

Can capital requirements counteract procyclicality in New Zealand housing lending margins?

Tim Ng
Reserve Bank of New Zealand

Abstract

This paper explores whether a simple capital requirement for lenders would be feasible and effective at counteracting financial procyclicality arising from housing lending behaviour in New Zealand. The capital requirement would vary with an indicator of the cyclical state of the housing finance market and be calibrated to the estimated procyclical component of the housing lending interest rate margin. Simple arithmetic, under restrictive assumptions, using the cost of debt versus equity capital suggests that the anti-procyclicality capital requirement on a housing loan would have to move trough-to-peak by at least three percent of the value of the loan, in order to offset the estimated procyclical component in the housing lending rate margin. I conclude that the requirement is unlikely to be able to offset substantially procyclicality arising from the lending rate margin during cyclical upswings. However, there might be stabilising effects during downswings if capital becomes scarce, since the requirement would lead a capital buffer to build up during the upswing that could subsequently be run down.

Keywords: banking regulation, capital requirements, procyclicality, housing lending

JEL classification: E58, E59

This version: May 2008

The views expressed in this paper are those of the author and do not necessarily represent those of the Reserve Bank of New Zealand.

I am grateful to Bryan Chapple, Andrew Coleman, Aaron Drew, David Hargreaves, Leni Hunter, Michael Reddell and Grant Spencer for helpful comments and suggestions on earlier versions of this paper. All errors and omissions are my own.

A. INTRODUCTION

Economists have long been interested in the interaction between financial intermediaries and the business cycle. Theoretically and empirically, the notion is now uncontroversial that lending activity is ‘procyclical’, in that it tends to propagate and amplify shocks to aggregate output, and is thus an active and destabilising contributor to the business cycle.

The explanations for procyclicality include the following. A ‘financial accelerator’ may operate such that a lender makes credit cheaper relative to a borrower’s internal funding sources (i.e. the external finance premium falls) when the lender observes improvements in the borrower’s financial condition or infers them from improvements in general economic conditions (Bernanke and Gertler, 1989). The value of collateral may move with the cycle, enabling a greater quantity of collateralised borrowing (Kiyotaki and Moore, 1997). Bank managers operating under incentives biased towards short-term performance may exhibit herding behaviour (Rajan, 1994). Lenders may relax credit standards to chase market share when a boom state increases the quantity of new borrowers (Dell’Ariccia and Marquez, 2006). Prudential capital and other regulatory constraints may inadvertently relax during upswings (e.g. Goodhart, 2005b; Gordy and Howells, 2006). And finally, financial distress, or the fear of imminent financial distress, may lead to lending curtailment due to incapacity (e.g. Goodhart, 2005a).

This paper looks at whether, in New Zealand, a simple capital requirement on housing lending (that is, lending secured on residential property) might dampen procyclicality arising from this source, and thus reduce its destabilising influence on the business cycle. If successful, the capital requirement would make monetary policy’s job of cycle stabilisation easier, in that the necessary response of official interest rates to output shocks would be smaller.¹ The focus on housing lending reflects the important role of housing market dynamics in New Zealand’s business cycle, and of housing lending exposures on New Zealand lenders’ balance sheets (see Hodgetts *et al.* (2006) and Reserve Bank of New Zealand (2007a), and references therein).

The rest of the paper proceeds as follows. Section B notes the broad characteristics of housing and housing finance markets and household expenditure in New Zealand. Section C briefly reviews the literature on the idea of regulating lending for cyclical stabilisation purposes. Section D looks at how a simple capital requirement on housing lending could be implemented in an attempt to offset the estimated procyclical component of housing lending margins. Section E discusses how feasible such a requirement might be, and its likely effectiveness in terms of offsetting procyclicality in lending margins. Section F concludes.

