Karlo Kauko

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THE NET STABLE FUNDING RATIO REQUIREMENT WHEN MONEY IS ENDOGENOUS

The NSFR regulation reduces banks' liquidity risks by encouraging the use of deposit funding. Deposit money is created by lending, but the requirement restricts possibilities to grant loans. This contradiction may be destabilising if there is a substantial foreign debt.

1 Introduction

Banks in different parts of the world were hit by serious liquidity problems during the recent global financial crisis. The international regulatory community tries to prevent this from happening again. The Net Stable Funding Ratio (NSFR) requirement is an essential part of the Basel III regulatory reform proposed by the Basel Committee (2014). The NSFR regulation stipulates how to calculate required stable funding (RSF) and available stable funding (ASF). Situations where RSF exceeds ASF are banned. The requirement can limit possibilities to grant loans. The requirement also encourages banks to collect more stable funding, such as retail deposits. Most European banks would not have satisfied the requirement in the last few years (Dietrich et al. 2014).

Many liquidity regulations have been designed as if the regulated entities themselves did not affect the financial environment. At the bank level, the NSFR regulation is normally satisfied if the bank collects enough deposits and does not grant excessive amounts of loans. However, deposits are created by banks' lending function. When a bank grants a loan, it enters in its accounting system the loan as an asset and the newly created deposit as a liability. Deposits are spread between customers of different banks when debit cards, cheques and giro transfers are used as payment media. A bank has difficulties in collecting deposits if other banks do not grant loans. The endogenous nature of money has been recently discussed by e.g. McLeay et al (2014). Moore (1983) argued that money creation is predominantly driven by the demand for loans. The hypothesis of money being endogenously determined finds econometric support in the findings of Badarudin et al. (2012 & 2013). As to the equilibrium condition that money supply must equal money demand, different mechanisms have been proposed (See Howells 1995 and references therein). Whether increasing quantities of money cause inflation, output growth or low velocity of money is beyond the scope of this paper.

If loans and deposits grow by the same amount, ASF normally grows more than RSF because deposits' ASF factors are typically higher than loans' RSF factors. Therefore, in a closed economy, the NSFR requirement would not normally be binding for all the banks simultaneously. The requirement is a potentially useful microprudential tool because it limits the lending possibilities of the most expansive banks; excessive money creation could impose a negative externality on the rest of the economy (Stein 2012). Instead, as will be seen, the situation is more problematic in an indebted open economy. If a substantial foreign debt has been financed via banks, the NSFR requirement may render the banking system highly unstable. If short-term cross-border interbank lending has been widely used, which was the case of e.g. Spain and Ireland before the crisis, any minor shock to the supply of funding from abroad may lead to disproportionate changes in the quantity of money and loans.

The consequences of the NSFR requirement have not been widely discussed in academic literature, King (2013) and Schmaltz et al. (2014) being exceptions. The Basel III package includes another liquidity requirement, namely the liquidity coverage ratio (LCR) regulation, which may also have unintended consequences (van den End and Kruidhof 2013, de Haan et al 2013).

2 The model

2.1 Assumptions

There is an open economy with a large number of identical banks. The NSFR is a binding constraint; it restricts the amount of loans (L) of each bank. There is no central bank money. Deposits (D) account for 100 % of the money stock. D might also contain other financial instruments classified as stable funding, such as long maturity bonds and equity issued by banks.

The country has been running a current account deficit. This debt is funded via banks' balance sheets as short-term loans from foreign banks. Each domestic bank grants customer loans domestically, collects somewhat less deposits from domestic customers and finances the difference V from abroad. There is no domestic interbank market.

Money is endogenous and created as a by-product of lending. No Kaldorian reflux mechanism (see Lavoie 1999) destroys extra money balances. The banking industry is atomistic and no bank takes into account the impact of its own lending on deposit supply. Because deposits are used as a means of payment, and because no one takes a loan in order to deposit the money with the same bank, retail payment flows spread the money evenly across banks. Interbank payment flows are cleared with debt balances abroad; the debt of the payee diminishes and the debt of the payer bank increases, although domestic payment flows net out to zero for each bank because banks are identical.

In the Basel Committee proposal, deposits' ASF factors range from 50 to 95%, depending on the customer and the deposit insurance. Short-term interbank loans have got a 0% ASF factor. RSF is determined by the quantity of different asset types and their respective RSF factors. Banknotes, many loans to large corporate customers and long-term loans to retail customers have been assigned RSF factors of 0%, 50% and 85%, respectively. (See Basel Committee 2014.) These details are now simplified in the following way. The ASF factors of deposits and cross-border interbank debt are 100% and 0%, respectively. The RSF factor of loans is β, $0 < \beta < 1$. No other balance sheet items exist.

