The Unique Dollarization Case of Lebanon

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Abstract

We make a thorough analysis of the unique dollarization case of Lebanon: a heavily dollarized economy with recurring public deficits and monetary financing of the public debt, together with a contained inflation and a de facto fixed exchange rate lasting for more than 20 years. What makes Lebanon's case specific is the high level of foreign currency liquidity in the hands of the banking system due to the abundant capital inflows in the last three decades, and the high levels of the central bank's gross international reserves contrasting with its low and sometimes negative levels of net international reserves. We shed light on a number of areas that were unexplored so far in international finance and monetary economics, mainly the difference between gross and net international reserves and their relative fiscal costs, together with a synthetic classification of sterilization techniques. We explain the monetary "freezing" mechanism that helped contain inflation in Lebanon, despite the monetary financing of the country's recurring public deficits. We also assess the results of Lebanon's monetary and exchange rate policy in the last two decades, and make a number of policy recommendations in light of previous studies.

Keywords: Dollarization; Emerging Markets Exchange Rate Regimes; Sterilization; International Reserves; Lebanon

JEL Classification: F30; F41; E50, E40

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1 Introduction

Lebanon's monetary sector has been defying the mainstream emerging markets literature in the last two decades: a heavily dollarized economy with recurring public deficits and monetary financing of the public debt together with a contained inflation and a de facto fixed exchange rate lasting for more than 20 years. Understanding and analyzing this unique case is a big challenge to economists.

Dollarization started during the 1975-1989 Lebanese civil war that witnessed recurring depreciation episodes, that led to a generalized loss of confidence in the local currency. At present, Lebanese banks hold Dollar deposits and provide Dollar loans to their resident customers, alongside local currency deposits and loans. The deposits dollarization ratio is 71.25% and the loan dollarization ratio is 67.65% at 2017 end. Lebanon's exchange rate regime is classified as "stabilized arrangement" in the IMF AREAER[1] for 2017. The exchange rate of the US Dollar (USD) has been fixed since December 1997 at the mid rate of 1507.5 Lebanese Pounds (LBP), thanks to daily interventions of Banque du Liban (BdL - Lebanon's central bank) in the domestic interbank foreign exchange market. Since the adoption of the de facto fixed exchange rate regime, the country did not experience episodes of high inflation, as was the case during and after the civil war. In the period 2002-2017, the average annual real GDP growth rate was 4%, and the average annual inflation rate was 3.3%[2]. Gross public debt is high (154% of GDP at 2017 end) and the country suffers a chronic current account deficit (23.5% of GDP in 2017) due to the weakness of its export sector.

In this paper, we aim at analyzing the Lebanese case in light of the findings of the literature on dollarization and emerging markets exchange rate regimes. We shed the light on the specificity of the Lebanese case, namely the high level of foreign currency liquidity in the hands of the banking system due to the abundant capital inflows in the last three decades, the high levels of gross international reserves contrasting with low and sometimes negative levels of net international reserves of the central bank (Lebanon's central bank borrows foreign liquidity, in the form of domestic banks dollar deposits), and the monetary "freezing" mechanism (the transformation of banks sight deposits into term deposits) that explains the contained inflation alongside the strong nominal anchor of the fixed exchange rate.

In the course of our analysis, we compute the fiscal cost of holding net and borrowed international reserves by Lebanon's central bank. We explain the main motives behind the choice of the de facto fixed exchange rate regime - dollarization, the small size of the export sector, institutional weakness and corruption. We also analyze the nominal and real interest rates implications of the fixed exchange rate regime. Finally, we analyze the implication of dollarization on the design of foreign currency macroprudential regulations, and we discuss the ways of promoting de-dollarization and preparing the move to a floating exchange rate regime.

[1] International Monetary Fund - Annual Report on Exchange Arrangements and Exchange Restrictions

[2] Source: IMF WEO - October 2017.

This paper is a thorough documentation of the rarely analyzed and unique Lebanese case of dollarization - Desquilbet (2007) is the only published paper we are aware of, that makes a thorough analysis of Lebanon's monetary policy. Moreover, it also contributes to the analytical literature on the cost of international reserves, by computing the cost of net international reserves (both sterilized and unsterilized interventions) and borrowed international reserves, while past literature - as summarized, for example, by Adler and Mano (2018) - has only taken into account the cost of sterilized net international reserves (i.e., the difference between the return on the domestic assets the central bank disposes of in the sterilization process, and the return on the foreign liquid assets the central bank holds as a result of its intervention). Another important contribution of this paper is the introduction of the monetary "freezing" mechanism that can apply to banks clients deposits (i.e., the transformation of sight deposits into term deposits) or to the money base (i.e., the transformation of banks excess reserves into term deposits at the central bank).

The remainder of the paper is organized as follows. In the second section, we analyze Lebanon's stylized facts. In the third section, we suggest a classification of sterilization techniques and we make an analysis of the fiscal cost of gross and net international reserves. The fourth section is dedicated to the analysis of Lebanon's monetary and exchange rate policy in the last two decades. The last section concludes.

2 Lebanon's stylized facts

While the causes of dollarization in Lebanon go back to the hyper-inflationary environment during the 1975-1989 Lebanese civil war, the persistence of both deposits and loans dollarization has been characterizing the Lebanese banking sector for the last three decades, despite the relatively stable inflationary environment and the fixed exchange rate versus the US dollar since December 1997. Two main characteristics make the Lebanese dollarization case unique:

- Unlike the majority of emerging economies, capital inflows and consequently foreign currency liquidity in the hands of the domestic banking sector have been constantly abundant, despite the chronic current account deficit.

- The high level of gross international reserves in the hands of the central bank, that contrasts with its low and sometimes negative level of net international reserves.

2.1 Dollarization of deposits, credit and transactions

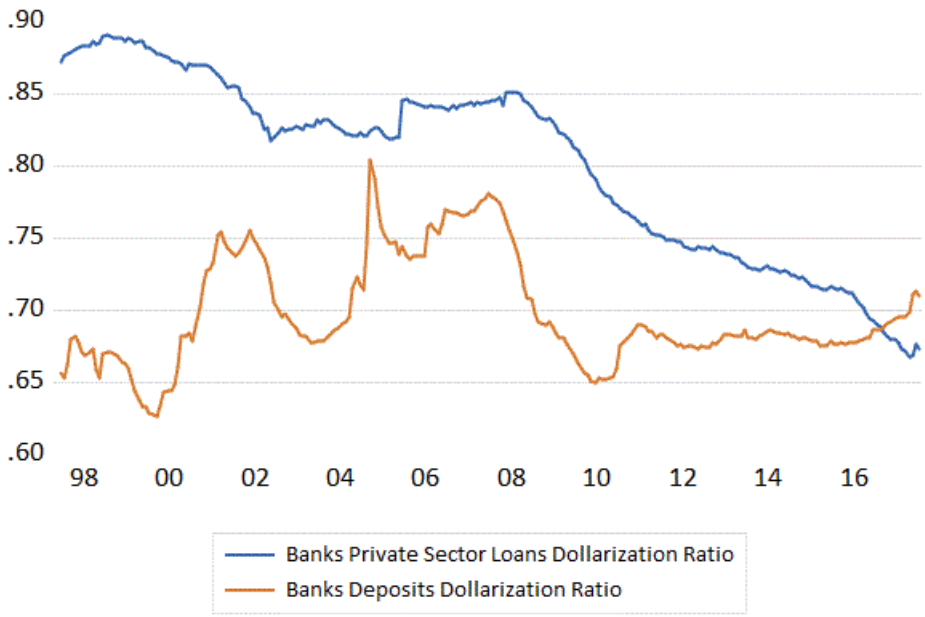
Dollarization can take multiple forms. The basic form of dollarization that has been traditionally referred to as "currency substitution" is the use of the foreign currency as medium of exchange for transactions. This often comes with the foreign currency being the unit of account too, as domestic agents tend to use it to price goods and services as well as to denominate contracts. The term "assets dollarization" has been commonly used to describe the use of the

foreign currency as store of value, by holding foreign currency term deposits at domestic banks for example. "Liabilities dollarization" often described domestic debt in foreign currency, mainly vis-a-vis non-resident counterparts. The term "loans dollarization" was mostly used for local banks foreign currency credit to resident agents[3]. Away from the above traditional classifications, we broadly define dollarization as resident agents use of the foreign currency in any economic activity. Seen as such, dollarization is a phenomenon that is not exclusive to some emerging and developing economies. It is a generalized phenomenon that goes in parallel with the globalization of real and financial activities, that leads domestic agents to contract, trade, save, borrow and invest using a currency other than their domestic currency.