B. THE HOUSING MARKET, HOUSING FINANCE AND THE BUSINESS CYCLE IN NEW ZEALAND

Figures 1 and 2 show the strong co-movement of house prices, housing lending and household expenditure in New Zealand². This experience is common to many other

¹ The efficiency costs of financial procyclicality support regulatory measures to correct that procyclicality. Going further, one could contemplate using capital requirements to amplify the impact of official interest rates on lending rates (that is, to more than offset procyclicality and use capital requirements as, in effect, an additional or supplementary monetary policy instrument). This paper does not explore that possibility, as it would introduce complicating considerations of the trade-off of cycle stabilisation against financial sector efficiency.

² calculated as the sum of private consumption and private residential investment

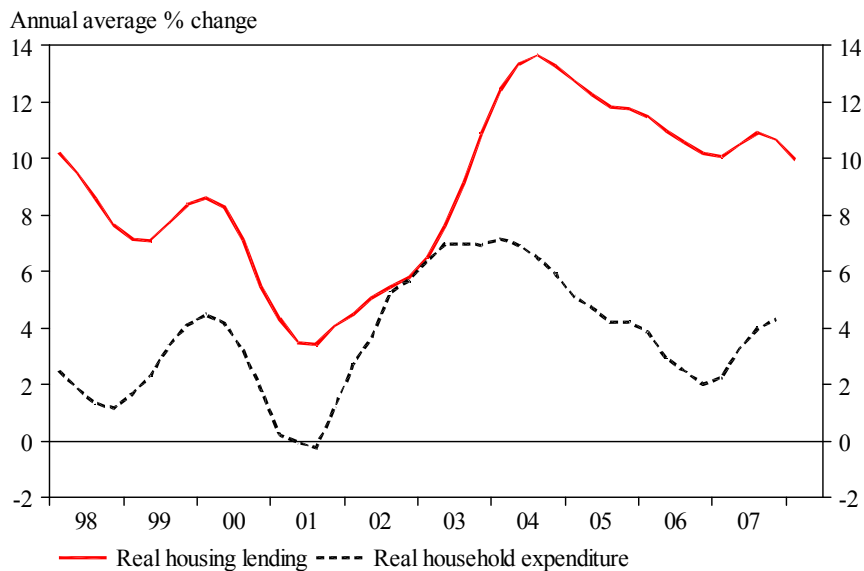
developed economies (IMF, 2008). The most obvious theoretical source of procyclicality suggested by this co-movement is housing assets' role as collateral.

Figure 1
Housing lending growth and house price inflation



Sources: Statistics NZ, RBNZ.

Figure 2
Housing lending and household expenditure growth



Sources: Quotable Value NZ, Statistics NZ.

Over the sample shown, housing lending has tended to lag slightly both house prices and household expenditure. This lag suggests that lending is not usually a source of shocks to output, though it may still have a role in amplifying output shocks from other sources.

A key question here concerns the degree to which lending volume growth is promoted by procyclical lending behaviour, rather than simply reflecting growth in spending, over the cycle. The intent in this paper is to calculate the movement in capital requirement needed to offset estimated procyclicality in lending margins and to assess the likely effectiveness of the

requirement for that purpose. The question I do not address is what difference such an offset would make to the movement of lending over the business cycle, and to the business cycle more generally. This question about the price elasticity of lending is important, but outside the scope of this paper.

C. REGULATING LENDING FOR CYCLE STABILISATION PURPOSES

There is little policy-focused research on the potential for the regulation of lending, or of lenders' balance sheets more generally, to assist in stabilising the cycle.³ The literature is generally at the level of principles. Some potential regulatory approaches aimed at curbing procyclicality in financial activity, aside from capital requirements, include loan-loss provisioning requirements (Jiménez and Saurina, 2005), portfolio composition restrictions (Carmichael and Esho, 2001), constraints on funding behaviour and liquidity management (Grenville, 2006) and caps on high-risk lending (Blackmore *et al.*, 2006, and Reserve Bank of New Zealand, 2007a). Other tools familiar from prudential policy, including moral suasion and disclosure requirements, could also be adapted to take account of cyclical stabilisation objectives.⁴

Requiring lenders to hold capital above minimum levels is, of course, already mainstream practice in prudential policy. Recent papers by Borio and Shim (2007) and Goodhart *et al.* (2004), among others, have argued that the prudential capital-setting process should account more explicitly for the impact of procyclical lending behaviour on institutions' risk profiles and on overall systemic stability. This is a step in a similar direction to that explored in the present paper, but for different purposes. Whereas prudential policy is generally motivated by depositor protection and limiting the probability of failure of individual financial institutions, the motivation in the present paper is to stabilise the business cycle.

