Credit Channel of Monetary Policy between Australia and New Zealand: an Empirical Note

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Abstract

Some economists argue that a monetary tightening shifts the supply schedule of bank loans left, thereby forcing bank-dependent borrowers to cut back on expenditures. This is the credit view. In the literature, the credit view is typically studied in a closed-economy context. In reality, however, banks make international loans through their overseas branches and subsidiaries. This short paper tests the credit view in an open-economy context: a monetary-policy shock originated in one country propagates to another through banks' shifts of funds between the two countries. For this purpose, the paper uses the data on Australia and New Zealand because Australian-owned banks dominate the banking market in New Zealand. A significant finding is that the supply schedule of loans shifts left in New Zealand after a monetary tightening in Australia.

I Introduction

A longstanding macroeconomic issue is how monetary policy affects the real economy. There are economists placing an emphasis on the role of bank lending in monetary transmission. Their view is collectively called the credit view. The credit view is that a monetary tightening reduces loanable funds in the banking sector, thereby forcing bank-dependent borrowers to cut back on their expenditures. In the literature, the credit view is typically studied in a context of closed-economy. In reality, however, banks often make international loans through their overseas branches and subsidiaries. This suggests that the credit view should be studied in a context of open economy.

This research note proposes the international credit view. Suppose that there are two countries, A and N. Suppose also that banks in A dominate the banking market in N. What will happen if money is tightened in A? The standard credit view tells us that monetary tightening will reduce loanable funds in A. In a two country case, however, this is not the end of the story. The banks might reallocate their funds from N to A. If this happens, loanable funds will decrease in N, thereby forcing bank-dependent borrowers in N to cut back on their expenditures. This reasoning leads to the international credit view: monetary-policy shocks originated in one country are transmitted to another through the banks' reallocation of loanable funds between the two countries.

For testing the international credit view, Australia and New Zealand provide an excellent case to study. Since New Zealand allowed the entry of foreign banks to its domestic market in the late 1980s, Australian-owned banks have increased their shares of the total assets held by banks in New Zealand. Consequently, nearly 90% of the total assets held by banks in New Zealand belong to Australian-owned banks. With the data on the two countries, this research note tests the international credit view.

II Approach

This section lays out the model to test the hypothesis that a monetary tightening in Australia shifts the supply schedule of bank loans in New Zealand, thereby affecting the level of output in New Zealand. A similar hypothesis is tested by Peek and Rosengren (1997). Focusing on Japanese banks operating in the U.S., they test the hypothesis that exogenous shocks originated in Japan reduce the loanable funds in the U.S. banking market. To test this hypothesis, they use panel data on the balance-sheets of Japanese-owned banks operating in the U.S. banking market. Unfortunately, however, their approach is not readily available for the New Zealand case. First, the list of registered banks in New Zealand changes due to (de)registration, mergers, and acquisitions. This makes it hard to obtain consistent panel-data on the banks' balance-sheets. Second, the number of registered banks is currently 16. This makes the cross-section analysis of little use. As such, the availability of the data restricts the choice of the approach.

In the empirical literature on monetary transmission, vector auto regression (VAR) models are often employed. Let $\mathbf{x}$ denote a vector of macroeconomic variables. Then, the economy is approximated by a system of linear equations:

$$\mathbf{B}_0\mathbf{x}_t = \mathbf{k}_0 + \mathbf{k}_1 t + \mathbf{B}_1\mathbf{x}_{t-1} + \cdots + \mathbf{B}_p\mathbf{x}_{t-p} + \mathbf{u}_t, \text{ where } \mathbf{u}_t \sim i.i.d.\ N(\mathbf{0}, \mathbf{D}), \qquad (1)$$

where $\mathbf{D}$ is a diagonal matrix. A macroeconomic VAR model, in general, includes the short-term interest rate in $\mathbf{x}$. The equation associated with the interest rate is commonly assumed to represent the policy-reaction function of the central bank. Under this assumption, its residual is interpreted as a monetary-policy shock. Empirical work simulates the responses of the other macroeconomic variables to the residual of the interest-rate equation.

For the credit view to be tested in an open-economy context, the above model should be amended with the inclusion of an overseas sector. In what follows, variables in $\mathbf{x}$ are divided into two groups, namely, the domestic sector and the overseas one. The domestic sector is composed of New Zealand variables. The overseas one includes Australian variables. Taking into account the openness of the two countries, however, the model should also include variables of the rest of the world. In the empirical literature, the U.S. is assumed to represent the rest of the world for a small open economy (see, for instance, Cushman and Zha 1997). Following the convention, this note includes the U.S. variables in the overseas sector. Table 1 summarises the component of $\mathbf{x}$.