In Lebanon, dollarization has taken in the last three decades one of its most complete forms: individuals and companies use the dollar for transactions, hold dollar accounts in domestic banks and contract dollar loans with those banks. The Lebanese government issues dollar denominated bonds (called Eurobonds) subscribed by the domestic banking system as well as by foreign investors. Figure 1 shows the evolution of the deposits and loans dollarization ratios of domestic banks. The share of dollar loans declined in the last two decades, but remains relatively high at the end of 2017, while the share of dollar deposits seems to increase in period of tensions and to decrease in politically and economically stable periods, without showing any clear long term trend.

[3]See Cuaresma, Fidrmuc and Hake (2014) for an analysis of the determinants of loan dollarization

Figure 1: Banks Deposits and Loans Dollarization Ratios in Lebanon

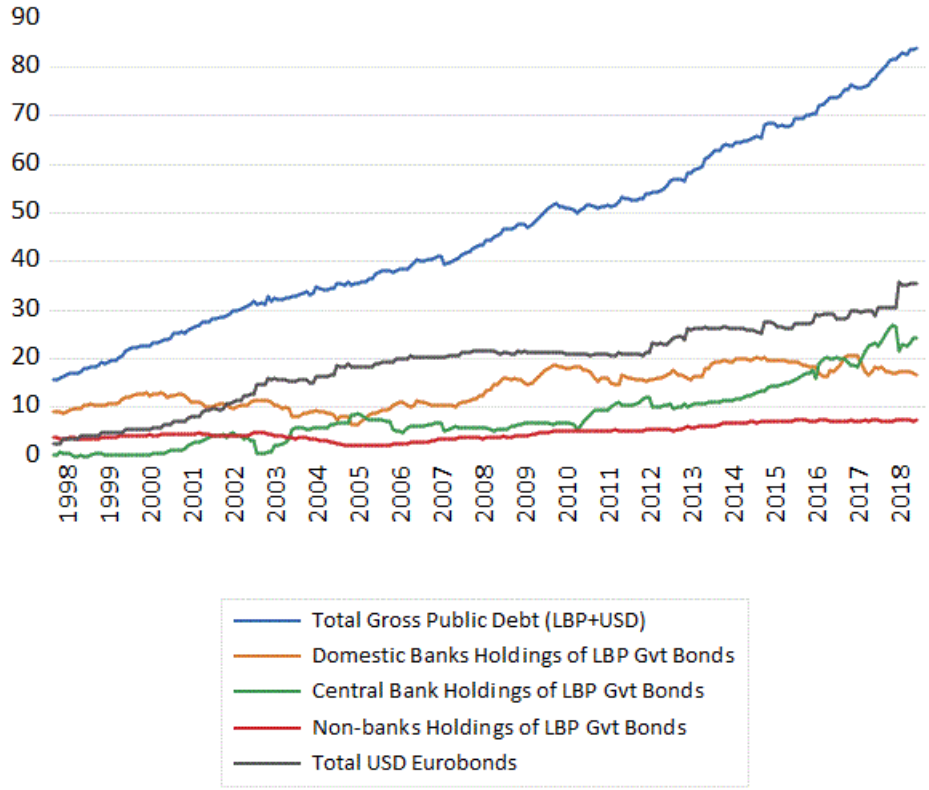


Data Source: BdL Website

2.2 Public debt composition and financing

As shown in Figure 2, Lebanon's public debt has been steadily growing in the last three decades. The government issues LBP denominated bonds and bills alongside USD denominated bond (Eurobonds). We plotted the LBP denominated debt breakdown by holders to show the monetary financing of this debt by the central bank as well as by commercial banks (depository institutions). The share of non-banks holders is minor comparing to the latter. In the same graph ,we plotted the amounts outstanding of USD Eurobonds. Also, a minor share of the latter is held by non-bank and foreign investors, and the larger share is held by the central bank and commercial banks. However, this is not to be seen as monetary financing as it is does not involve the creation of domestic currency.

Figure 2: Lebanon's Government Public Debt Breakdown by Holders (USD Bn)



Data Source: BdL Website

2.3 Monetary aggregates and "freezing" in Lebanon

Figure 3 shows the growth of key monetary components from January 1998 to December 2017: M1 (which comprises LBP currency in circulation and LBP sight deposits), total banks sight deposits (current and checking accounts and sight deposits, in both LBP and USD), and total banks term deposits (in both LBP and USD). Figure 4 shows this evolution in terms of ratios to GDP. We notice a larger growth of total term deposits comparing to M1 and total sight deposits.

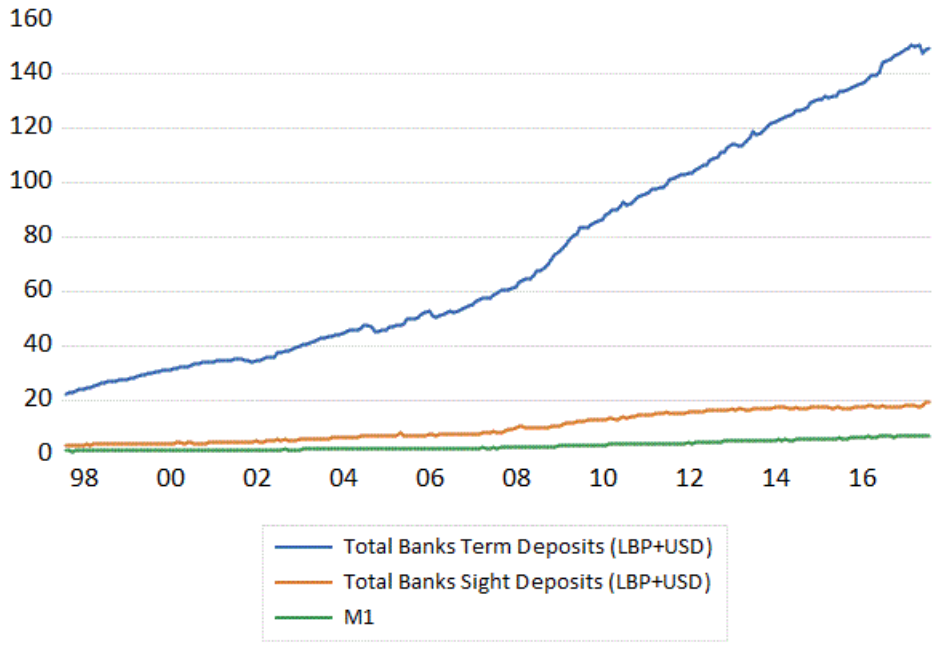
Boostani, Ameli and Karami (2018) show that Iran's M1 demand function is stable but not M2 from 1973 to 2015 using the Engle and Granger co-integration method. The instability of broad money demand comes from the fact that a considerable share of M2 is comprised of long-term interest bearing deposits. In the absence of developed financial markets, these deposits are the only option

available for domestic agents to use as saving instruments. They show that there is a positive relation between the interest rate on one-year deposits and the long term deposits to nominal GDP ratio, while there is a negative relation with M1 to nominal GDP ratio. They conclude that M2 is not a suitable measure for monitoring inflation. An augmented M1 (M1+) may be a better variable to explain the price trend and ensure money demand stability. Along similar lines, Barnett and Al Khareif (2015) compare the simple-sum monetary aggregates (M1 and M2) for Saudi Arabia with the new Divisia monetary indexes (D1 and D2). A Divisia monetary index is a money supply measure that weighs the monetary components (currency, demand deposits, savings and time deposits) according to their usefulness in transactions. It takes into account the price of a monetary asset, called its user cost i.e. the interest return forgone by holding a monetary asset rather than holding a higher return less-liquid asset. They find that both D1 and M1 are identical, given the perfect substitutability of the monetary components within those aggregates. For the broader monetary aggregates M2 and D2 where the perfect substitutability assumption is not realistic, the two monetary indices differ substantially.