Having said that, prudential, financial stability and monetary policy considerations align and overlap to a substantial degree.⁵ Strong economic growth and inflation pressure often coincide with overheated asset markets and rapid credit growth. A sound and efficient financial system makes monetary policy more effective, and macroeconomic stability reduces the stresses to which the financial system might otherwise be exposed.

In practice, therefore, it might not matter that much which reasons – prudential, financial stability, or cycle stabilisation – are invoked to motivate capital requirements intended to mitigate procyclicality. The present paper takes the approach of calibrating a capital requirement to offset fully procyclicality arising from a particular source, so that that source of business cycle fluctuations would be nullified if the approach were successful. I leave the assessment of the impact of the capital requirement on lenders' risk profiles and other financial stability metrics for future research – though it should suffice to say that the impact would be expected to be beneficial against those measures. The capital requirement proposed here would simply add to prudential capital requirements, so that the risk-sensitivity principle in prudential capital setting would be preserved to some degree.⁶

³ See Fisher and Gai (2005) and Borio and Shim (2007) for surveys.

⁴ For example, one could imagine a requirement on lenders to disclose information relevant to the measurement of financial procyclicality, such as summary statistics on loan-to-value ratios.

⁵ For discussions of the implications of blending these policy perspectives together, see Fisher and Gai (2005) and Hunter (2008).

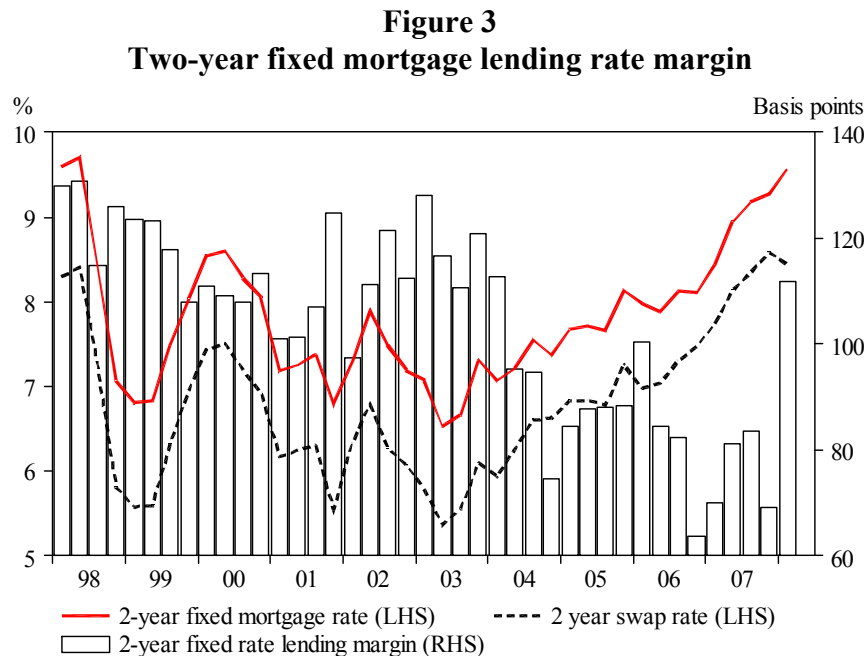
⁶ The requirement could be made more complicated by making it multiply, rather than add to, prudential capital requirements, or otherwise making it sensitive to the risk characteristics of particular loans. This would disturb

D. A SIMPLE ANTI-PROCYCLICALITY CAPITAL REQUIREMENT

This section steps through the two elements needed to construct a capital requirement to counteract procyclicality in housing lending margins. First, I estimate the procyclical component of lending margins using an indicator of overheating in the housing finance market. Then, I calculate the scaling of the cyclical variation in the capital requirement needed to offset the estimated procyclicality.

