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Does the interest rate for business loans respond asymmetrically to changes in the cash rate?

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Abstract

This article examines the dynamic relationship between the Reserve Bank of Australia's (RBA's) cash rate and the variable interest rate for lending to small businesses. The relationship is evaluated via an asymmetric GARCH model using monthly data spanning from August 1990 to October 2012. Our results show that a 1 percentage point increase in the cash rate results in an instantaneous 1.086 percentage point rise in the variable rate for small businesses, whereas an equivalent 1 percentage point cut only leads to a 0.862 percentage point fall with a delay of up to 2 months. This outcome has obvious implications for the RBA's monetary policy transmission mechanism and the effectiveness of the expansionary policy versus contractionary policy.

Keywords

changes, asymmetrically, respond, loans, business, does, cash, interest, rate, ERA2015

Disciplines

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This article examines the dynamic relationship between the Reserve Bank of Australia's (RBA) cash rate and the variable interest rate for lending to small businesses. The relationship is evaluated via an asymmetric GARCH model using monthly data spanning from August 1990 to October 2012. Our results show that a 1 percentage point increase in the cash rate results in an instantaneous 1.086 percentage point rise in the variable rate for small businesses, whereas an equivalent 1 percentage point cut only leads to a 0.862 percentage point fall with a delay of up to 2 months. This outcome has obvious implications for the RBA's monetary policy transmission mechanism and the effectiveness of the expansionary versus contractionary policy.

I. Introduction

We examine how dynamic changes in the RBA's cash rate impact on variable lending rates for small business loans. Compared to large corporations, small businesses usually cannot raise funds through the issue of bonds or shares and are thus heavily reliant on lenders for capital formation. Without alternative avenues for raising funds it is of vital interest to small businesses to investigate if interest rates for this important sector of the economy "shoot up like rockets" in response to a rise in banks' funding costs but "float down like feathers" in response to a fall.

In Australia the RBA, which is the country's central bank, conducts monetary policy by setting the desired interest rate on overnight loans in the money market. Through this monetary policy transmission mechanism, changes in the cash rate are ultimately reflected in the rates on all lending instruments. There are a growing number of studies which have found that banks tend to raise interest rates immediately once

costs rise, while hesitating to lower their rates when costs drop (see *inter alia* Payne, 2007; Toolsema and Jacobs, 2007; Payne and Waters, 2008).

Lowe and Rohling (1992) and Lowe (1995) investigated the degree of stickiness in Australia's various deposit and lending rates by comparing them in the pre- (1979-1985) and post- (1986-1991) deregulation periods. Lowe and Rohling (1992) argued that switching and search costs were the most critical reasons behind the stickiness of most lending rates in Australia. However, apart from these two early studies, the issue of the asymmetric behaviour of interest rates for businesses in Australia has not received much attention. This article intends to fill this gap by identifying the full extent of asymmetric rate changes (if any), with the aim of increasing transparency in the commercial lending market for small businesses.

The rest of this article is organised as follows. A discussion of the theoretical framework for capturing lenders' asymmetry pricing behaviour in response to changes in the cash rate is given in Section II. The descriptive statistics and the unit root test results for the monthly data are presented in Section III. Empirical findings are offered in Section IV, followed by concluding remarks in Section V.

II. Theoretical Framework

Equation 1 allows us to examine whether short-run positive and negative changes in the cash rate, with different lags, can exert asymmetric impacts on the small business lending rate. At the same time it also enables us to capture any possible ARCH and GARCH effects due to the use of monthly data:

$$\Delta L_t = \xi_0 + \sum_{j=0}^q \lambda_j^+ \Delta R_{t-j}^+ + \sum_{j=0}^q \lambda_j^- \Delta R_{t-j}^- + \gamma GFC_t + \sum_{j=1}^q \eta_j \Delta L_{t-j} + v_t \quad (1)$$

$$h_t = \sum_{i=1}^p \alpha_i u_{t-i}^2 + \sum_{i=1}^q \beta_i h_{t-i}^2 \quad (2)$$

where:

L_t = the interest rate for small business loans,

ξ_0 = the intercept term in the mean equation,

R_t = the cash rate,

λ_j^+ and λ_j^- = the short-run effects of positive and negative changes in the cash rate on L_t ,

GFC = a binary dummy variable accounting for the GFC and taking the value of unity after September 2008 when the Lehman Brothers collapsed,

γ = the effect of the GFC on borrowing cost,

η_j = the short-run effects of changes in the j^{th} -lagged dependent variable ($j = 1, 2, \dots, 12$),

α_i and β_j = the ARCH and GARCH coefficients in the variance equation.

