without bound rendering external debt unsustainable. This will also violate the NPG constraint in Eq. (9). A stationary external debt series means that the series is reverting to a certain mean over time and is not growing without bounds. If that were the case, then obviously external debt would be sustainable, since it will be under control. Moreover, according to Fève and Henin (1998), for external debt to be sustainable in the long run, the ratio of external debt to exports should be stationary (i.e. effective sustainability condition), or else the hypothesis of unsustainable debt should be accepted.

Equivalently, cointegration tests between the different components of the balance of payments are also used in the empirical literature to depict the sustainability of external debt. If the export and import series are cointegrated, then again Eq. (9) will not be violated, since net exports in the numerator will not grow without bounds, and therefore external debt B will tend to converge to zero, and the NPG constraint in Eq. (9) will hold in this case. For instance, Fisher (1995) studies the long-term sustainability of the balance of payment deficit by testing the cointegration between imports and exports for the period 1947–1973 in the US. Due to the existence of a cointegrating vector \((-1; <1)\) for those two variables, the conclusion was that the current account deficit and therefore external debt are sustainable for the period under consideration.

Leachman and Francis (2000), believe that traditional unit root tests are not sufficient for the analysis of external debt sustainability, and should be paired with cointegration tests either between

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3 Agenor and Montiel (1996) argued that the government is solvent if the present value of the future resources available to it for debt service at least equal to the face value of its initial debt stock (p. 123). Thus, satisfying the present value budget constraint, implying that the government is solvent.

4 However, Wilcox (1989) found that debt was not sustainable over the 1960–1984 sample period.

5 For empirical studies on emerging economies, see Smith and Zin (1991), Butier and Patel (1992), Baglioni and Cherubini (1993), and Caporale (1995).

6 From a different perspective and using similar time series econometric technics, Neaime (2012) studied the implications of the US financial crisis on the emerging stock markets of the MENA region. His paper explores the global and regional financial linkages between MENA stock markets and the more developed financial markets, and the intra-regional financial linkages between MENA countries’ financial markets.
exports and imports, or between external debt and exports. In order to complete the analysis, the authors propose to integrate the intertemporal dimension in the dynamic debt accumulation by testing the existence of a cointegration relation between external debt and exports. If such relationship exists then external debt would be sustainable.

The empirical literature has also studied the relationship between twin deficits and debt sustainability in developing countries, since budget and current deficits are primarily responsible for rendering public debt unsustainable. Specifically, if the budget deficit is further deteriorating the current account deficit, then subsequent debt will be expected to grow without debt and debt would become unsustainable. For instance, Islam (1995) examined empirically the causal relationship between budget deficits and trade deficits for Brazil from 1973:1 through 1991:4. Using Granger Causality tests, the study showed a presence of bilateral causality between trade deficits and budget deficits. Using cointegration technics, Khalid and Guan (1999) examined the causal relationship between budget and current account deficits for developed and developing countries. The results suggest a higher statistically significant association between the two deficits in the long run for developing countries than is the case for developed countries. The results for Indonesia and Pakistan indicate that the direction of causality runs from the current account deficits to budget deficits. This is because much of the current account deficit was financed by internal and external borrowings, contributing further to the huge national debt. Interest payments on these debts have increased over the years, leading these countries to running bigger budget deficits.

Finally, two separate strands of the literature address the issue of external debt sustainability and its linkages with the exchange rate regime. One such strand is the literature on sovereign debt. Following the debt and exchange rate crises of the last two decades, several authors focused on how a no-default debt equilibrium could be explained for sovereign borrowers (see Eichengreen, 1991 for a review) using models based on reputation or sanctions (Bulow and Rogoff, 1989). Some early empirical work associated with this literature (for example, Edwards (1984), Cline (1985)) attempted to link sovereign default to exchange rate policy, by considering how the exchange rate regime prevailing prior to a debt crisis would influence the occurrence of such a crisis. The central idea was that a flexible exchange rate may constitute a mean of adjustment to external shocks, and could have the effect of reducing the likelihood of an external debt crisis. However, when the exchange rate is fixed, monetary policy will be subordinated to defend the exchange rate peg, and could in no way be used to absorb external shocks, rendering the likelihood of a crisis occurring more significant.