In light of those analyses, we can presume that the increase of the banking system balance sheet in a bank based financial system, due to either capital inflows or monetary financing of the public debt (loans of the central bank and domestic banks to the government), does not automatically translate into an increase of the narrow monetary aggregate, which is the relevant aggregate to consider when it comes to the transaction services of money. An increase of the nominal interest rate can induce the transformation of sight deposits into term deposits within the banks liabilities side, therefore "freezing" their transaction services. This mechanism partially explains the contained inflation in Lebanon - alongside the successful fixed exchange rate nominal anchor - despite the large increase of the consolidated banks balance sheet. This mechanism might be less relevant in a financial system with developed financial markets as agents would be able to direct their savings towards bonds and equity securities away from banks term deposits.

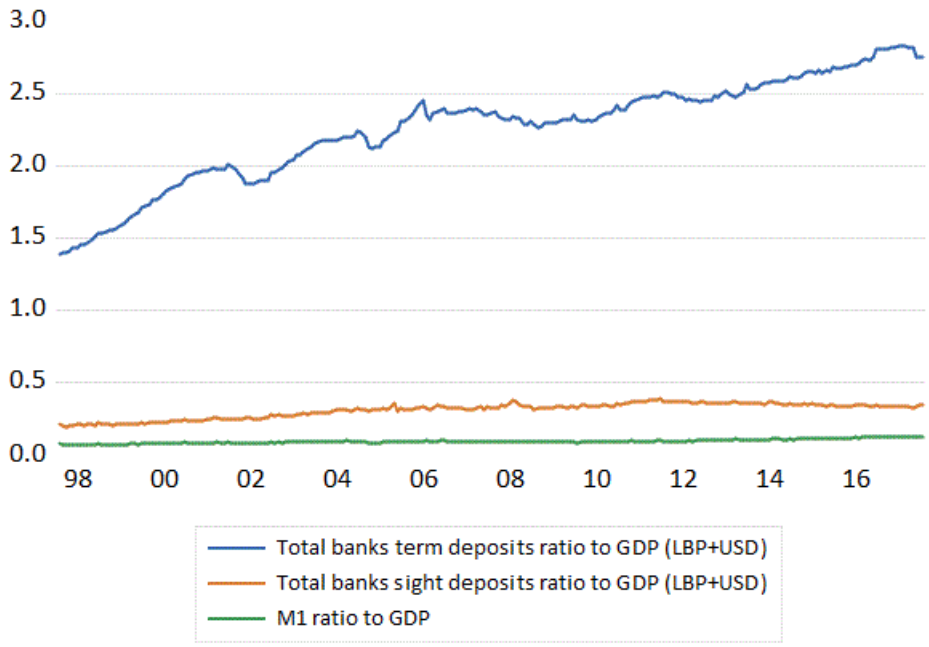
The increase in the interest rate triggering the "freezing" mechanism can be engineered by the central bank - in line with a standard anti-inflationary monetary policy logic. It can also result from the market led increase in interest rates levels as a consequence of the increasing risk premium relating to higher public debt or to higher current account deficits. It is however important to stress that this "freezing" of deposits is not a permanent solution to fight inflation, although it has been lasting for almost two decades in the Lebanese case. Once the market sentiment deteriorates, depositors would require the liquidation of their term deposits which would ultimately lead to high inflation and to the depreciation of the domestic currency.

Figure 3: Lebanon's Banks Sight and Term Deposits Evolution (USD Bn)



Data Source: BdL Website

Figure 4: Lebanon's Banks Sight and Term Deposits Ratio to GDP Evolution



Data Source: BdL Website

2.4 Capital flows, gross international reserves and net international reserves

Cumulative capital inflows have largely exceeded the persistent current account deficit in Lebanon since the end of the civil war in 1989, leading to a high foreign currency liquidity level in the hands of the domestic banks sector. Figure 5 shows the cumulative excess of capital inflows over current and capital account deficits, as well as the increase of Lebanon's central bank international reserves (IR)[4] - ex-gold - and domestic banks foreign assets. The gross foreign assets of the consolidated banks sector (equal to the sum of the central bank's international reserves and domestic banks foreign assets) evolution mirrors the cumulative excess of the balance of payments, adjusted for valuation changes. Although capital inflows slowed down in the last decade, the level of foreign liquidity of the consolidated banks sector remained high.

[4] Aizenman and Lee (2007) define two motives for holding international reserves: the precautionary motive is a self-insurance to avoid costly liquidation of long-term projects when the economy is susceptible to sudden stops. The mercantilist motive is reserves accumulation favoring export growth by preventing or slowing the domestic currency appreciation. Their empirical results support precautionary motives over mercantilist motives.

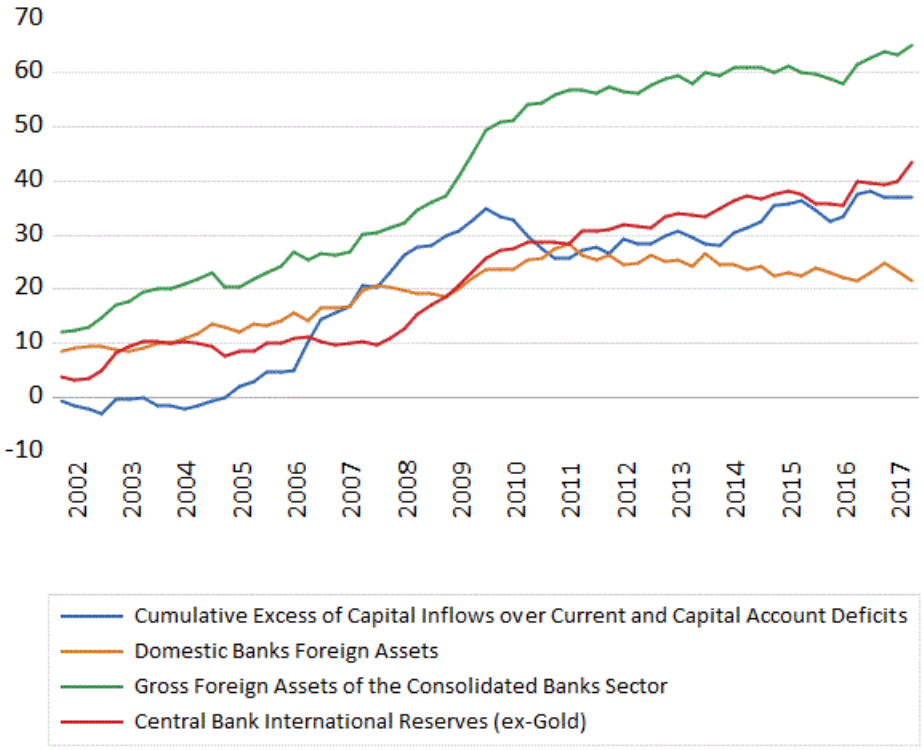
Lebanon's central bank imposes mandatory reserves requirement on foreign currency deposits at banks, and holds remunerated foreign currency deposits of domestic banks in excess of those mandatory reserves. These operations do not increase net international reserves as they increase the foreign exchange liabilities of the central bank in the same amount, but they do increase gross international reserves. Gross international reserves are the amounts available for a central bank to intervene in the foreign exchange market.[5]

Gross IR (GIR) = Net IR (NIR) + Borrowed IR (BIR)

Figure 6 shows the evolution of Lebanon's central bank GIR, NIR and BIR. The central bank borrows dollar liquidity from domestic banks in the form of deposit accounts. Those are either remunerated dollar mandatory reserves (as a percentage of domestic banks clients dollar accounts) or remunerated dollar term deposits. Therefore BIR is equal to the amount of USD domestic banks deposits at the central bank in the Lebanese case. As those deposits amounts are not provided by Lebanon's central bank statistics department, we estimated them in a conservative way, by assuming a perfect currency matching in the consolidated commercial banks balance sheet. We estimated the NIR amounts by deducting the estimated BIR amount from GIR. We notice a substantial increase of estimated commercial banks USD deposits at the central bank (BIR), while the amount of estimated NIR fluctuates with the need to intervene in the foreign exchange market. NIR have been in negative grounds during episodes of exchange market pressure.

