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A prudential stable funding requirement and monetary policy in a small open economy☆

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ABSTRACT

The Basel III net stable funding requirement, introduced in January 2018, requires banks to use a minimum share of long-term wholesale funding and deposits to fund their assets. A similar regulation has been in place in New Zealand since 2010. We introduce the stable funding requirement (SFR) into an open-economy DSGE model featuring a banking sector with richly-specified liabilities, and estimate the model for New Zealand. We then evaluate the impact of the new prudential instrument on monetary policy trade-offs. A higher steady-state SFR level amplifies the effects of shocks to the spread on long-term bond financing in the banking sector, adding to macroeconomic volatility conditional on these shocks. However, the SFR plays a passive role in the transmission of all other shocks to the real economy. Hence in the overall picture, the monetary policy trade-off between inflation stabilisation and output stabilisation, is only slightly worsened by the SFR. We note that the trade-off can be improved when monetary policy responds systematically to credit growth.

1. Introduction

Central banks act as lenders of last resort to prevent liquidity pressures from becoming solvency problems. Liquidity provision by central banks, however, can lead to the problem of moral hazard. The availability of public liquidity reduces the incentive for banks to raise relatively expensive 'stable' funding such as retail deposits and long-term bonds, and leads banks to underinsure against refinancing risk. In periods when credit has grown rapidly, retail deposits have tended to grow more slowly, and banks have shifted toward less stable funding from short-term wholesale markets. As discussed in Shin and Shin (2011), the shift toward short-term wholesale funding increases the exposure of the banking system to refinancing risk, both by increasing rollover requirements and by lengthening intermediation chains through funding from other financial institutions. In response to the systemic liquidity stress experienced during the recent global financial crisis, extensive liquidity support was provided to banks, reinforcing incentives for moral hazard. Hence, stronger liquidity regulation has been proposed to increase banks' self-insurance against liquidity risk.

The Basel III liquidity regulations, that came into force in January 2018, include a net stable funding ratio (NSFR) that requires banks to raise a share of funding from more stable retail deposits and long-term wholesale funding, rather than short-term wholesale funding. In this paper, we introduce the stable funding requirement into a New Keynesian small openeconomy (SOE) general equilibrium model. We then examine how the new prudential policy alters the monetary policy trade-off between inflation stabilisation and output stabilisation. Central to our modelling strategy is the design of a banking sector with disaggregated liabilities: retail deposits, and short-term and long-term wholesale funding. The stable funding requirement regulates the proportion of deposits and long-term liabilities on the bank's balance-sheet and a deviation from the required proportion of stable funding is subject to a

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penalty function.[1] We consider the case of New Zealand, a country that in 2010 adopted a liquidity policy that is similar to the Basel III proposals. In particular, the New Zealand policy includes a core funding requirement that is similar in spirit to the Basel III NSFR and maturity mismatch ratios.[2]

We show the history of the core funding ratio in New Zealand in Panel (a) of Fig. 1. Before the regulation was put in place in April 2010, New Zealand banks used stable funding due to internal risk management considerations or implicit requirements imposed by creditors and rating agencies. New Zealand's experience with the stable funding requirement, provides us with a time series on the stable funding ratio, which, along with other key macroeconomic and financial series, facilitates the estimation of the SOE model. We estimate the model with Bayesian methods using quarterly data over 1998–2010, the period immediately preceding the introduction of the policy.

The estimated model is used to evaluate the implications of the prudential instrument for the transmission of structural shocks. We note that increasing the stable funding requirement does not significantly influence the transmission of most structural shocks to the real economy. However the picture is starkly different in the case of the shock to the spread on multi-period bonds which affects long-term bank funding.

It is well known that credit spreads are compressed during booms and expand during recessions.[3] As shown in Panel (b) of Fig. 1, New Zealand dollar wholesale funding spreads were low during the build-up to the global financial crisis and rose sharply during the crisis. Long-term funding spreads can be important for the commercial banks because they are larger and more variable than short-term spreads (Acharya and Skeie, 2011). The spread component must be carried for the duration of the funding because it cannot be hedged, unlike the benchmark interest rate. A stable funding requirement that increases the share of long-term funding in banks' balance sheets increases the banks' exposure to shocks in the long-term bond market. This feature of the policy instrument makes it an amplifier of the transmission of bond spread shocks; if a higher proportion of banks' liabilities are held in long-term bonds when the spreads on these bonds rise, the upward pressure on domestic lending rates is stronger and hence economic activity contracts further, and macroeconomic volatility increases. However, since the prudential instrument plays only a passive role in the transmission of other shocks, in the overall picture, a tightening of the stable funding requirement only mildly worsens the monetary policy trade-off between inflation stabilisation and output stabilisation. We find that the worsening of monetary policy trade-offs can be reversed if monetary policy responds directly to credit growth.