D.1. Measuring procyclicality in New Zealand housing lending margins

There has been little empirical study of financial procyclicality in New Zealand.⁷ However, behaviour during New Zealand's most recent period of cyclical strength, from roughly 2002 to 2007, is suggestive. Figure 3 shows that during this period, the margin of the two-year fixed-rate mortgage rate over the two-year swap rate (the benchmark rate in New Zealand for two-year bank funding up until the last two or three quarters of the sample⁸) dropped noticeably in 2004-05, by around 20-30 basis points. This was at a time when the economy and housing market had reached substantial levels of stretch, and reports of a "mortgage war" were widespread (e.g. Bennett, 2006) – conditions suggestive of lending procyclicality in full swing.



The highly competitive atmosphere of this period most likely reflected the high levels of activity in the New Zealand housing market, and more generalised business cycle strength, at that time. The number of house sales in New Zealand has for many years strongly followed the business cycle up and down. Figure 4 shows a scatter plot of the lending margin shown in Figure 3 against the number of house sales lagged by one year (the lag that fit best, and which

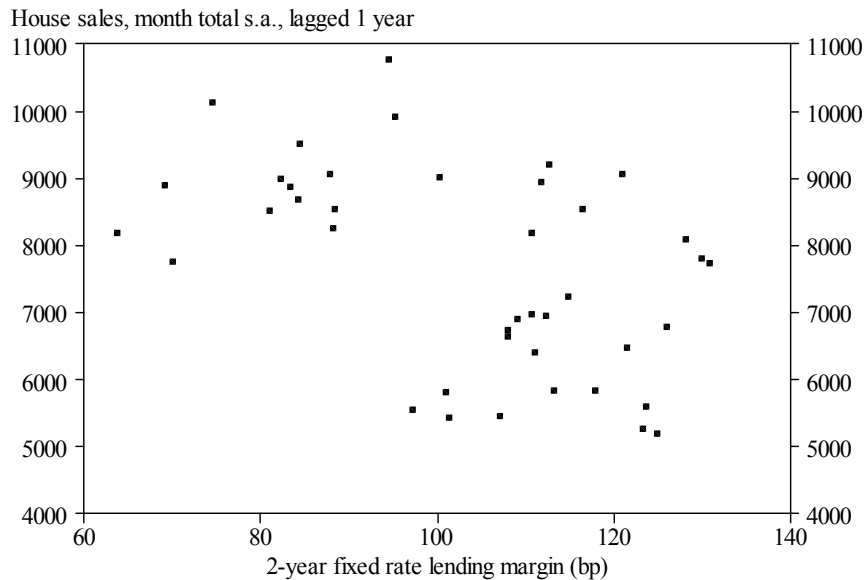
less risk-sensitivities of capital requirements on subclasses of housing loans. Such complications are not necessary for the demonstration of the basic logic of this paper.

⁷ Craig *et al.*'s (2006) study includes New Zealand in a sample of eleven countries.

⁸ Since the global credit market disruption began in the second half of 2007, the swap rate has been a less satisfactory measure of the typical marginal rate paid by banks for term funding. Prior to the disruption, swap rates would typically track below funding rates for the same term by less than 10 basis points; since the disruption, that margin has varied between 20 and 150 basis points as term funding and other major credit markets (such as commercial paper) have become markedly tighter.

probably reflects that bank lending managers take a while to respond to evidence on the state of the housing market). A downward sloping relationship is evident over the sample period shown, suggesting prima facie that there is a procyclical relationship between lending margins and conditions in the housing market.⁹