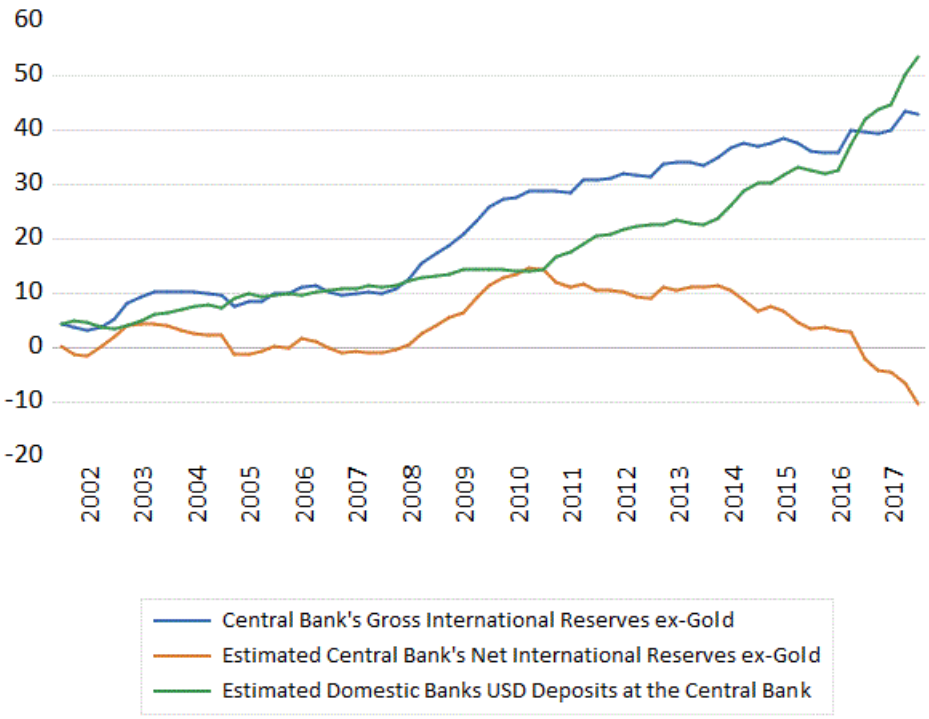
[5]The formal definition of international reserves by the IMF (BPM6, paragraph 6.64) is the following: "...those external assets that are readily available to and controlled by monetary authorities for meeting balance of payments financing needs, for intervention in exchange markets to affect the currency exchange rate, and for other related purposes (such as maintaining confidence in the currency and the economy, and serving as a basis for foreign borrowing)". As defined, the concept of international reserves is based on the balance-sheet framework, with "reserve assets" being a gross concept. It does not include external liabilities of the monetary authorities.

Figure 5: Lebanon's International Liquidity Evolution (USD Bn)



Data Source: BdL Website

Figure 6: Lebanon's Central Bank Estimated Gross and Net International Reserves (USD Bn)



Data Source: BdL Website and Author's Estimates

3 Sterilization and the cost of international reserves

3.1 Sterilization and "freezing"

There is no consensus in the literature on the definition and characterization of sterilization operations. Reinhart and Reinhart (2008) point that when faced with substantial international capital flows authorities look for ways of monetary control, while delivering a stable exchange rate. The preference for relatively stable exchange rates often necessitates accumulating international reserves. Authorities mainly use reserves requirement in order to contain the consequences of unsterilized interventions on domestic liquidity. Controls on capital inflows, on capital outflows, and changes in official exchange rate bands are also used. Lee (1997) argues that the classical forms of sterilization mainly through the use

of open market operations (selling treasury bills and other instruments to reduce the domestic component of the monetary base) can be effective for a time. However, the use of supplementary measures, including some indirect capital controls, may also be both desirable and effective. Aizenman and Glick (2008) find that the greater accumulation of foreign reserves has been associated with a greater intensity of sterilization by developing countries in Asia and Latin America – i.e. a significant increase in the coefficient of sterilization. [6] Glick and Hutchison (2000) find that intervention has an immediate effect on exchange rates and interest rates, but also sets in motion further portfolio adjustments, in conjunction with the objective of maintaining monetary control. The monetary base has been in large part insulated from exchange rate policies.[7]

We can conclude from the above that the term sterilization has been used in the literature for a heterogeneous group of techniques that aim at limiting the monetary effect of foreign exchange interventions. While some authors include means of limiting the flows of capital per se (forms of capital controls), we prefer to include under the sterilization umbrella only the means to deal with the monetary consequences of those flows. We can group sterilization techniques in three categories:

- The standard sterilization technique is to counter the increase of the money base resulting from the purchase of foreign currency by the central bank. This is done through either open market sales of domestic currency bonds or the reduction of its credit to resident counterparts (mainly domestic banks and government). This sterilization technique alters (decreases) the size of the central bank's balance sheet.

- Another widespread technique is to influence the money multiplication mechanism through the variation of mandatory deposits rates of banks. Increasing the mandatory deposits rates of banks automatically reduces the money multiplier. Therefore, the increase in the money base resulting from the central bank's foreign exchange intervention cannot translate into an increase in money supply.

- The last category of sterilization techniques that is overlooked by the economic literature is what we would like to call the "freezing" of the money base. It consists in transforming the reserves deposits of domestic banks (liquid liabilities) at the central bank into less liquid liabilities (time deposits and central

[6] They estimate the extent of sterilization by a simple OLS regression of the monetary authorities change in net domestic assets ΔDC/RM on the change in net foreign assets held on its balance sheet ΔFR/RM, where change is measured over four quarters, and scaled by the level of the reserve money stock four quarters ago. They also include the four-quarter growth rate of nominal GDP on the right-hand side to control for other explanatory variables that might influence the demand for money. They define the regression coefficient β on the variable ΔFR/RM as the coefficient of sterilization. A unitary coefficient, i.e. β = -1, represents full monetary sterilization of reserve changes, while $\beta = 0$ implies no sterilization. A value of the sterilization coefficient between these levels, $-1 < \beta < 0$, indicates partial sterilization.

[7] Using a simple VECM model for Japan and Germany between 1974 and 1990, they find that the direct impact of a given foreign exchange market intervention on the central bank's domestic credit falls markedly after a few months, implying that sterilization lessens. Central banks apparently make systematic efforts to gradually unwind their foreign asset positions after initial interventions.

bank bills) that are not part of the money base.[8]

In contrast to the first technique, the second and third sterilization techniques do not impact the size of the central bank's balance sheet.

Figure 7 shows BIR's and NIR's impact on the central bank's balance sheet, with different sterilization techniques.

Figure 7: BIR, NIR and sterilization impact on the central bank's balance sheet

Borrowed International Reserves

Assets	Liabilities
(+) Liquid foreign assets	(+) Foreign currency banks deposits at the central bank (+) Foreign currency loans from foreign financial institutions

Net International Reserves (Standard Sterilization)

Assets	Liabilities
(+) Liquid foreign assets (-) Domestic currency bonds	

Net International Reserves (Sterilization through mandatory reserves)

Assets	Liabilities
(+) Liquid foreign assets	(+) Mandatory reserves in domestic currency

Net International Reserves (Sterilization through "freezing")

Assets	Liabilities
(+) Liquid foreign assets	(+) Banks long term deposits/CB Bills in domestic currency

Net International Reserves (No Sterilization)

Assets	Liabilities
(+) Liquid foreign assets	(+) Banks reserves deposits in domestic currency

3.2 Costs of international reserves and sterilization

Adler and Mano (2018) argue that the fiscal costs of sustained foreign exchange interventions are high enough to be taken into account when conducting ex-

[8] As explained in the previous section, "freezing" can also apply to the money supply directly (and not through the money base) if the central bank incentivizes domestic banks (mainly by raising interest rates) to transform their client deposits into less liquid assets like time deposits or certificates of deposits. Therefore, controlling money supply through freezing (and de-freezing) could be applied directly on banks deposits or indirectly on central bank reserves deposits (freezing of the money base).

change rate policy. They find ex-ante total costs of sustaining foreign exchange positions in the range of 0.3-0.9 percent of GDP per year. Also, Ex-post costs have been relatively large on account of both sizable deviations from the uncovered interest rate parity (domestic currencies appreciation) and the rapid growth of central bank foreign exchange positions. Kletzer and Spiegel (2004) argue that a forward-looking central bank will incorporate sterilization costs in its monetary policy decisions. Central banks choose more accommodating nominal exchange rate strategies, the higher is the cost of maintaining an announced peg or crawl. Taking into account that spreads represent a true default risk premium rather than deviations from uncovered interest rate parity, they argue that actual sterilization costs become lower. They show that most emerging countries only attempt sterilization over limited periods, which suggests that sterilization costs are incorporated into their policy decisions.