A second strand is the variant of the currency crisis literature (for example, Obstfeld, 1996), which examines the factors that influence an optimizing government’s choice to alter an existing exchange rate peg. While this literature considers such a choice as part of a wider menu of policies that also includes a fiscal instrument and a debt default option, it fails to link external debt to the prevailing exchange rate regime.

With the above in mind, this paper can thus be perceived as addressing gaps in both the debt crises and currency crises literature by simultaneously looking at the interaction among exchange rate policy, fiscal policy, and potential default on internal/external debt within the context of the small open of Lebanon. This paper, therefore, adds to the limited existing literature on MENA countries by studying and for the first time the sustainability of debt and exchange rate policies in the emerging economy of Lebanon. This exercise is carried out by establishing the short run casual patterns and long run equilibrium relationships between debt, exchange rates and government current account and budget deficits.

5. Empirical methodology and results

This section examines empirically the sustainability of Lebanon’s external and internal public debts, as well as, the sustainability of exchange rate policies, on the one hand, and the validity of the twin deficit hypothesis, on the other, using time series yearly data covering the period 1970–2013. Our data set was collected from the World Bank’s World Development Indicators, the International Monetary Fund’s Direction of Trade Statistics and International Financial Statistics, BDL, and the Lebanese Ministry of Finance.
Table 1

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</table>

Source: Author’s estimates.

Notes: (1) PP is the Phillips–Perron unit root test; ADF is the Augmented Dickey–Fuller test; and TT refers to a Time Trend. (2) The appropriate number lags is based on the Akaike Information Criterion (AIC); (3A) ** indicates rejection of the null hypothesis of non-stationarity at the 1% level of significance, while A * indicates rejection at the 5% level. (4) The last two columns are Mackinnon’s critical values at the 5% and 1% significance level respectively. (5) The random walk assumes no intercept or time trend in the respective series, while the constant assumes a drift in the series, and a constant and time trend assume the existence of both a drift and a time trend in the respective series.

The econometric analysis will help policy makers formulate appropriate policies to resolve Lebanon’s current fiscal and macroeconomic difficulties. 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 relationship between the fiscal variables of interest.

The empirical literature argues that if the budget/current account series are non-stationary, then it means that they are growing without bound over time, which means that subsequent internal/external debts will also grow without bound, rendering fiscal policy unsustainable. This will also violate the NPG constraints (4) and (9). Moreover, if the internal/external debt series are non-stationary, then it means that they are growing without bound over time, which means that subsequent internal/external debt will also grow without bound rendering internal/external debt unsustainable. This will also violate the NPG constraints in Eqs. (4) and (9).7

We use the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) (1988) unit root tests. Table 1 reports the ADF and PP tests for government expenditures (G), tax revenues (T), budget deficit, and total public debt. It is clear that all 4 variables are non-stationary I(1) series. Since the debt and deficit series are non-stationary, then it means that the NPG constraint in Eq. (4) is violated, which means that Lebanon’s debt is not sustainable.

Table 2 reports the ADF and PP tests for the current account (CA), external debt (Edebt), exports (X), imports (M), and the ratio of external debt to exports (Edebt/X). It is clear that all 5 variables are

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7 According to Fève and Henin (1998), for external debt to be sustainable in the long run, the ratio of external debt to exports should be stationary (i.e. effective sustainability condition), or else the hypothesis of unsustainable debt should be accepted.
non-stationary \( I(1) \) series. Since the external debt series is non-stationary, then it means that that the NPG constraint in Eq. (9) is violated, which means that Lebanon’s external debt is not sustainable. Tables 1 and 2 also indicate that when the variables are taken in first difference, all the series become stationary (are integrated of order zero, or \( I(0) \)), establishing that the series in levels are integrated of order one, or \( I(1) \).

Equivalently, cointegration tests between the different components of the budget and the balance of payments are also used in the empirical literature to depict the sustainability of internal/external debt. If the government expenditures and revenues series, as well as, the export and import series are cointegrated, then Eqs. (4) and (9) will not be violated.