The paper lies at the interface of several strands of the literature. The first is the theoretical literature that explicitly incorporates financial regulation into macroeconomic models, *e.g.* Gertler et al. (2012); Roger and Vlcek (2011); Gertler and Karadi (2011); de Walque et al. (2010); Covas and Fujita (2010); Van den Heuvel (2008); Goodfriend and McCallum (2007).[4] The focus on the stable funding requirement, which has not received previous attention, distinguishes our contribution to the theoretical literature. On the other hand, the empirical dimension of this paper links it to the literature on DSGE models of financial intermediation estimated with Bayesian methods on US or euro area data, as in *e.g.* Christiano et al. (2014); Jermann and Quadrini (2012) or Gerali et al. (2010). The interaction between the banks and households in our model is along the lines of Gerali et al. (2010) who estimate a closed-economy New Keynesian model with banks on euro area data. However, they focus on different macroprudential instruments, namely restrictions on loan-to-value ratios and bank capital holdings. Furthermore, since we design the model for New Zealand, a very open economy, we introduce international trade in goods and financial assets. The banking sector in our model interacts with a real economy that has much in common with the empirical small openeconomy models of Adolfson et al. (2007); Bergin (2003).

The estimated model forms the foundation for our policy analysis where we examine the implications of the stable funding requirement for the monetary policy trade-off between inflation stabilisation and output stabilisation. This qualitative segment of the paper links it to a growing DSGE model-based literature focussing on the interactions between optimal monetary policy and optimal macroprudential policies pertaining to loan-to-value ratios or capital requirements, *e.g.* Gelain and Ilbas (2017); Quint and Rabanal (2014); Rubio and Carrasco-Gallego (2014); Angelini et al. (2014); Lambertini et al. (2013); Angeloni and Faia (2013). In contrast, we assess how the monetary policy trade-off is altered due to the presence of a new prudential instrument, the stable funding requirement. To this end, we use a monetary policy loss function specified in terms of macroeconomic volatilities akin to those used by Gelain and Ilbas (2017); Angelini et al. (2014), and study optimised monetary policy rules that minimise the policy loss function. In contrast, Quint and Rabanal (2014); Lambertini et al. (2013) use household welfare criteria derived from model-specific utility functions while the optimal policy analysis of Angeloni and Faia (2013) is based on household welfare as well as macroeconomic volatilities.

Finally, the modelling strategy for the introduction of long-term wholesale funding, which is one of the key target variables of the stable funding requirement, links the paper to the literature on multi-period debt. Woodford (2001) introduced exponentially-decaying perpetuities in DSGE models as a tractable way of modelling multi-period debt with a single state variable. While this approach is suitable to model fixed-rate financial assets, it can imply a large degree of interest rate risk and associated valuation effects. In our model, multi-period bonds pay a floating rate coupon on the benchmark component to eliminate benchmark interest rate risk, in addition to a fixed-rate spread that cannot be hedged. The introduction of an additional state variable enables us to model the cost structure of bank funding more realistically, implicitly accounting for the fact that modern banks use interest rate swaps to hedge benchmark interest rate risk.[5]

The rest of the paper is set out as follows. In Section 2 we introduce the stable funding requirement in an SOE model for New Zealand and Section 3 describes the estimation results. We examine the impact of the stable funding requirement and other financial sector parameters on the transmission of structural shocks in Section 4. The implications of the stable funding requirement for monetary policy trade-offs are explored in Section 5. Section 6 concludes.

[1] A previous working paper version of this paper, Bloor et al. (2012), studied a similar banking sector set-up in a calibrated real business cycle model. We thank Chris Bloor and Rebecca Craigie for contributions in the early stages of the project.

[2] The Basel III NSFR is defined as the ratio of available stable funding to required stable funding (see www.bis.org/publ/bcbs189.pdf). The New Zealand Core Funding Ratio is defined as the ratio of stable funding to loans and advances (see www.rbnz.govt.nz/regulationandsupervision/banks/prudentialrequirements/4664431.html). Although the definitions differ in details, they are broadly equivalent.

[3] See *e.g.* Christiano et al. (2014) for the US experience.

[4] A vast literature in finance also studies financial frictions and regulation in smaller scale models, often set in partial equilibrium, solved by non-linear techniques. See Angelini et al. (2014) for a review of this literature.

[5] A different strategy for modelling long-term debt, in the context of fixed-rate and variable-rate mortgages, is considered by Brzoza-Brzezina et al. (2014). See the references therein for the literature studying long-term debt in the housing market.