The literature has focused so far on the fiscal cost of sterilized NIR only. Adler and Mano (2018) assume that if the FX intervention is unsterilized, the expansion of the money supply does not entail larger interest payments, and if it is fully sterilized, it does. This is why most past studies often refer to the cost of sterilization, rather than the cost of international reserves. We will show in this section that the holding of gross international reserves (GIR), whether they are comprised of BIR or NIR, comes at a fiscal cost, no matter if the monetary authorities sterilize their foreign exchange interventions or not. We analyze BIR's and NIR's ex-ante fiscal cost in what follows.[9]

The spread between the domestic interest rate (i) and the corresponding world interest rate (i*) is:

$$i - i^* = d + E(e^{\cdot}/e) \tag{1}$$

Where (d) is the domestic country's asset risk premium, and E($e^{\cdot}$/e) the expected depreciation of the domestic currency (following the uncovered interest rate parity).

As regards BIR, sterilization is not required as they do not induce an increase in the domestic currency money base. However, their unit fiscal cost amounts to the interest differential between the interest rate the central bank pays on its foreign currency liabilities (foreign currency deposits of domestic banks, foreign currency loans of the central bank etc. . .) and the interest rate the central bank earns on its liquid foreign assets. This differential is equal to the sum of the risk premium (d), and a liquidity (term) premium if the assets and liabilities involved are of different maturities – there is no exchange rate premium in this case as both assets and liabilities are denominated in the foreign currency.

$$BIR\, unit\, fiscal\, cost = d + term\, premium \tag{2}$$

As regards NIR, the domestic currency money base is increased by an equivalent amount (NIR are international reserves resulting from foreign exchange

[9]Ex-post costs take into account the realized gains and losses made on the holding of international reserves mainly due to exchange rates and interest rates movements.

interventions). The general calculations of sterilization costs developed in the literature [10] apply, for the standard and "freezing" sterilization techniques: the ex-ante unit cost of sterilization is equal to the difference between the interest rate paid (or forgone) on sterilization instruments and the interest rate received on the liquid foreign assets. This amounts to the sum of the risk premium (d) and the expected depreciation of the domestic currency E(e˙/e) (the exchange rate premium), and a liquidity (term) premium if the assets and liabilities involved are of different maturities.

$$Sterilized\,NIR\,unit\,fiscal\,cost = d + E(e^{\cdot}/e) + term\,premium \qquad (3)$$

Thus, if the domestic currency exchange rate premium E(e˙/e) is positive (which is generally the case), the fiscal cost of BIR is lower than the fiscal cost of sterilized NIR.

When foreign exchange interventions are not sterilized, there is still a fiscal cost involved in case banks excess deposits at the central bank (domestic currency money base) are remunerated. Gray (2011) points that the remuneration rate of excess reserves (i.e., reserves held above reserve requirements levels) signals the stance of monetary policy. The interest on excess reserves (IOER) sets a floor to interbank rates, since a bank with surplus reserves would have no incentive to lend to another bank at the IOER rate if it could obtain that rate with no risk. Therefore, the central bank is obliged to remunerate excess reserves, in order to keep money market rates within their target range. The increased domestic currency money base net unit cost is equal to the difference between the unit interest cost the central bank pays on banks domestic currency excess reserves (IOER) and the unit interest income the central bank receives on its liquid foreign assets. This amounts also to the sum of the risk premium (d) and the expected depreciation of the domestic currency E(e˙/e) (the exchange rate premium), and a liquidity (term) premium if the assets and liabilities involved are of different maturities. It is worthy to note that the exact unit fiscal cost in each case will depend on the market interest rates of the specific instruments involved.

$$Unsterilized\,NIR\,unit\,fiscal\,cost = d + E(e^{\cdot}/e) + term\,premium \qquad (4)$$

Finally, as regards sterilization through the variation of the mandatory deposits rate of banks at the central bank, it generates an income equal to the interest rate received on the corresponding foreign currency assets if those mandatory deposits are not remunerated by the central bank. However, in some cases the central bank remunerates these mandatory deposits to avoid weighing on domestic banks profitability. Thus, the unit fiscal income/cost of sterilization is equal to the difference between the interest rate received on the corresponding foreign currency assets and the interest rate paid on mandatory deposits. In

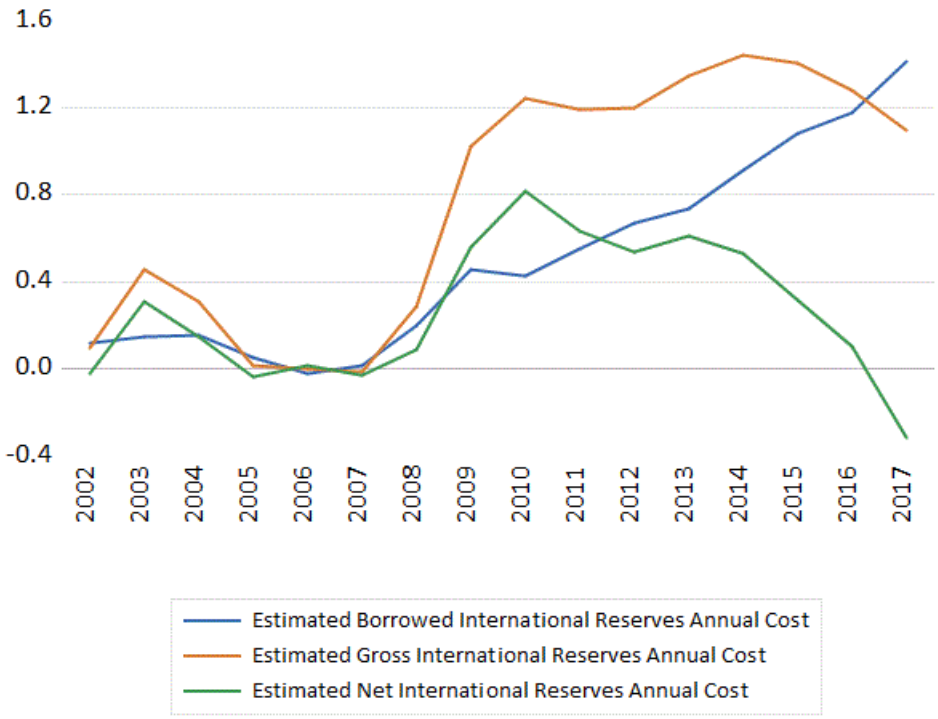
[10] For a good analysis of the cost of international reserves please see Adler and Mano (2018)

that regards, Gray (2011) points that, if there are surplus reserve balances in the economy, increasing the level of unremunerated (or under–remunerated) reserve requirements would be a cheap way of sterilizing the impact of the surplus. The alternatives consisting in draining through open market operations or paying interest on excess reserves represent a higher cost to the central bank.