For a two variable model, Engle and Granger (1987) developed a two-step procedure, which is commonly used to identify a cointegrating relationship between any two time series. An alternative test for cointegration is developed by Juselius and Juselius (1990). This test uses maximum likelihood method based on the trace of the stochastic matrix to determine the exact number of cointegrating vectors in the system. We use both methods to test for cointegration between Lebanon’s fiscal variables.

Engle and Granger’s two-step procedure is computed by performing two types of regressions

\[
X_t = \beta_0 + \beta_1 Y_t + \eta_t, \quad (11)
\]

\[
Y_t = \beta_0 + \beta_1 X_t + \eta_t. \quad (12)
\]

At the second stage, the ADF test is obtained as the t-statistic of \( \rho_0 \) in the following regressions:

\[
\Delta u_t = \rho_0 u_{t-1} + \sum_{i=1}^{p} \rho_i \Delta u_{t-i} + \sigma_t, \quad (13)
\]

\[
\Delta \eta_t = \rho_0 \eta_{t-1} + \sum_{i=1}^{p} \rho_i \Delta \eta_{t-i} + v_t. \quad (14)
\]
Table 3
Cointegration tests: government expenditures and revenues.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>λ-Trace statistics</th>
<th>Critical values</th>
<th>Engle–Granger test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Null</td>
<td>Alternative</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>r = 0</td>
<td>r ≥ 1</td>
<td>8.3</td>
<td>15.41</td>
</tr>
<tr>
<td>r ≤ 1</td>
<td>r = 2</td>
<td>1.04</td>
<td>3.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>−2.73</td>
<td>−2.53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(−2.95)</td>
<td>(−2.95)</td>
</tr>
</tbody>
</table>

Source: Author’s estimates.

Notes: (1) The Johansen cointegration likelihood ratio test is based on the trace of the stochastic matrix. (2) The test allows for a linear deterministic trend in the data, and a constant. (3) r represents the number of cointegrating vectors. (4) The asymptotic critical values are from Osterwald-Lenum (1992). (5(a) and (b) refer to ADF test statistic on the residuals obtained from the cointegrating regressions (11) and (12) respectively. (6) The numbers in brackets are the 5% critical values. (7) The functional form for the unit root tests based on Engel–Granger’s method is conducted with a constant.

Table 4
Cointegration tests: exports and imports.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>λ-Trace statistics</th>
<th>Critical values</th>
<th>Engle–Granger test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Null</td>
<td>Alternative</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>r = 0</td>
<td>r ≥ 1</td>
<td>8.1</td>
<td>15.41</td>
</tr>
<tr>
<td>r ≤ 1</td>
<td>r = 2</td>
<td>1.99</td>
<td>3.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>−2.37</td>
<td>−2.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(−2.95)</td>
<td>(−2.95)</td>
</tr>
</tbody>
</table>

Source: Author’s estimates.

Notes: See notes of Table 3 except that the functional form of the unit root test based on Engel–Granger’s method has a constant for (a) and (b).

where \( u_t \) and \( \eta_t \) are the residuals from the cointegrating regressions, and \( \Delta u_t = u_t - u_{t-1} \) while \( \Delta \eta_t = \eta_t - \eta_{t-1} \). One lag on the first difference of the cointegration residuals is included in the test regression to ensure the residuals from the ADF regression are serially uncorrelated.

The null hypothesis of no cointegration is tested against the alternative of co-integration. A large negative test statistic is consistent with the hypothesis of co-integration. The last column in Table 3 presents the computed ADF statistic for the coefficient \( \rho_0 \) in Eqs. (13) and (14). The empirical results indicate no long-run relationship between the government expenditure and revenues series, that is, the two series are diverging from one another, rendering fiscal policy unsustainable. The computed ADF t-statistics are \( -2.73 \) and \( -2.53 \), which falls below the 5% critical values of \( -2.95 \). Thus, there is little evidence in favour of a cointegrating relationship among the two series. The presence of no cointegration has been confirmed by performing the Johansen cointegration tests (see the remaining rows of Table 3), and by Fig. 1(a) where the two series seem to divert from one another overtime, with the expenditures series exceeding by far the revenues series. These cointegration results coupled with the above unit root tests confirm again the unsustainability of Lebanon’s public debt. It is clear that Lebanon should devote serious efforts in the near future to reduce government spending and improve the collection of taxes if it wishes to narrow the gap between government spending and revenues, and further contain its recurrent budget deficits.