The overseas sector is composed of Australian variables as well as the U.S. ones. The Australian variables are four macroeconomic variables: the general price (P^{AU}), the level of output (Y^{AU}), the short-term interest rate (R^{AU}), and the exchange rate (XR^{AU}). In the literature, a macroeconomic VAR model typically includes these four variables. Similarly, the U.S. variables are the general price (P^{US}), the level of output (Y^{US}), and the short-term interest rate (R^{US}). Following the suggestion made by Sims (1992), the commodity-price index (CP) is also included. These overseas variables are supposed to affect the New Zealand economy contemporaneously.

The domestic sector is composed of New Zealand variables. Four of them are macroeconomic variables: the general price (P^{NZ}), the level of output (Y^{NZ}), the short-term interest rate (R^{NZ}), and the exchange rate (XR^{NZ}). The other variables are those related with credit. Following the suggestion made by Suzuki (2004), this note includes the lending rate (LR^{NZ}) as well as the quantity of loans (LQ^{NZ}) in $\mathbf{x}$. These two variables play a crucial role in testing the hypothesis that the supply curve of loans shifts left. As Figure 1 shows, a leftward shift of the supply schedule is identified with a rise of the price

(i.e., LR^{NZ}) and a decrease of the quantity (i.e., LQ^{NZ}). The estimated model (1) is used to simulate the responses of these two credit variables in New Zealand to a monetary-policy shock in Australia.

In macroeconomic modelling, it is always difficult to measure monetary-policy shocks in a convincing way. As is mentioned earlier, an innovation to the short-term interest rate is often assumed to represent an unanticipated monetary tightening in the VAR literature. Australian empirical work by Brischetto and Voss (1999), Dungey and Fry (2001), and Dungey and Pagan (2000), for instance, follows this convention.[1] In what follows, a positive innovation to R^{AU} is assumed to represent an unexpected hike of the cash rate by the Reserve Bank of Australia (RBA).

As the model (1) is a simultaneous-equations model, it requires a set of identifying restrictions. For this purpose, a recursive structure is imposed on $\mathbf{B}_0^{-1}$. The ordering of the variables is as follows: CP, P^{US}, Y^{US}, R^{US}, P^{AU}, Y^{AU}, R^{AU}, XR^{AU}, P^{NZ}, Y^{NZ}, R^{NZ}, XR^{NZ}, LQ^{NZ}, and LR^{NZ}. The ordering implies that the Australian economy does not contemporaneously affect the U.S. economy, and that the New Zealand economy does not contemporaneously affect the Australian economy or the U.S. economy. As such, the ordering of the variable may be justified by the differences in the size of the economy among the three countries.

Equation (1) is estimated over the sample period of 1988:Q4 to 2005:Q4.[2] The beginning of the sample period is restricted by the availability of the data on the credit aggregate in New Zealand. All the variables except for the interest rates are taken natural logs. The number of lags is chosen as two by likelihood ratio tests. When conducting the likelihood ratio tests, the maximum number of lags is set as two in an attempt to secure meaningful degrees of freedom.

III Results

Before interpreting the results, the hypothesis should be formalised in a testable way. Figuer 1 suggests the following sets of hypotheses.

$$\text{H0 (A): } \partial E(LQ^{NZ}_{t+i}|I_t)/\partial u_t^{R^{AU}} = 0 \text{ for } i = 0, 1, \cdots,$$

$$\text{H1 (A): } \partial E(LQ^{NZ}_{t+i}|I_t)/\partial u_t^{R^{AU}} < 0 \text{ for } i = 0, 1, \cdots,$$

and

$$\text{H0 (B): } \partial E(LR^{NZ}_{t+i}|I_t)/\partial u_t^{R^{AU}} = 0 \text{ for } i = 0, 1, \cdots,$$

$$\text{H1 (B): } \partial E(LR^{NZ}_{t+i}|I_t)/\partial u_t^{R^{AU}} > 0 \text{ for } i = 0, 1, \cdots,$$

where E and I denote the operator of expectation and the set of information available at time t, respectively. $u_t^{R^{AU}}$ is an innovation to R^{AU}, which is interpreted as an unanticipated hike of the Australian cash rate by the RBA. If both H1 (A) and H1 (B) are simultaneously accepted, we may conclude that the supply schedule of loans shifts left in New Zealand in the wake of tight money in Australia.

Another set of hypotheses is for testing the effectiveness of the Australian monetary policy in New Zealand:

$$\text{H0 (C): } \partial E(Y^{NZ}_{t+i}|I_t)/\partial u_t^{R^{AU}} = 0 \text{ for } i = 0, 1, \cdots,$$

$$\text{H1 (C): } \partial E(Y^{NZ}_{t+i}|I_t)/\partial u_t^{R^{AU}} < 0 \text{ for } i = 0, 1, \cdots.$$

If H1 (C) is accepted, we may conclude that the Australian monetary policy has an impact on the real economy in New Zealand.