In Equation 2 the severity of asymmetry depends on the difference between $\sum_{j=0}^q \lambda_j^+$ and

$\sum_{j=0}^q \lambda_j^-$. In other words, the higher the difference, the greater the extent of asymmetry. It

is hypothesised that the RBA's rate rises have immediate effects on the small business interest rate (only λ_0^+ to be statistically significant), whereas in the case of rate cuts the lagged effects are exhausted over a longer period ($\lambda_0^-, \lambda_1^-, \lambda_2^-, \dots$ can be significant).

Hence, the short-run effects of changes in R on the business loan rate can vary both in magnitude and through time. Once Equations 1 and 2 are estimated by a maximum likelihood method, we can then use a Wald test to formally test the possibility of asymmetric effects of changes in the cash rate on L_t .

III. Data

The data utilised in this article was collected directly from the RBA (2012, Tables D2, F1 and F5). It has been established elsewhere that the use of aggregated frequencies (*i.e.*, annual and quarterly) may obscure underlying asymmetries in a series (Brännäs and Ohlsson, 1999). Thus we used monthly observations from August 1990 to October 2012 in order to undertake our econometric analysis.

Figs 1 and 2 show how total credit and loans were distributed for various uses by all bank and non-bank financial institutions from 1990 to 2012. As can be seen from Fig. 1 unlike the other four categories (owner-occupier housing; investor housing; other personal; government), business (small and large combined) loans suffered a noticeable decline over the post 2008 GFC era, only just recovering in the last 12 months. Similarly, Fig. 2 reveals that the percentage share of business loans in total credit (including securitisation) has consistently been on a downward trajectory since 1990. This share declined from 57% in 1990 to 32% in 2012. It is therefore apparent that lenders have changed preference away from credit and loans for businesses and toward owner-occupier housing and investor housing loans.

[FIGS 1 AND 2 ABOUT HERE]

Fig. 3 shows the difference (spread) between the cash rate and five different variable lending rates for small businesses: residential-secured term; residential-secured term overdraft; other term; other overdraft; small overdraft. Monthly data were available for only two spread measures (*i.e.* other overdraft; small overdraft) from August 1990 to October 2012. Thus in this article we chose the variable interest rate on small overdraft (L) as a measure of lending costs for small businesses.

Irrespective of which measure of spread is considered, the gap between all lending rates for small businesses and the cash rate has widened considerably in the post 2008

GFC era, coinciding with a time where the cash rate has fallen dramatically. In comparison, during the period March 2002 to April 2008 when the cash rate rose from 4.3% to 7.2% all our measures of spread remained unchanged (See Fig. 3). One could attribute such a widening gap in recent times to either the rising funding cost or lenders' asymmetric behaviour in response to the RBA's rate cuts.

[FIG. 3 ABOUT HERE]

Table 1 shows the descriptive statistics and the DF unit root test with GLS Detrending (Elliott *et al.*, 1996) for the cash rate and interest rate for small business. During the sample period, the average overdraft rate for small business (as a dependent variable) was 10.2%, ranging from a minimum of 8.3% in January 1999 to a maximum of 17.6% in August 1990. The SD for the dependent variable (1.6%) is slightly less than the cash rate (1.9%). Table 1 also shows that the first differences of both interest rate series are stationary.

[TABLE 1 ABOUT HERE]

IV. Empirical Results

We use monthly data for the period August 1990 to October 2012 to estimate an asymmetric relationship between positive and negative changes in the cash rate (R_t) and the small business loan rate (L_t). Equations 1 and 2 are jointly estimated using the maximum likelihood method and results are presented in Table 2. We have used the lowest value of the Schwarz criterion to determine the optimal lag length and the number of the ARCH and GARCH terms. Table 2 indicates that all the estimated coefficients in the mean and variance equations are statistically significant at the 1% level with the expected theoretical signs. The estimated model also shows no sign of ARCH effects and heteroskedasticity. Table 3 presents the correlograms of the

estimated standardised residuals squared showing that the Q -Stats up to 24 lags are all statistically insignificant. One can thus argue that our GARCH (1, 1) model is adequate in capturing the volatility clustering.