Figure 8 shows the evolution of the annual estimated fiscal cost of NIR and BIR for Lebanon, as well as their sum amounting to the estimated total fiscal cost of GIR. We computed the estimated cost of BIR by multiplying their estimated amount by the interest differential between the USD term deposits interest rate at banks (which is a conservative minimal estimation of the interest rate paid by the central bank on USD deposits of domestic banks - the actual interest rate not being disclosed by the central bank) with the 1-month USD Libor (which is a reasonable estimate of the average return of the central bank's international reserves placements in international financial markets liquid assets). We computed the estimated fiscal cost of NIR by multiplying their estimated amount by the interest rate differential of LBP term deposits interest rates at banks with 1-month USD Libor, following a similar reasoning to that of the calculation of the estimated cost of BIR.

Our conservative computations show that Lebanon's annual GIR costs have been constantly above the one billion US dollar mark in the last decade. The graph shows an increase of BIR costs due to the increase of the USD amounts borrowed by the central bank from domestic banks as well as the increase of the domestic USD interest rates differential to the 1-month USD Libor in the last decade. The NIR costs decreased with the decrease of the amounts of the latter leading to a negative NIR position in the last years.

Figure 8: Lebanon's International Reserves Estimated Annual Fiscal Costs (USD Bn)



Data Source: BdL Website and Author's Estimates

4 Lebanon's monetary and exchange rate policy analysis

4.1 Dollarization and monetary policy

We will start by stating the findings of a number of recent papers with regards to the implications of dollarization on the conduct of monetary policy and financial stability. Rajan (2004) stresses the fact that dollarization is a response to institutional infirmities and that we have to learn to "live with dollarization" until those infirmities are fixed. This implies stepping up regulation and supervision to ensure that dollarization does not become excessive, and maintaining a reasonable fiscal position and adequate international reserves. He argues that a dollar shortage, arising from a variety of causes including excessive government borrowing, an external liquidity shock, or an overvalued exchange rate,

can be magnified by a dollarized banking system, into a total collapse of the financial system, the exchange rate, and other asset prices. Alvarez-Plata and Garcia-Herrero (2008) show that highly dollarized countries tend to experience a larger exchange rate pass-through to inflation than countries with limited dollarization. The reason behind this would be that in a dollarized economy non-tradable goods are priced in foreign currency resulting in exchange rate variations passing through to domestic inflation for a broader set of goods. Dollarization might increase the volatility of domestic money demand due to the possibility of switching from domestic to foreign currency holdings. The fact that the foreign currency component of broad money cannot be directly influenced by monetary authorities implies weaker monetary transmission. They argue that in dollarized economies an inflation targeting regime together with a floating exchange rate is difficult to implement because of the higher exchange rate pass-through on prices and the vulnerability of the economy to balance sheet effects. In the case of Peru, interventions in the foreign exchange market helped in the implementation of inflation targeting by smoothing exchange rate movements. They suggest that the reduction of the degree of dollarization should be ideally done through a mix of a hands-on approach based on administrative and legal measures and a more hands-off approach based on good macroeconomic performance and the stability of the local currency. Levy-Yeyati (2006) shows empirically that financially dollarized economies tend to display a greater sensitivity of domestic prices to money creation, higher inflation rates, a greater propensity to suffer systemic banking crises, and a slower and more volatile output growth, without any visible gain in terms of domestic financial depth. These findings provide a case for promoting de-dollarization as an active policy. He notes that standard prudential best practices have traditionally addressed currency imbalances only at the bank level and through limits on open currency positions, and have remained silent on the higher credit risk of dollar loans to non-dollar earners. Alper, Kılınc and Yorukoglu (2015), looking at the case of Turkey, argue that shifts between domestic and foreign currency funding can reduce the effectiveness of policy interest rates, as those are effective mainly vis-à-vis domestic currency assets and liabilities. Another major issue related to financial intermediation in foreign currency is balance sheet effects arising from exchange rate movements. Government and banks do not generally have open foreign exchange positions, but households have a long position and firms have a short position. Balance sheet effects can be a major constraint on monetary policy transmission and can even change the direction of the policy response in turbulent times: in a crisis situation where the domestic currency loses value, with large currency mismatches in the economy, the central bank can be forced to increase interest rates to defend the currency and contain the negative balance sheet effects. Thus, the implementation of structural and cyclical macroprudential policies becomes very crucial in managing the domestic economy and containing the risks to financial stability.

To sum up, the main implications of dollarization on the conduct of monetary policy and financial stability are the following:

- the weakening of the nominal interest rate as a monetary policy tool

- a stronger exchange rate pass-through to inflation

- increased balance sheets vulnerability to direct and indirect foreign exchange risk

The main prescribed policy responses are:

- managing exchange rate volatility, or literally adopting a currency peg

- implementing macroprudential policies aimed at reducing direct and indirect foreign exchange risk exposure

- reducing the degree of assets and liabilities dollarization

We will discuss these policy implications in Lebanon's case in the following sections.

4.2 The choice of the exchange rate regime and the interest rate cost

Calvo (2006) argues that policy interest rate is an inherently weak instrument in emerging markets, especially in the presence of domestic liabilities dollarization. It can achieve poor nominal anchoring, and cannot prevent volatility. As a consequence, it may be advisable momentarily to switch to more robust instruments such as foreign exchange intervention or some kind of exchange rate peg during periods of high volatility. The central bank should be ready to operate as lender of last resort during a sudden stop of capital inflows by releasing international reserves in an effective manner. Therefore, the stock of international reserves or credible international credit lines should be large enough to prevent a major credit crisis. Acosta-Ormaechea and Coble (2011) find that in Chile and New Zealand (very low dollarization economies), a contractionary monetary policy shock reduces inflation and output, suggesting the existence of a strong transmission of monetary policy through the traditional interest rate channel. For Peru and Uruguay (high dollarization economies), the interest rate pass through is rather weak, however, the exchange rate channel may play a more substantial role in curbing inflationary pressures, as indicated by the relatively larger exchange rate pass through of these two economies. They find that as Peru and Uruguay reduced their levels of dollarization the effectiveness of the monetary policy transmission has somewhat increased in these countries. Magud (2012) uses a DSGE model with nominal rigidities and foreign currency denominated debt to show that the lower is the share of tradables in a country's GDP, the more likely that a fixed exchange rate regime will be the optimal choice. The balance sheet effect implies that real devaluations resulting from negative real shocks increase the real value of debt. For producers of tradables, the expansionary effects of the real devaluation compensate the contractionary balance sheet effect. This is not the case for producers of non-tradables since they cannot re-direct the excess supply generated by the fall in domestic demand to the rest of the world. Hefeker (2010) develops a theoretical model to show that a tight peg to a low inflation currency can improve the institutional quality and reduce corruption in a country as the government is induced to fight more strongly against fiscal leakages if the revenue from seignorage is lower. Governments thus face a trade-off between higher tax revenue, output and spending on

one side and lower inflation and corruption on the other, when choosing their exchange rate regime.

Dollarization (via the foreign exchange risk linked to liabilities dollarization as well as the increased exchange rate pass-through to inflation), the small size of the export sector, institutional weakness and corruption favor the choice of a fixed exchange rate regime in Lebanon. Desquilbet (2007) points however to the fact that the combination of a fixed exchange rate regime and recurring fiscal deficit puts Lebanon in a standard situation of first generation financial crises. This is confirmed by Neaime (2015) who uses unit root and cointegration methods to find that Lebanon's public deficit and external debt are not sustainable. He concludes that Lebanon's government will have to timely introduce adequate austerity measures to curb the negative implications of its rising budget and current account deficits, to avoid a future depreciation of the exchange rate and perhaps fiscal and currency crises.