Table 4 reports no long-run relationship between the exports and imports series. As is also clear from Fig. 2(a), there exists a significant gap between the two series since the early 1990s, where exports exceed by far imports. The computed ADF t-statistics are \( -2.37 \) and \( -2.03 \), which falls below the 5% critical values of \( -2.95 \). These results are also confirmed by the Johansen cointegration tests. Moreover, Table 5 reports no long-run relationship between external debt and exports. Therefore, one can safely conclude that Lebanon’s current account deficit, and therefore external debts are not sustainable for the period under consideration.

Causality tests are used next to test the twin deficit hypothesis in order to study whether the two existing deficits are putting further strains on fiscal policy aggravating further the unsustainability of both internal and external debts. The issue of testing Granger causality in such scenarios has been the subject of considerable recent empirical literature. If all variables contain a unit root but are not
Table 5
Cointegration tests: external debt and exports.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Alternative</th>
<th>λ-Trace statistics</th>
<th>Critical values</th>
<th>Engle–Granger test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Null</td>
<td>Alternative</td>
<td></td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>r = 0</td>
<td>r ≥ 1</td>
<td>11.9</td>
<td>15.41</td>
<td>20.04</td>
</tr>
<tr>
<td>r ≤ 1</td>
<td>r = 2</td>
<td>3.6</td>
<td>3.76</td>
<td>6.65</td>
</tr>
</tbody>
</table>

Source: Author’s estimates.
Notes: See notes of Table 3 except that the functional form of the unit root test based on Engel–Granger’s method does not include a constant for (a) and (b).

Table 6
Cointegration tests: budget and current account deficits.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Alternative</th>
<th>λ-Trace statistics</th>
<th>Critical values</th>
<th>Engle–Granger test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Null</td>
<td>Alternative</td>
<td></td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>r = 0</td>
<td>r ≥ 1</td>
<td>8.7</td>
<td>15.41</td>
<td>20.04</td>
</tr>
<tr>
<td>r ≤ 1</td>
<td>r = 2</td>
<td>0.05</td>
<td>3.76</td>
<td>6.65</td>
</tr>
</tbody>
</table>

Source: Author’s estimates.
Notes: See notes of Table 3 except that the functional form of the unit root test based on Engel–Granger’s method does not include a constant for case (a) and does include a constant and time trend for case (b).

cointegrated, then the estimation should be carried out through a vector autoregression (VAR) model with stationary time series. However, if the variables contain a unit root and are cointegrated, then Granger causality should be conducted through a vector error correction model (VECM).8

As our earlier results suggest, the budget and current account series contain a unit root but are not cointegrated (Table 6), and following Sims et al. (1990), and Toda and Phillips (1993), the causality tests involve estimation of the following VAR models but in first difference. The causality tests are conducted for 1 lag. Formally, let BD and CA represent the two series, Granger causality addresses the question whether BD is linearly informative about a future CA. This would hold true only when the event BD precedes the event CA. Stated differently, this presumes that the current and past observations of BD help in the forecast of CA. To conduct the test, each series is represented as a difference vector autoregression and regressed on its lag and those of the other series as follows.

\[
\Delta BD_t = \sum_{i=1}^{p} \alpha_i \Delta BD_{p-i} + \sum_{i=1}^{p} \beta_i \Delta CA_{p-i} + \sigma_t, \tag{15}
\]

\[
\Delta CA_t = \sum_{i=1}^{p} \alpha_i \Delta CA_{p-i} + \sum_{i=1}^{p} \beta_i \Delta BD_{p-i} + \epsilon_t. \tag{16}
\]

The estimated parameters β’s capture the impact of the exogenous variable (the independent variable) on the endogenous variable (the dependent variable). The causality tests consist of an F test for the null hypothesis:

\[
H_0 : \beta_1 = \beta_2 = 0. \tag{17}
\]

For Eq. (16) in the model above, the null hypothesis is the difference budget deficit does not Granger cause the difference current account. The results which are summarized in Table 7, indicate that in the short run the budget deficit is causing the current account deficit at the 1 per cent significance

---

Table 7
Granger causality tests on budget and current account deficits.