Figure 2 shows the impulse responses of the four variables of interest to an innovation to the Australian cash rate. In each graph of Figure 2, the solid line and the dotted lines represent the point estimate of the impulse response and its 90% confidence interval,

respectively. The confidence intervals are derived from the 1,000 bootstrapped samples.[3] The 90% confidence intervals are used for testing the above one-tailed tests at the 5% significance level.

As Figure 2 shows, an unanticipated hike of the cash rate in Australia is followed by a decrease of the loan quantity and a rise of the lending rate in New Zealand. These responses are significant at 5%. As H0 (A) and H0 (B) are rejected, the conclusion is that the supply schedule of loans shits left in New Zealand in the wake of tight money in Australia. This is consistent with the essence of the international credit view: a monetary tightening in Australia shifts the supply schedule of loans in New Zealand.

Figure 2 also shows that real GDP falls in New Zealand after a monetary tightening in Australia. In the 16th quarter, the decrease of real GDP is nearly significant, and the p-value to reject H0 (C) is 0.118. As a VAR model typically suffers from over-parameterisation, it may be reasonable to conclude that real GDP decreases in New Zealand after a monetary tightening in Australia. This implies that monetary policy in Australia effectively has impacts on the real economy in New Zealand.

The decrease of real GDP in New Zealand has two interpretations. One is that the leftward shift of loans in New Zealand forces bank-dependent borrowers to cut back on expenditures in New Zealand. This is consistent with the international credit view. The other is that a monetary tightening in Australia decreases aggregate demand in Australia, thereby decreasing net exports from New Zealand to Australia. This implies the existence of another transmission mechanism through which Australian monetary policy affects New Zealand economy. Note, however, that there can be multiple channels of monetary policy. Therefore, even the second interpretation does not necessarily deny the international credit view.

IV Conclusion

This research note proposes the international credit view: a monetary-policy shock originated in one country is transmitted to another through banks' reallocation of funds. The purpose of the note is to test this hypothesis for Australia and New Zealand within a framework of vector auto-regression models. The main finding is that the supply schedule of loans shifts left in New Zealand in the wake of tight money in Australia. This finding, which is significant at 5%, is consistent with the essence of the international credit view. Another finding, which is nearly significant at 10%, is that real GDP falls in New Zealand in the wake of tight money in Australia. This implies the effectiveness of Australian monetary policy in New Zealand. Thus, the results are consistent with the hypothesis that Australian banks reallocate funds from New Zealand to Australia in response to tight money in Australia, thereby affecting the real economy in New Zealand.

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Notes

[1]This practice has been subject to criticism. See, for instance, the debate between Rudebusch (1998) and Sims (1998) in the context of the U.S. VAR models. Rudebusch argues that an equation of the funds rate does not correctly model the reaction of the Fed. Sims, however, criticises such critiques as unconstructive quibbles.

[2]Guender (1998) tests the credit view in a closed-economy context for New Zealand using the sample of the data before 1987 when the entry of foreign banks to the domestic banking market was restricted.

[3]The bootstrapping method is originally proposed by Runkle (1987) for the impulse response analysis. See, for instance, Davidson and MacKinnon (1993, pp. 763-768) for the illustration of the procedure. In the GAUSS code for the analysis of this research note, the seed is arbitrarily set as 12345.

Table 1: List of Variables

Variable	Source	Code	Abbreviation
US VARIABLES and COMMODITY PRICE			
Commodity Price (non-fuel)	IMF	00176NFDZF	CP
CPI (All Items)	IMF	11164ZF	P^{US}
Real GDP	IMF	11199BVRZF	Y^{US}
Federal Funds Rate	IMF	11160BZF	R^{US}
AUSTRALIAN VARIABLES			
CPI (All Groups)	IMF	19364ZF	P^{AU}
Real GDP	IMF	19399BVRZF	Y^{AU}
Cash Rate	IMF	19360BZF	R^{AU}
Exchange rate	IMF	193RHZF	XR^{AU}
NEW ZEALAND VARIABLES			
CPI (All Groups)	IMF	19664ZF	P^{NZ}
Real GDP	IMF	19699BRXF	Y^{NZ}
Cash Rate	IMF	19660BZF	R^{NZ}
Exchange Rate	IMF	196RHZF	XR^{NZ}
Domestic Credit Aggregate	RBNZ	DC(R)	LQ^{NZ}
Base Lending Rate	IMF	19660PZF	LR^{NZ}