[TABLES 2 AND 3 ABOUT HERE]

Table 2 shows that if the RBA increases the cash rate by 1 percentage point, the business loan rate (proxied by the small business variable overdraft rate) would instantaneously (at time t) increase by 1.086 percentage points with no further subsequent responses over time. However, a 1 percentage point fall in the cash rate would bring about an instantaneous 0.620 percentage point decrease at time t in addition to a subsequent one month lagged effect of 0.242 percentage points, with the total effects at times t and $t-1$ thus being 0.862 ($=0.620+0.242$). Finally, the GFC coefficient $\hat{\gamma} = 0.021$ is also highly significant, confirming that the cost of borrowing for small businesses has risen since 2008.

We have formally tested $H_0 : \lambda_0^+ = \lambda_0^- + \lambda_1^-$ versus $H_1 : \lambda_0^+ > \lambda_0^- + \lambda_1^-$ and present these results at the bottom of Table 2. The null hypothesis is rejected at the 1% level of significance. This means that small business lending rate do indeed respond asymmetrically to positive versus negative changes in the cash rate. Clearly stated, rate cuts are confirmed to be passed onto the customer much slower than rate rises. Since it takes longer for lenders to partially pass the rate cuts to small businesses, one may argue that this can adversely affect the efficacy of the RBA's expansionary monetary policy.

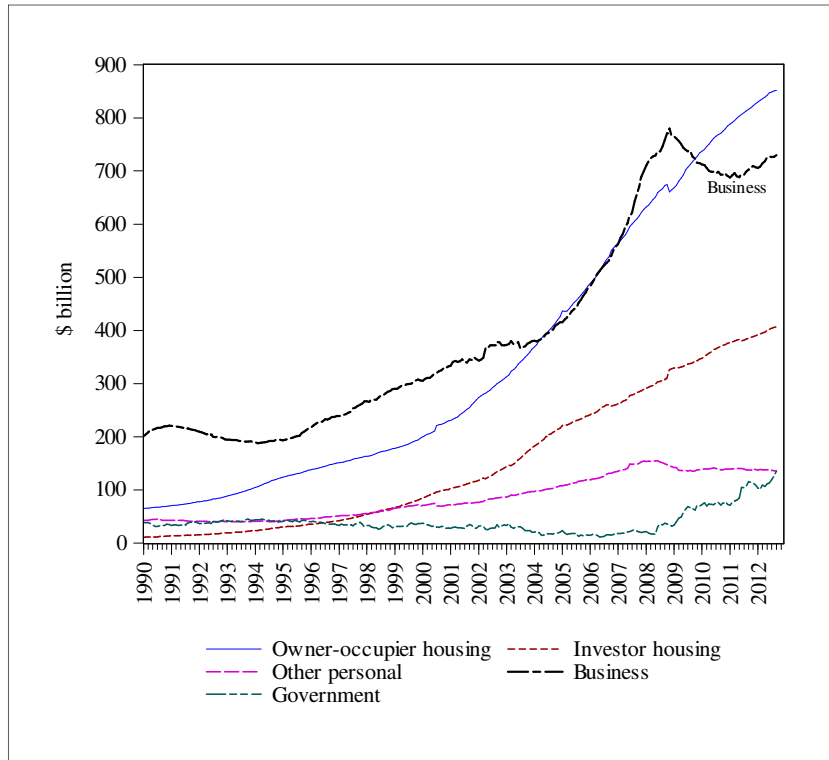
V. Conclusion

This article traces out the lenders' dynamic asymmetric responses to changes in the funding cost over time using monthly data (August 1990-October 2012). We found that the lending rate for small businesses rises more quickly than it falls in response to

changes in the RBA's cash rate. In other words, in contrast to cash rate increases which are passed on immediately and with a premium, when the RBA cuts its cash rate the banks only partially pass on the cut with a month delay. We also found that funding costs for small business have increased significantly since the GFC. These findings have obvious adverse effects for small business capital formation and loan servicing in an important recovery phase of the economy as well as broader implications for the effectiveness of monetary policy transmission in Australia.