<table>
<thead>
<tr>
<th>Null hypothesis</th>
<th># of Obs.</th>
<th>F-statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA does not Granger Cause BD</td>
<td>42</td>
<td>3.51</td>
<td>0.068</td>
</tr>
<tr>
<td>BD does not Granger Cause CA</td>
<td>42</td>
<td>13.91(^a)</td>
<td>0.0006</td>
</tr>
</tbody>
</table>

Source: Author's estimates.
\(^a\) Indicates rejections of the null hypothesis at the 1% significance level. One lag is included in the test. CA refers to current account, while BD to budget deficit.

level, and that the current account deficit has no impact on the budget deficit. The latter result can be explained by the fact that the current account deficit was never financed by internal and/or external borrowings. While the two deficits are not related in the long run (Table 6), there appear to be strong short run unidirectional linkages between Lebanon’s twin deficits, running form the budget deficit to the current account deficit (Table 7). These empirical results are perfectly plausible. It is well known that the budget deficit phenomenon is relatively recent in Lebanon. It started emerging in late 1990s, when public debt and its service started soaring upward. The rise in the budget deficit has increased interest rates and decreases national savings, which subsequently appreciated the real exchange rate, leading to a widening of the already existent current account deficit. In this way, the budget deficit resulting from increased government purchases of goods and services is widening even further the nation’s current account deficit.

However, the decrease in savings effect of increasing budget deficits in inducing a large current account deficit could be one aspect of Lebanon’s twin deficits phenomenon. Another aspect is the positive effect of budget deficits on interest rates. Higher interest rates in Lebanon have attracted investment from abroad into Lebanese TBs, appreciating subsequently the real exchange rate. Over time, Lebanon’s real exchange rate has been appreciating due to higher relative inflation rates. Lebanon has become less competitive internationally and as a result its trade balance has been in recurrent deficits. The real appreciation of the Pound implied cheaper imports and more expensive exports, pushing the trade balance towards further deficits. In other words, recurrent budget deficits have raised domestic interest rates which in turn pushed up the real exchange rate, leading to the further widening of the current account deficit.

6. Conclusions and policy implications

This paper examined empirically using time series econometric models the sustainability of public debt (internal and external) and exchange rate policies, as well as, the relationship between current account and budget deficits in the emerging small open economy of Lebanon. The empirical results indicate that both internal/external debts are not sustainable. They also indicate that rising fiscal deficits have started to put even more strain on the current account deficits, endangering the current fixed exchange rate regime. This is due to the fact that Lebanon has been running chronic current account deficits since the early 1980s, and recurrent budgetary deficits since the early 1990s. The empirical results suggest that a long-run relationship between the two deficits does not exist; while in the short run recurrent budgetary deficits have started to widen even further the current account deficits. This may be related to the fact that the Lebanese government has been suffering from corruption, inadequate government expenditure policies, and from inefficient revenue collection systems, which resulted recently into high fiscal deficits. In addition, the recent rise in the budget deficit has increased interest rates, decreased total national savings, leading subsequently to an appreciation of the real exchange rate and to the widening of the already existent current account deficit.

Granger causality test results support the existence of a uni-directional causal relationship between the budget deficit and the current account deficit. This is in line with earlier empirical studies from developing countries providing evidence supporting that budget deficits cause current account deficits.

The uni-directional causality from the budget deficit to the current account deficit may be explained as follows. The recurrent current account deficits since the early 1980s, were mainly financed by
surpluses in the capital account and not by resorting to external borrowing (deficit financing). The balance of payments data rarely indicate a deficit over the period prior to 1998. Fiscal policy was totally ineffective during the 1975–1995 period, even though public debt was virtually absent. However, this is no longer the case due to the recent accumulation of a significant internal/external debt and its subsequent service. Accumulated debt and budget deficits started to surface after 1993, when the government issued TBs 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. The constant capital inflows have been in the form of remittances from Lebanese working abroad, and in the form of bank deposits attracted from the rich Gulf countries. However, the huge surge in external debt since the early 2000s, implies that Lebanon may have to rely more and more on external financing, leading to further deteriorations in its current account and budget deficits in the future. In addition, future servicing of the external debt may aggravate the deteriorating current account deficit, and put more pressure on the current exchange rate peg to the US$, forcing perhaps the central bank at one point in the near future to float the exchanges rate if foreign exchange reserves are no longer sufficient to maintain the peg.

