International Reserves, Net Foreign Assets and Interest Rates

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Paper Objectives (1)

- Main objectives:

- Providing a new analytical framework to explain the effects of net foreign assets and gross international reserves on domestic interest rates.

- Testing the impacts of net foreign assets and gross international reserves on the interest rate differential in the case of Lebanon using long-run co-integrating techniques.

Paper Objectives (2)

- Other objectives:

- Stressing the difference between net and gross international reserves: the role of borrowed reserves.
- Accounting for the portfolio balance premium in the interest rate differential, alongside the exchange rate premium and the default risk premium.
- Proposing a target for small open economies monetary policy: the minimization of the interest rate differential to the world interest rate.
- Deriving a minimum level of gross international reserves.

Related Literature

The portfolio balance theory

- Our paper follows the approach of Flood and Jeanne (2005) that explicitly introduce a wedge in the uncovered interest rate parity equation in order to account for the portfolio balance effect reflecting the imperfect substitutability between domestic and foreign assets.

The current account and the interest rate level

- Past literature found a negative relationship between NFA and the current account balance, and interest rates: Spiro (1997), Bernhardsen (2000), Lane and Milesi-Ferretti (2001b), Boileau and Normandin (2008).
- Our theoretical analysis improves on previous studies, as it distinguishes between NFA's impact on the country's assets default and currency risks, and its impact on the portfolio balance premium relating to the imperfect substitutability of domestic and foreign assets.

Optimal level of international reserves (1)

- International reserves are traditionally seen as a tool in the hands of monetary authorities to manage the exchange rate through foreign exchange market interventions (see Flood and Marion (2002) and Hausmann, Panizza and Stein (2000))
- 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.

Optimal level of international reserves (2)

- Cheung and Ito (2009) find that the relationship between international reserves and their determinants is different between developed and developing economies and is not stable over time.
- The “minimum” level of gross international reserves we suggest in our paper is broadly in line with both their role as a tool to manage exchange rates dynamics, and their precautionary motive.

Theoretical Analysis

Gross Vs Net International Reserves (1)

- The literature often refers to net international reserves that are the proceeds of foreign exchange interventions.
- However, a number of countries borrow international reserves, either from non-resident counterparts (from the IMF for example), or from the local banking system in the form of foreign currency deposits at the central bank (mainly in dollarized economies).

Gross Vs Net International Reserves (2)

- Gross international reserves are the amounts available for a central bank to intervene in the foreign exchange market:

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

GIR, NIR and Balance of Payments flows

- We reason in terms of stocks to reflect the portfolio balance model assumptions.
- The fundamental BoP identity :

$$\Delta GIR = \Delta NIR + \Delta BIR = CA + FA$$

- We sum flows in order to obtain stock figures (we do not account for valuation changes):

$$GIR = NIR + BIR = NFA + NFFL$$

- NFA is the Net Foreign Assets of the economy equal to the cumulative Current Account balances.
- NFFL is the Net Foreign Financial Liabilities of the economy equal to the cumulative Net Capital Inflows. It represents the stock of liabilities of the domestic economy towards the rest of the world.

The interest rate differential and the portfolio balance premium (1)

$$i - i^* = s + d + E(e^{\cdot}/e) \qquad (2)$$

- Following the portfolio balance theory, agents require a premium (s) over the world interest rate in order to increase the share of their holdings of domestic assets.
- (d) is the domestic country's asset default risk premium
- E(e·/e) the expected depreciation of the domestic currency

The interest rate differential and the portfolio balance premium (2)

- The expected depreciation of the domestic currency E(e·/e) is a decreasing function of GIR/GDP as the central bank is in a better position to defend the external value of the domestic currency if its gross stock of international reserves is larger:

$$E(e^{\cdot}/e) = \gamma' + \gamma.ln(GIR/GDP) \qquad \gamma \leq 0 \qquad (3)$$

- The default premium of a country's assets (d) decreases with GIR/GDP in case the government borrows in foreign currency:

$$d = \beta' + \beta.ln(GIR/GDP) \qquad \beta \leq 0 \qquad (4)$$

The interest rate differential and the portfolio balance premium (3)

- NFFL is an increasing function of the portfolio balance premium (s) as investors would shift their portfolio towards domestic assets if they are offered a higher portfolio balance premium:

$$(NFFL/GDP) = \alpha' + \alpha.s \qquad \alpha \gtreqless 0 \qquad (5)$$

- α is the sensitivity of the net stock of foreign capital to (s) - i.e. a higher α translates higher capital mobility. Our analysis in this paper pertains to cases of high capital mobility (i.e higher values of α).