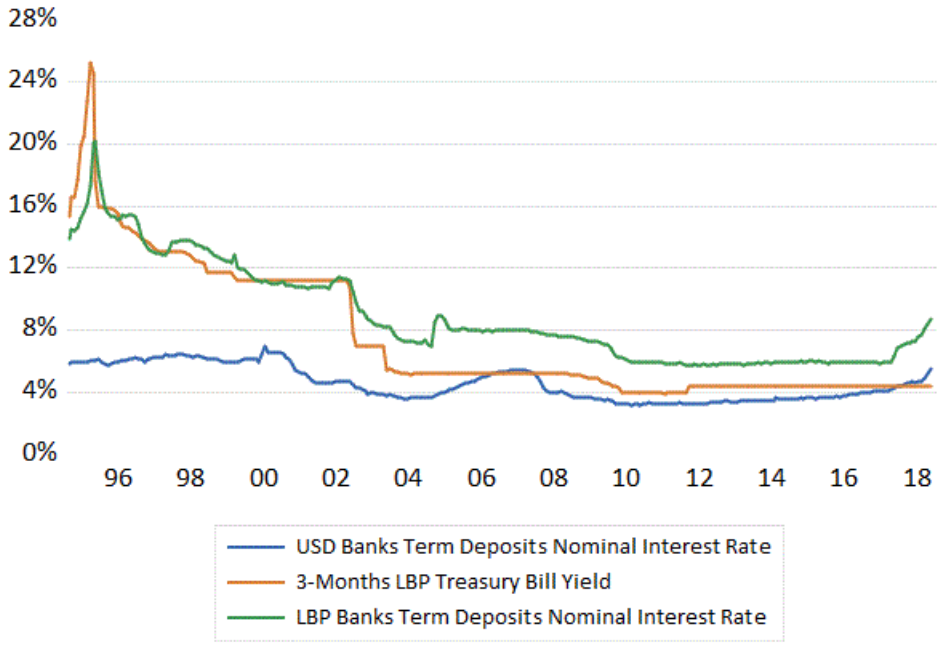
Also, it is argued that the fixed exchange rate regime in Lebanon has resulted in relatively high levels of nominal and real interest rates, weighing on the country's economic growth, mainly through their negative impact on private investment. The argument behind this claim is that the central bank is obliged to constantly keep interest rates at a relatively high level in order to defend the peg, by increasing the attractiveness of LBP assets versus USD assets, and by attracting capital inflows to cover the recurring current account deficit and to build a substantial international reserves buffer. The literature on the interest rate defense of the currency has emphasized its temporary character and its long term adverse effects. It should be intended at allowing the government time to put order in its public finances.[11]

Desquilbet (2007) notes that the de facto fixed exchange rate regime in Lebanon since 1997 has acted as a strong nominal anchor in the country's infla-

[11] Lahiri and Vegh (2003) suggest via a theoretical model that some active interest rate defense of a peg is optimal but that large increases in interest rates are likely to do more harm than good by generating higher inflation in the future, due to the increased fiscal costs of higher interest rates. In practice, the ability to delay a potential crisis buys precious time that may allow the fiscal authority to put its house in order. Lahiri and Vegh (2000) suggest via a theoretical model where all nominal exchange rates fluctuations are contractionary (not only appreciations) due to the existence of nominal wages rigidity, that policymakers have an incentive to prevent exchange rates fluctuations through a combination of interest rate policy and foreign exchange interventions. The optimal mix depends on the size of the output cost of the interest rate policy, the cost of foreign exchange intervention, and the speed of adjustment of nominal wages. They show that when interventions are costly it is optimal to allow some exchange rate fluctuations. Flood and Jeanne (2005) introduce the possibility of an active interest rate defense in first generation models of speculative attacks a la Krugman–Flood–Garber (KFG). This requires a departure from the uncovered interest parity (UIP) that implicitly assumes that the domestic currency interest rate is the passive reflection of devaluation expectations, and therefore there is no room for active interest rate policy. They bring in a wedge (by assuming a transaction cost due to domestic and foreign bonds being imperfect substitutes) that allows the domestic monetary authorities room to maneuver in setting the interest rate. In their model, the purpose of a successful interest rate defense is to prevent international reserves from falling into negative territory while the stock of public debt decreases. If the fiscal situation is unsustainable, this strategy is bound to fail: increases in debt and in the interest rate feed each other until the fixed peg collapses.

tion stabilization process, and led to the decrease of the country's interest rate spreads with US rates. Figure 9 shows the evolution of Lebanon's LBP banks term deposits, 3-months LBP T-Bills, and USD banks term deposits nominal interest rates in the long run. Figure 10 shows the evolution of Lebanon's banks LBP term deposits and 3-months LBP T-Bills real interest rates. Since the adoption of the de facto fixed exchange rate regime in December 1997, LBP nominal interest rates have decreased gradually, and LBP real interest rates decreased too on average, although they remain highly correlated to the levels of effective inflation. We can notice the shrinking spread between the LBP and USD term deposits rates, following the adoption of the de facto fixed exchange rate regime. This shows that the decrease of LBP nominal rates was mainly driven by the decrease of the currency premium of the LBP, as a result of the credible peg.[12]

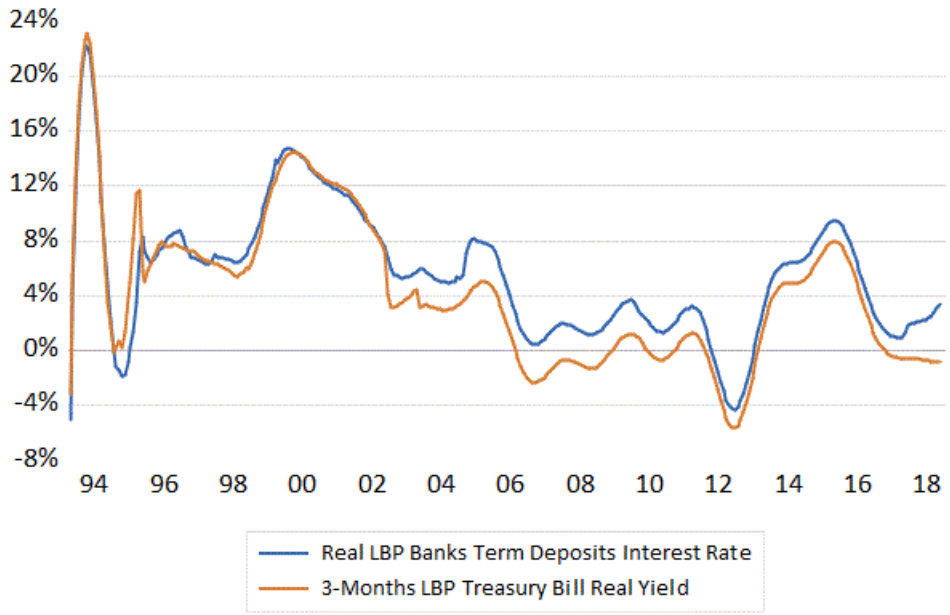
Figure 9: Evolution of Lebanon's Nominal Interest Rates



Data Source: BdL Website

[12]The analysis of the impact of nominal and real interest rates movements on private investment in Lebanon during the past three decades is beyond the scope of our paper.

Figure 10: Evolution of Lebanon's Real Interest Rates



Data Source: BdL Website

4.3 Macroprudential foreign exchange regulations and dedollarization

Zettelmeyer, Nagy, and Jeffrey (2010) explain that borrowers might prefer the cheaper foreign currency loan because they ignore, underestimate, or excessively discount the foreign exchange risk that is involved (irrational behavior). They also assume that they will not be forced to repay in full in the event of a depreciation related insolvency because of limited liability or because of the expectation of state support in the event of devaluation (moral hazard behavior). Focusing on emerging Europe, they argue that the policy response needs to focus primarily on improving macroeconomic institutions and policy credibility or on regulation or on a combination of both, together with measures to develop the legal and institutional infrastructure underlying local currency money and bond markets. However, in countries that lack credible macroeconomic frameworks and institutions, attempts to develop local currency markets are unlikely to succeed, and regulatory solutions may well be counterproductive. Catao and Terrones (2016) findings for Peru indicate that de-dollarization can be achieved through sound macroeconomic policies (mainly the introduction of inflation targeting in 2002) and some macro-prudential measures, especially higher loan provisioning and higher capital requirements on dollar loans.