Lebanon’s permanent current account deficits have so far been offset by surpluses in the capital account due mainly to foreign direct and indirect investments. If for whatever reason these capital inflows decline, like during the recent political crisis, the central bank will have to tap once again its foreign exchange reserves. During the latest political turmoil, the central bank lost the equivalent of US$ 1 billion in trying to maintain its current peg to the dollar, decreasing its foreign reserves from US$ 28 billion to US$ 27 billion in 2011.

There is also renewed labour demand for a significant adjustment in the salary scale of public employees by 120%, with an estimated additional budget burden of US$ 1.5 billion. So far the government was able to contain those demands despite economic/political turmoil. Such a salary increase, if granted without securing adequate revenues, is expected to increase inflation, worsen further the budget and current account deficits, and put further pressure on the pegged exchange rate, foreign exchange reserves, and the balance of payment, and might affect the already declining trend in capital inflows (portfolio and foreign direct investments). After a surplus of about US$ 8 billion in 2010, the balance of payment has been on a declining trend reaching a low of US$ 2 billion in 2013. Moreover, if adequate financing is not secured to account for the proposed salary scale increase, the government will then face further budget deficits, and the risk of a downgrade in its sovereign credit ratings, to a rating below B, coupled with a TBs downgrade to Junk bonds, which are considered too risky to be offered on international financial markets. The adoption of the proposed salary scale may subsequently lead to devastating consequences on domestic interest rates, and subsequently, on the service of a huge public debt. Despite their good financial position, a decline in Lebanon’s credit ratings may also impact the credit ratings of local commercial banks with a significant exposure to the government’s public debt, exceeding 65%.

Expected higher wages will worsen the inflationary pressure due to a rise in local demand. The usual response to this increase in demand is either through an increase in the demand for imports or through an increase in the price of goods and services. The added inflation will further affect the monetary stability as the equivalent of 25% of the budget will be injected into the economy and hence, affecting negatively the exchange rate peg to the US$. The expansion of imports to meet the increase in domestic demand resulting from the rise in public sector salaries will further worsen a deteriorating current account deficit.

An adjustment in the salary scale of public employees should to be avoided at this stage, given the current fundamentals of Lebanon’s economy. Instead, austerity measures need to be introduced but need not target aggregate demand, in the short run, in order not to worsen the prevailing recession. Lebanon’s austerity measures should target the supply side of the economy. The proposed increase in the value added tax from 10 to 11% is expected to renew the inflationary pressure and further appreciate the real exchange rate. Instead, the government should consider for instance to (1) lower fiscal spending; (2) improve the tax collection system; (3) increase the dividend/corporate tax rates; (4) reorganize the social security system; and (5) tackle Electrique Du Liban’s chronic deficits with yearly registered losses of US$ 1 billion. Any potential austerity measures should be carefully designed so that any increase in taxes should target financial capital rather than labour, with a subsequent
lower impact on aggregate demand and GDP growth rates. The potential tax increases should neither target productive sectors, nor sectors prone to international competition like for instance the real estate sector. Thus, austerity measures should be carefully designed so as to minimize their negative macroeconomic impact on the country’s economy.

Given the current fiscal/monetary indicators, tapping new international sources of financing is becoming more and more difficult, rendering the financing of the current external debt unsustainable. Therefore, the government may be compelled to abandon its fixed exchange rate peg, and may have to introduce painful fiscal adjustment measures to generate the necessary foreign exchange from its own internal recourses to finance its external debt in the coming few years.

In short, policy makers would need to move on several fronts to tackle the debt sustainability and twin deficits phenomena: (1) stimulate national saving by reducing the budget deficit, reducing domestic interest rates, and by increasing the rate of private saving; (2) introduce timely needed fiscal adjustment measures, enhance the tax collection system and actively fight corruption; and (3) tackle the future implications that may emanate from an expected depreciation of the exchange rate.

References