The interest rate differential and the portfolio balance premium (4)

- Combining equation (5) with the BoP stocks identity, and scaling by GDP, we obtain:

$$s = [(GIR/GDP) - (NFA/GDP) - \alpha']/\alpha \qquad (6)$$

- The above equation suggests that:

- (s) is endogenously determined by the target GIR level that the central bank chooses to hold.

- a negative relationship exists between the portfolio balance premium (s) and NFA. It translates the portfolio balance effect on the interest rate differential, of the higher financing needs relating to a deteriorating NFA position.

The central bank's objective (1)

- In the case of small open economies that are constrained by the uncovered interest rate parity, the world interest rate is a completely exogenous variable that monetary authorities need to accommodate in their policy design.
- They can only influence the differential to the world interest rate at best.

The central bank's objective (2)

- We propose that the policy objective of the central bank of a small open economy should be to keep its interest rate differential to the world interest rate at the lowest level possible in order not to hamper domestic economic growth.
- This objective is equivalent to traditional exchange rate targeting (as it implies keeping depreciation expectations at low levels), while accounting for the effect of the nominal interest rate level on real economic activity.

Interest rate differential, GIR & NFA (1)

- Replacing (s), (d) and E(e·/e) by their determinants in the interest rate differential we have:

$$i-i^* = (\beta'+\gamma')-\alpha'/\alpha+(GIR/GDP)/\alpha+(\beta+\gamma).ln(GIR/GDP)-(NFA/GDP)/\alpha \quad (7)$$

- Minimizing the interest rate differential we have:

$$GIR/GDP^{min} = -(\beta+\gamma).\alpha \quad (8)$$

- And:

$$(i-i^*)^{min} = (\beta'+\gamma')-\alpha'/\alpha-(\beta+\gamma)+(\beta+\gamma).ln(-(\beta+\gamma).\alpha)-(NFA/GDP)/\alpha$$

The central bank's objective (3)

- The high degree of capital mobility implies that monetary authorities loose the control on the nominal interest rate to a large extent. The key interest rate becomes a capital flows management tool, whose main determinant is the world interest rate.
- What has been traditionally considered as macro-prudential tools (limits on loan-to-value, limits on loan-to-income, limits on banks credit growth, banks reserves requirements, etc) emerge as suitable means to limit credit expansion in the event of an overheating of the activity.

Interest rate differential, GIR & NFA (2)

- To plot the following graph, we have chosen the values of $\alpha=0.5$; $\beta=-0.1$; $\gamma=-0.7$; NFA/GDP=-1; $\beta'=\gamma'=\alpha'=0$
- The graph equation is:

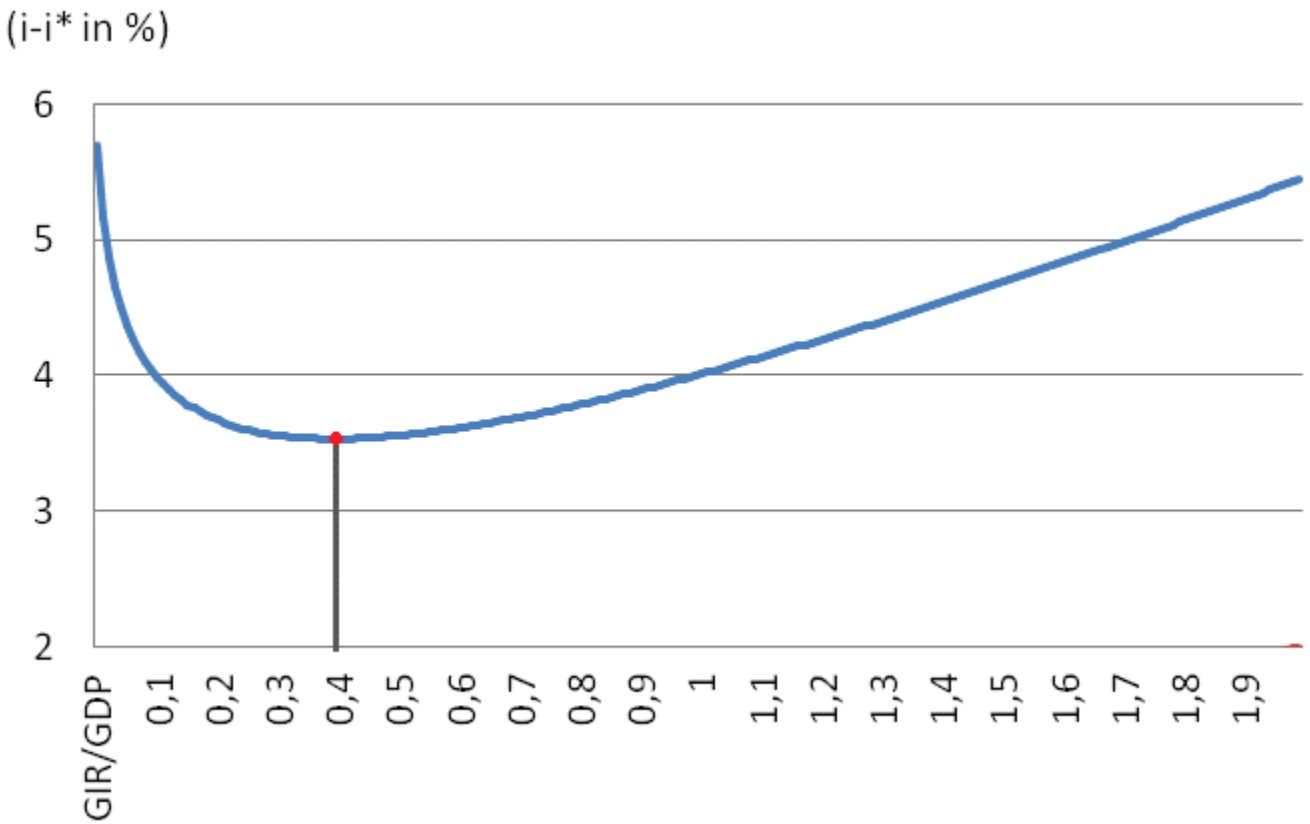
$(i-i^*) = 2(GIR/GDP) - 0.8Ln(GIR/GDP) +2$

- At the minimum:

$(GIR/GDP) = 0.4$

and $(i-i^*) = 3.5330\%$

Interest rate differential, GIR & NFA (3)



Interest rate differential, GIR & NFA (4)

- Away from the optimum situation, if GIR/GDP is lower than its “minimum” value, (i-i*) decreases if GIR/GDP increases, as (d) and E(e·/e) decrease more quickly than (s) increases.
- If GIR/GDP is higher than its “minimum” value, (i-i*) increases if GIR/GDP increases, as (d) and E(e·/e) decrease less quickly than (s) increases.

Interest rate differential, GIR & NFA (5)

- Our analysis goes beyond previous analyses, to give to the financial market the role of assessing the adequacy of the GIR level, through the exchange rate and default risk premiums.
- GIR level is determined in practice by the central bank's subjective assessment of potential market reactions. The more risk-averse the central bank is, the more its GIR level exceeds the theoretical “minimum” level.

Empirical Example

Empirical Example (1)

- We test the long run co-integrating relationships between the interest rate differential, net foreign assets and gross international reserves in the case of Lebanon. We use the ARDL and DOLS models.
- Our dependent variables are respectively:
- The spread between the 5-years USD Eurobond of the Lebanese Government and the corresponding 5-years US Government bond Yield to Maturity.

Empirical Example (2)

- The spread between the 5-years USD Eurobond of the Lebanese Government YtM and the 1-month USD Libor rate.
- The spread between the USD denominated banks term deposits average interest rate and the 1-month USD Libor rate.
- The spread between the LBP denominated banks term deposits average interest rate and the 1-month USD Libor rate. This last spread does not exclude the currency risk premium.