Lending by the representative bank affects the foreign net debt. Some borrowers spend on imported goods. Banks' lending policies affect house prices, and house prices have been observed to Granger-cause current account deficits (Roy and Kemme 2012). $V = F(L) + x$, where x is an exogenous shock, possibly a mere interest rate shock that expands the foreign debt. No precise assumptions on the functional form of F are made, except that $1 > F' > 0$. When customers buy goods from abroad, they use claims on domestic banks as money; the deposit base shrinks and banks' foreign debt increases.

2.2 Solving the model

The equilibrium of a representative bank is characterised by the following conditions

The balance sheet identity $\qquad\qquad\qquad L-D-V=0 \qquad\qquad\qquad$ [1]

The NSFR requirement $\qquad\qquad\qquad \beta L-D = 0 \qquad\qquad\qquad$ [2]

The determination of foreign debt $V - F[L] - x = 0$ [3]

Conditions [1] and [2] imply

$L = V/(1-\beta)$ $D = V\beta/(1-\beta)$ [4]

The Jacobian of the system characterised by [1], [2] and [3] is

$$|J| = \begin{vmatrix} 1 & -1 & -1 \\ \beta & -1 & 0 \\ -F' & 0 & 1 \end{vmatrix} = \beta + F' - 1$$ [5]

Cramer's rule yields

$$\frac{\partial D}{\partial x} = - \frac{\begin{vmatrix} 1 & 0 & -1 \\ \beta & 0 & 0 \\ -F' & -1 & 1 \end{vmatrix}}{|J|} = \frac{-\beta}{\beta + F' - 1}$$ [6]

$$\frac{\partial L}{\partial x} = - \frac{\begin{vmatrix} 0 & -1 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 1 \end{vmatrix}}{|J|} = \frac{-1}{\beta + F' - 1}$$ [7]

In an equilibrium where the NSFR requirement prevents the growth of banks' balance sheets, the foreign net debt *V* and the Jacobian [5] must be positive; if either of them is negative, something else than the NSFR requirement limits lending. When [5] is positive, [6] and [7] are negative and the shock *x* leads to shrinking credit and deposit stocks. How strong could the impact on loans and deposits be? As implied by [6] and [7], money and credit aggregates depend almost infinitely strongly on the exogenous shock *x* if the Jacobian [5] is close to zero; $\beta = 0.71$ and $F' = 0.3$ do not seem unrealistic parameter values, but an exogenous increase in foreign debt would cause a 100 times stronger change in the equilibrium amount of credit. Obviously, real life banks would not be able to reduce their loan stocks at an infinite speed, which would slow down the collapse of money and loan stocks. The Jacobian might be very close to zero with meaningful values of *V, L* and *D*. *F* may depend on *L* in a very non-linear way, and if there were no loans (*L=0*) there might be net foreign receivables (*V<0*).

If bank customers spend mainly on imported goods ($F' \approx 1$), the situation becomes much more stable because [5] differs more from zero.   Bank lending would have a very weak marginal impact on the supply of deposit money.

3 Conclusions

The main problem of the NSFR requirement may be the implicit assumption that money supply is exogenous. The idea of money as a by-product of lending became the mainstream view among Post Keynesian macroeconomists decades ago, but it has been gaining wider popularity.

In a closed economy, major problems related to the NSFR regulation are unlikely. The regulation can be seen as a desirable microprudential tool. It prevents over-extension of loans by a euphorically optimistic bank during good times.

Instead, it was demonstrated that the requirement may become highly destabilizing in an economy with a history of persistent current account deficits, at least if the growing foreign debt has been funded via the international interbank market, which has been commonplace. Under such circumstances, a minor shock could cause an almost infinitely strong contraction in the equilibrium quantity of loans and deposits in the economy. When banks no longer satisfy the requirement, they grant less loans, which would make the overall situation worse. If a bank reduces its loan portfolio by 100, it might reduce its own RSF by, say, 70, but reduces others' ASF by, say 80. If everybody is doing this simultaneously, every bank will be further away from satisfying the requirement.

The main policy implication may be the following. If there is a country with a large foreign net debt funded in the international interbank market, the NSFR requirement should not be introduced. The situation would be very close to the one described above. In case of adverse shocks, the unintended consequences would be dramatic.

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