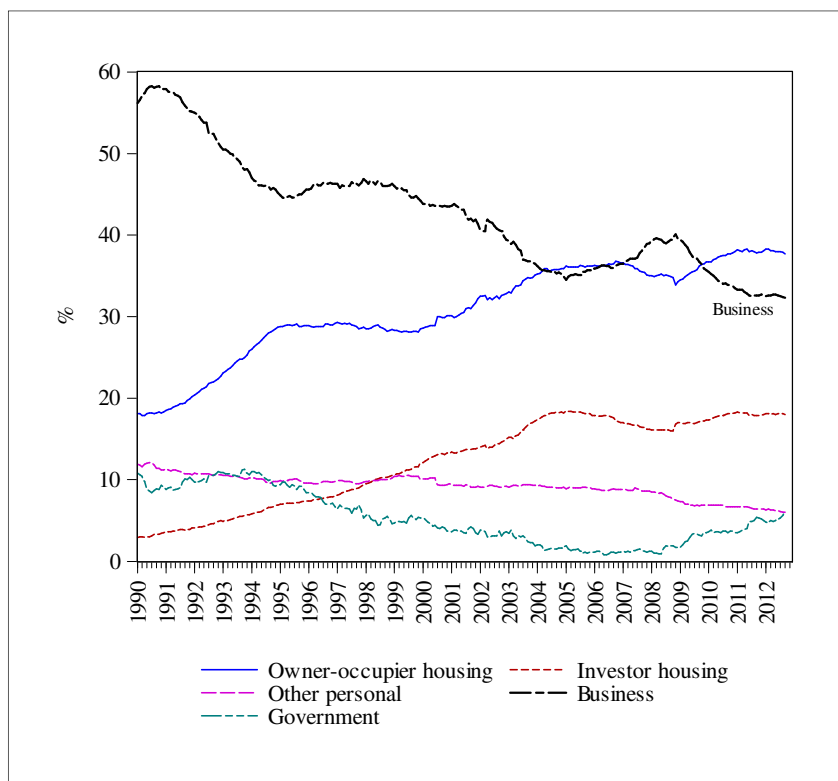
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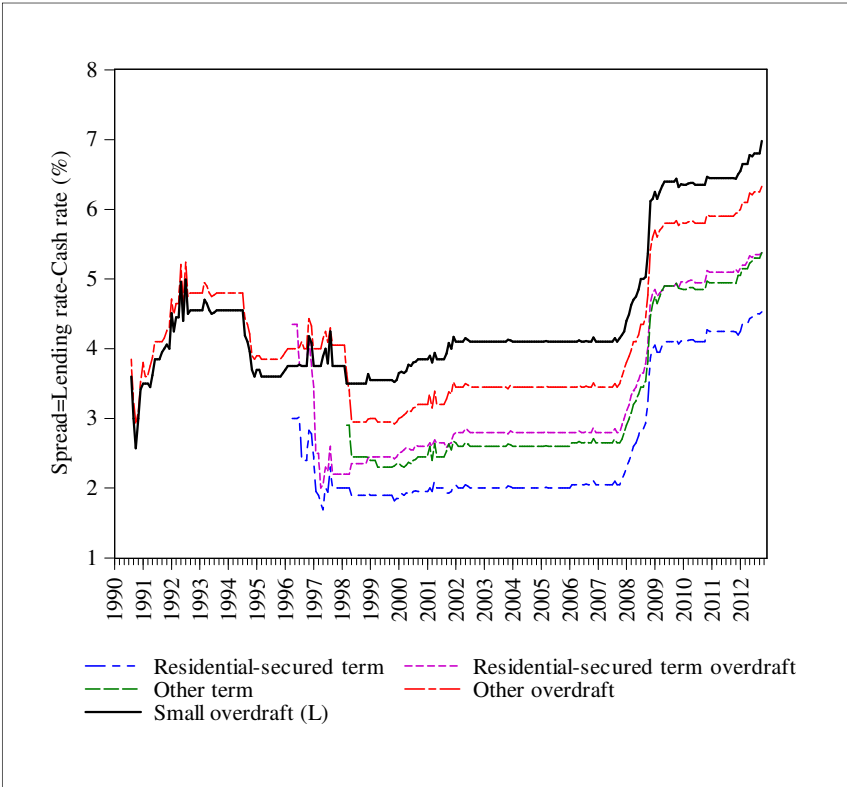
Source: RBA (2012, Table D2).