Empirical Example (3)

- As explanatory variables, we include NFA/GDP, together with GIR/GDP, Gross Public Debt/GDP (as a proxy for sovereign default risk) and we control for domestic real GDP growth and the perceived emerging markets risk (proxied by JP Morgan Emerging Market Bond Index Global spread).
- The gross foreign assets of the consolidated banks sector (GFA) – equal to the sum of GIR and consolidated domestic banks gross foreign assets - could be a better measure than the central bank's GIR to account for the gross international reserves of a dollarized economy. We perform the same regressions by replacing GIR/GDP by GFA/GDP, for robustness.
- The expected coefficient sign is negative for NFA/GDP, undetermined for GIR/GDP and GFA/GDP, and positive for Gross Public Debt/GDP.

Table 1: ARDL Results

	Leb-5Y - Libor-1M		Leb-5Y - Libor-1M		USD-Dep - Libor-1M		USD-Dep - Libor-1M	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
NFA/GDP	-1.705757	0.0000	-1.758771	0.0000			-1.075603	0.0605
GFA/GDP			1.019230	0.0685			6.113472	0.0000
GIR/GDP	0.860926	0.0413			4.077546	0.0002		
EMBIG Spread	0.876374	0.0000	0.897681	0.0000	0.795996	0.0000	1.018914	0.0000
Real GDP Growth	0.199001	0.0000	0.182858	0.0000				
F-bounds test	15.94490 ***		15.89987 ***		12.13833 ***		8.767967 ***	
t-Bounds test	-8.618067 ***		-8.601149 ***		-5.616654 ***		-5.152289 ***	
Obs.	150		150		191		179	

	LBP-Dep - Libor-1M		LBP-Dep - Libor-1M		LBP-Dep - Libor-1M	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
NFA/GDP	-1.249451	0.0095				
GFA/GDP					1.034200	0.0038
GIR/GDP			1.324728	0.0003		
EMBIG Spread	1.048958	0.0000	1.027704	0.0000	1.011237	0.0000
Real GDP Growth	0.187755	0.0004	0.114352	0.0128	0.129075	0.0242
F-bounds test	10.76310 ***		11.60441 ***		9.479936 ***	
t-Bounds test	-6.418573 ***		-6.572455 ***		-5.560246 ***	
Obs.	179		191		188	

Table 2: DOLS Results

	Leb-5Y - Libor-1M		Leb-5Y - US-5Y		USD-Dep - Libor-1M		USD-Dep - Libor-1M	
	Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
NFA/GDP	-1.303665	0.0000	-0.810177	0.0711	-9.947297	0.0000	-9.294494	0.0000
GFA/GDP							15.37381	0.0000
GIR/GDP	0.844506	0.0445			20.53847	0.0000		
EMBIG Spread	0.932808	0.0000	0.661442	0.0000	1.008537	0.0000	1.743258	0.0000
Real GDP Growth	0.172597	0.0000						
Gross Public Debt			1.732813	0.0387				
Adj - R2	0.812517		0.500470		0.949627		0.969090	
Obs.	152		152		162		156	

	LBP-Dep - Libor-1M		LBP-Dep - Libor-1M	
	Estimate	p-value	Estimate	p-value
NFA/GDP	-13.29626	0.0000		
GFA/GDP			1.370248	0.0000
GIR/GDP	5.269660	0.0302		
EMBIG Spread	1.623876	0.0000	1.028148	0.0000
Real GDP Growth	0.553852	0.0009		
Adj - R2	0.959801		0.798563	
Obs.	167		184	

Conclusion (1)

- Within the portfolio balance theory framework, we established the link between domestic interest rates, net foreign assets and the level of gross international reserves.
- We tested our theoretical results in the case of Lebanon:
- Higher net foreign assets lead to a lower interest rate differential.
- A higher level of gross international reserves is related to a higher interest rate differential. This reflects the risk-aversion of Lebanon's central bank, that has been holding levels of international reserves, in excess of the level that minimizes the interest rate differential.

Conclusion (2)

- Minimizing the interest rate differential as a monetary policy target entails managing exchange rate depreciation expectations. This favors a managed float regime as present exchange rate movements would influence future exchange rate depreciation expectations.
- This is also consistent with the fear of floating consideration of emerging economies.
- Our results are in line with the empirical fact that a majority of de jure emerging market floaters apply managed floating in practice.