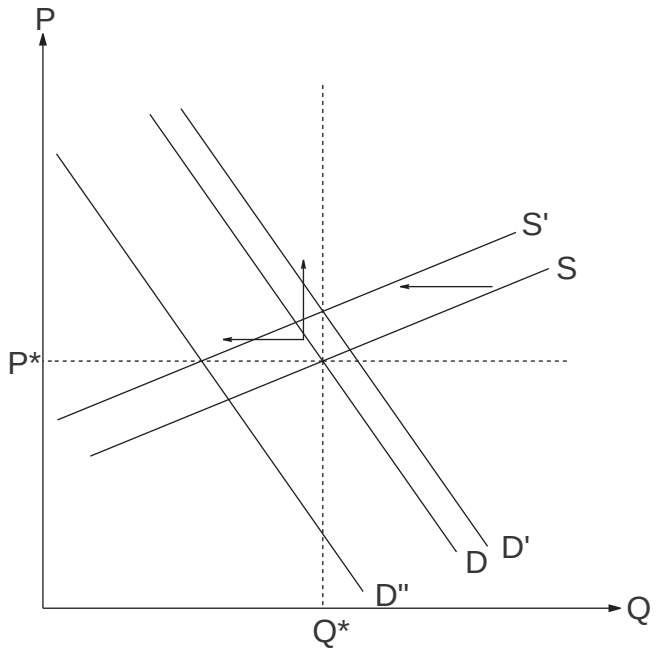

Figure 1: Consequence of a Leftward Shift of the Supply Schedule

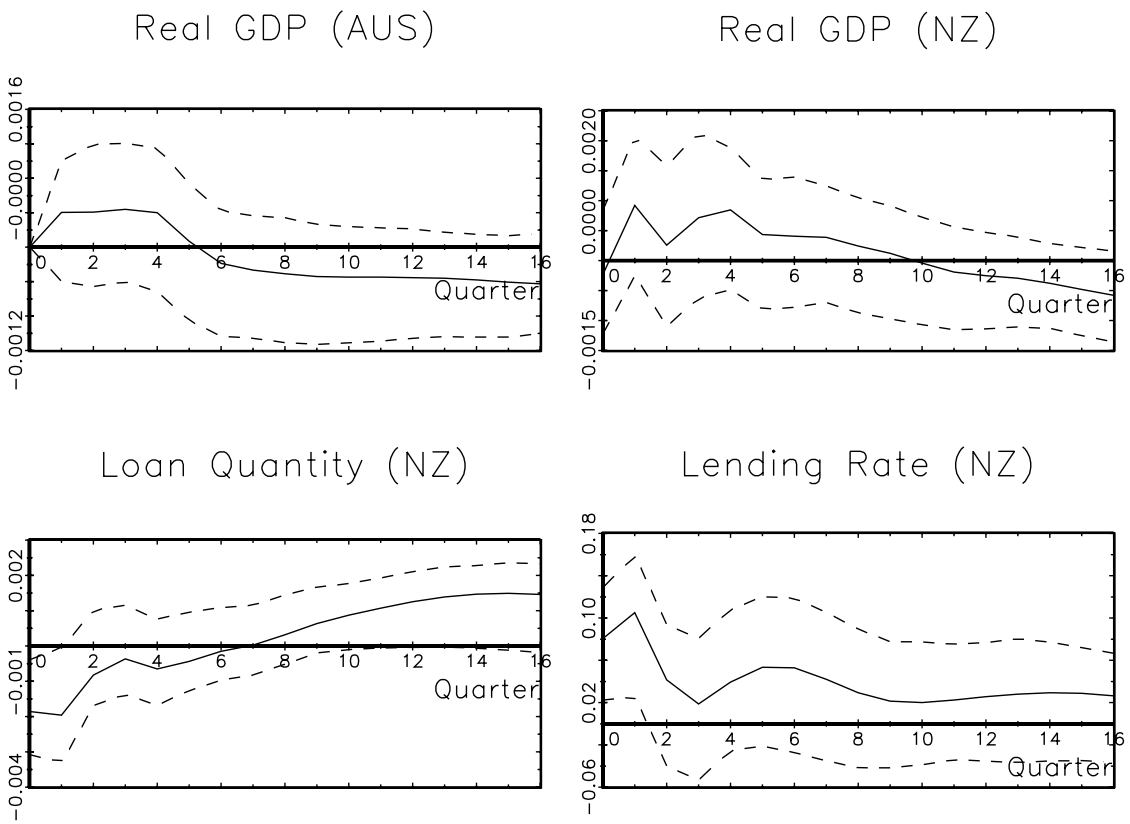

Figure 2: Responses to a Cash-Rate Shock in Australia

Sample: 1988:Q4-2005:Q4 (90% Confidence Intervals)