Fig. 1. Credit and loan distribution (Jan. 1990-Sep.2012)



Source: The authors' computations based on RBA (2012, Table D2).

Fig. 2. Percentage distribution of total credit and loans (Jan. 1990-Sep.2012)



Source: The authors' computations based on RBA (2012, Tables F1 and F5).

Fig. 3. Spread between small business lending rates and the cash rate

Table 1. Descriptive statistics and unit root test results (Aug. 1990-Oct. 2012)

Description	Unit	Mean	Max.	Min.	SD
Small business variable overdraft rate= L_t	%	10.2	17.6	8.3	1.6
RBA's cash rate= R_t	%	5.8	14.0	3.0	1.9
DF GLS test	L_t	ΔL_t	R_t	ΔR_t	
<i>t</i> -stat.	-0.706	-4.251***	-1.296	-6.018***	
Optimal lag	2	1	2	1	

Source: RBA (2012, Tables D2, F1 and F5)

Note: *** indicates that the corresponding null hypothesis is rejected at the 1% level of significance.

Table 2. Estimated short-run dynamic model

$$\Delta \hat{L}_t = \hat{\xi}_0 + \hat{\lambda}_0^+ \Delta R_t^+ + \hat{\lambda}_0^- \Delta R_t^- + \hat{\lambda}_1^- \Delta R_t^- + \gamma GFC_t + \eta_1 \Delta L_{t-1} + \eta_2 \Delta L_{t-2}$$

Variable	Coefficient	z-stat.
<i>Intercept</i>	0.001	0.89
ΔR_t^+	1.086***	165.68
ΔR_t^-	0.620***	44.33
ΔR_{t-1}^-	0.242***	11.31
GFC_t	0.021***	2.70
ΔL_{t-1}	-0.116***	-18.61
ΔL_{t-2}	0.028***	3.10
GARCH (1,1) equation		
ε_{t-1}^2	0.139***	53.74
σ_{t-1}	0.861***	334.04
R^2	0.728	
\bar{R}^2	0.721	
Schwarz criterion	-2.340	
DW	2.30	
Jarque-Bera	$\chi(2) = 758.5$ ***	
ARCH test:		
1 lag	$F(1,261)=0.773$	
2 lags	$F(2,259)=0.587$	
3 lags	$F(3,257)=1.079$	
4 lags	$F(4,255)=0.804$	
5 lags	$F(5,253)=0.639$	
6 lags	$F(6,251)=0.662$	
Testing for the asymmetry effects		
$H_0 : \lambda_0^+ = \lambda_0^- + \lambda_1^-$	$F(1,256)=94.2$ ***	
$H_1 : \lambda_0^+ > \lambda_0^- + \lambda_1^-$		

Note: *** indicates that the corresponding null hypothesis is rejected at 1% level of significance.

Table 3. Correlograms of standardised residuals

Lags	Standardised residuals squared			
	Auto-correlation	Partial Correlation	Q -Stat	p -value
1	0.054	0.054	0.788	0.375
2	0.042	0.039	1.269	0.530
3	0.093	0.089	3.598	0.308
4	0.006	-0.005	3.608	0.462
5	0.002	-0.006	3.609	0.607
6	-0.048	-0.056	4.223	0.647
7	-0.039	-0.035	4.646	0.703
8	-0.016	-0.008	4.716	0.787
9	-0.015	-0.002	4.781	0.853
10	0.101	0.112	7.595	0.668
11	0.028	0.022	7.819	0.729
12	-0.001	-0.012	7.819	0.799
13	0.060	0.035	8.812	0.787
14	0.063	0.051	9.915	0.768
15	0.016	0.006	9.983	0.821
16	0.011	0.007	10.017	0.866
17	-0.018	-0.021	10.110	0.899
18	-0.033	-0.031	10.416	0.917
19	-0.009	0.001	10.437	0.941
20	-0.018	-0.014	10.534	0.957
21	-0.056	-0.048	11.431	0.954
22	-0.066	-0.056	12.685	0.942
23	-0.040	-0.038	13.149	0.949
24	0.271	0.282	34.568	0.075

Note: These results are based on the estimated model presented in Table 2.