Based on previous experiences, and taking into account the specific monetary characteristics of Lebanon, our views with regards to foreign exchange macroprudential policies are the following:

- A regulation requiring domestic banks to strictly cover currency mismatches on their total balance sheet level on a daily basis must be a minimum requirement in dollarized economies. This measure ensures that banks avoid any foreign exchange exposure resulting form their normal operations and prevent them from taking any speculative foreign exchange position that might put pressure on the domestic currency exchange rate. Even in the context of Lebanon's credible fixed exchange rate regime where USD/LBP exchange rate risk is very low, this measure would prevent banks from building large carry positions in order to profit from the spread between LBP and USD interest rates. Also this measure protects the domestic banking system from direct currency risk in the event of a sudden (or forced) break of the peg. Lebanon's central bank has issued circulars limiting banks foreign currency exposures in many ways, but did not completely forbid currency mismatch on the total banks balance sheet level. Such a regulation would also boost the local market for forward foreign exchange contracts that would be used actively for daily foreign exchange positions hedging.

- Banks indirect currency risk relates to extending loans in foreign currency to companies and households whose incomes are perceived or indexed in the domestic currency. The best way to deal with this indirect risk is a macroprudential regulation requiring banks to assess the situation of each borrower applying for a foreign currency loan and to limit the amount loaned to its future expected incomes that are perceived in that currency. This regulation can provide partial cover only as it is dependent on banks assessment and therefore less strict than regulations involving limits on directly observable aggregates. The indirect result of such a regulation would be the reduction of the loans dollarization rate in the economy as non-eligible borrowers will not have access to it anymore.

- We do not favor macroprudential measures aimed at discouraging banking intermediation in foreign currencies by making it more costly than domestic currency intermediation (i.e. higher loan provisioning, higher capital requirements, higher mandatory reserves). These measures can be counterproductive in the absence of sound macroeconomic management, as agents would circumvent them (at lest partially) away from the banking sector, via market financing and direct foreign borrowing. Also, these measures would distort the market and make access to finance more costly, which will have adverse effects on the real economic activity.

- Our recommendation in Lebanon's case is to restrict the holding of foreign deposits accounts to term deposits only, and to legally forbid any use of the USD for transaction purposes (forbidding checking accounts and payments in USD). That measure would enhance the transaction function of the LBP and reduce the deposits dollarization ratios in the banking system, without triggering an outflow of capital, as term savings accounts in USD will still be allowed. On top of that measure, regulatory authorities must impose the denomination in LBP

of business and work contracts between local counterparts. Those two measures would help in reducing the indexation of the economy as a whole to the USD, and consequently reduce the pass-through from foreign prices to domestic prices, allowing a better monitoring of domestic inflation. Lebanon's central bank has been reluctant so far to introduce such measures in order to avoid disturbing the prevailing market functioning rules. We believe that the credible peg in place since 1997 provides an environment stable enough to implement such measures.

4.4 Preparing the move to a floating exchange rate regime

The last question we would like to tackle in this paper is Lebanon's exit strategy to a floating exchange rate regime, whether this regime switch is voluntary or forced by foreign exchange market pressures and the drying of international reserves. As argued in our previous sections, we do not see a solid argument in favor of a voluntary exit at this stage. However, if the macroeconomic conditions remain unsustainable, the country must be ready for a regime switch that might occur abruptly.

Agenor (2004) summarizes the literature on exits to more flexible exchange regimes. Countries that choose to exit from an exchange rate peg or a currency band regime have typically faced one (or several) of three types of problems: an unsustainable real exchange rate misalignment coupled with growing external imbalances and persistent losses in foreign currency reserves[13]; an inability to use interest rates or to maintain them at sufficiently high levels to defend the currency; and highly volatile capital flows that tend to affect domestic liquidity and create macroeconomic instability. He argues that conditions for a successful exit depend importantly on the initial level of international reserves and intervention rules during the transition; the ability to adopt in a timely manner an alternative anchor to expectations; the capacity to implement an independent monetary policy under a more flexible exchange rate regime; and the degree to which transparency is maintained during the exit process. These factors also affect the choice of the pace of exit (i.e. overnight vs gradual). In practice, gradual exits from an adjustable peg have often taken the form of a shift to a band regime, where the exchange rate is allowed to float within certain limits. The band itself can be either horizontal or diagonal, with widening margins over time. During the transition, there may be a need for clearly defined intervention rules to prevent destabilizing movements in the exchange rate within the band.

IMF report "From Fixed to Float: Operational Aspects of Moving Toward Exchange Rate Flexibility" (2004) argues that for a successful transition to a

[13] Rebelo and Vegh (2008) propose a theoretical model in which the fixed exchange rate regime becomes unsustainable due to an unexpected increase in government spending. In contrast to the Krugman–Flood–Garber (KFG) model of balance of payments crises in which a peg is abandoned if and only if international reserves reach a critical lower bound, their model is consistent with evidence suggesting that many countries exit fixed exchange rate regimes with still plenty of international reserves in the central bank's vault. They show that when there are no exit costs, it is optimal to abandon the peg immediately, and when there are exit costs (for ex. output losses and cost of bailing out the banking system), the optimal abandonment time is a decreasing function of the size of the fiscal shock.

float, the following four ingredients are generally needed: a deep and liquid foreign exchange market (reducing the central bank's market-making role, increasing the information flows in the market, eliminating regulations that stifle market activity, and improving the market micro-structure), a coherent intervention policy (correcting misalignment, calming disorderly markets, and accumulating reserves or supplying foreign exchange to the market), an appropriate alternative nominal anchor (monetary or inflation targeting)[14], and adequate systems to review and manage public and private sector exchange rate risk (information systems for monitoring risks, formulas and analytical techniques to measure exchange rate risk. and internal and regulatory risk policies and procedures).

To sum up, the four prerequisites that should be in place to ensure a smooth transition to a floating exchange rate regime are:

- a macroprudential regulation enforcing strict currency matching on banks balance sheets in order to eliminate direct foreign exchange risk, and a regulation aimed at minimizing indirect foreign exchange risk exposure of banks.

- an adequate institutional and structural framework for the implementation of an alternative monetary policy, guaranteeing the independence of the central bank.

- a liquid foreign exchange market, or the commitment of the central bank to perform a market making role in order to ensure the liquidity of foreign exchange transactions.

- an adequate level of international reserves giving the central bank the ability to intervene in the foreign exchange market in a coherent way in order to smooth any excessive volatility of the exchange rate in the transition period.

Our recommendation for Lebanon is to aim at ensuring those four prerequisites as soon as possible, even if the regime switch does not seem imminent, in order to be fully ready in case any exchange market pressure arises. Achieving the four targets would also be beneficial if the country keeps its fixed exchange rate regime for a longer period, as they will contribute to a better functioning of the monetary and prudential system in general.

5 Conclusion

We made a thorough analysis of the unique Lebanese dollarization case. This allowed us to shed light on a number of areas that were unexplored so far in international finance and monetary economics, mainly the difference between

[14]Roger (2009) overviews the major elements of inflation targeting frameworks. These include: Institutional arrangements i.e. legislation or public commitments providing clear prioritization and specification of the policy target, and giving the central bank the necessary autonomy to pursue the objective; Explicit quantitative targets for inflation, often in terms of headline CPI; A high degree of autonomy and accountability for performance in achieving the objective as well as a high degree of transparency of monetary policy strategy and implementation; Analytical capabilities and data availability to conduct a forward-looking assessment of inflation pressures and the appropriate policy response; An economic structure and a sound financial system that promote transmission from the policy instruments to inflation outcomes.

gross and net international reserves and their relative fiscal costs, together with a synthetic classification of sterilization techniques. We also explained the monetary "freezing" mechanism that helped contain inflation in Lebanon, despite the monetary financing of the country's recurring public deficits. We also assessed the results of Lebanon's monetary policy in the last two decades, and the impact of the de facto fixed exchange rate regime on nominal and real interest rates. Finally, we made a number of policy recommendations aiming at limiting banks foreign exchange exposure and at reducing the degree of dollarization, in light of previous studies.

Our paper contributes to the better understanding of the mechanisms involved in dual currency systems in general. As dollarization has taken different forms in different countries (dollarization of deposits, assets, liabilities, transactions, foreign financing of banks and corporate etc), the institutional, legal, macroeconomic and behavioral context is key in each specific case. As a consequence, multi-country or panel studies would fail to shed light on the mechanisms involved under different dollarization configurations. Similar studies are needed for other countries with other forms of dollarization in order to better understand the micro and macro mechanisms at play.

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