Figure 4
House sales and lending margin



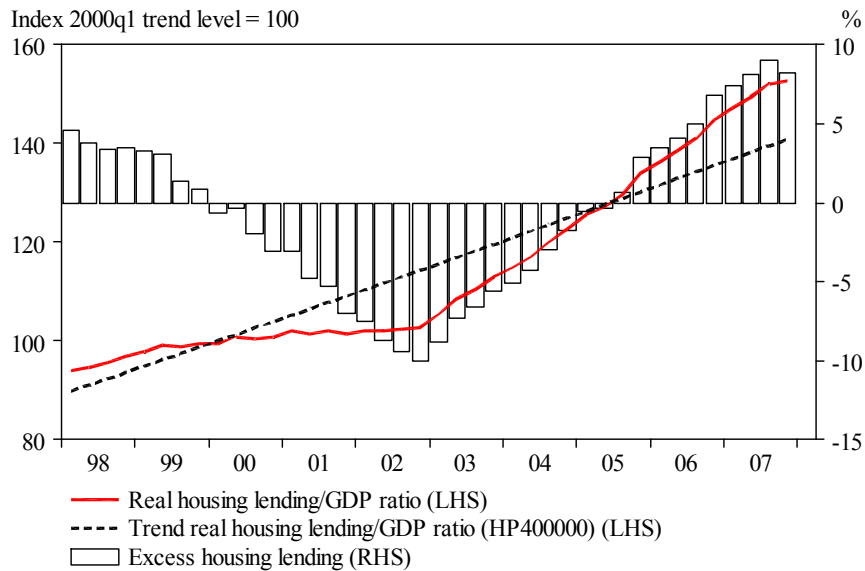
Sources: Real Estate Institute of New Zealand, RBNZ.

In order to operationalise an anti-procyclical capital requirement, one would need a better-founded and more defensible indicator than house sales of the state of the housing finance market. Here, I take the approach of Borio and Lowe (2004) who estimate ‘overheating’ indicators based on the predictive content for banking crises of credit growth and asset price inflation. I adapt this idea on the assumption that these overheating conditions are also likely to exist if financial procyclicalities are making a large contribution to a cyclical upswing.

Borio and Lowe construct measures of excess credit growth and excess departures of asset prices from equilibrium by de-trending with the Hodrick-Prescott filter and a smoothing parameter of 400000. Figures 5 and 6 show these measures of excess in the ratio of real housing lending to real GDP, and in real house prices.

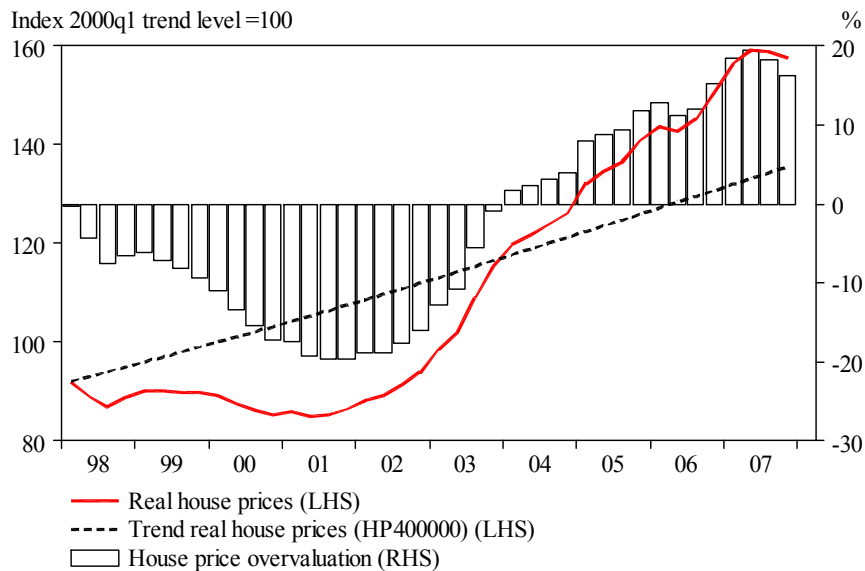
⁹ The correlation between the two series over the sample period is -0.5.

Figure 5
Excess housing lending



Sources: Statistics New Zealand, RBNZ.

Figure 6
House price overvaluation

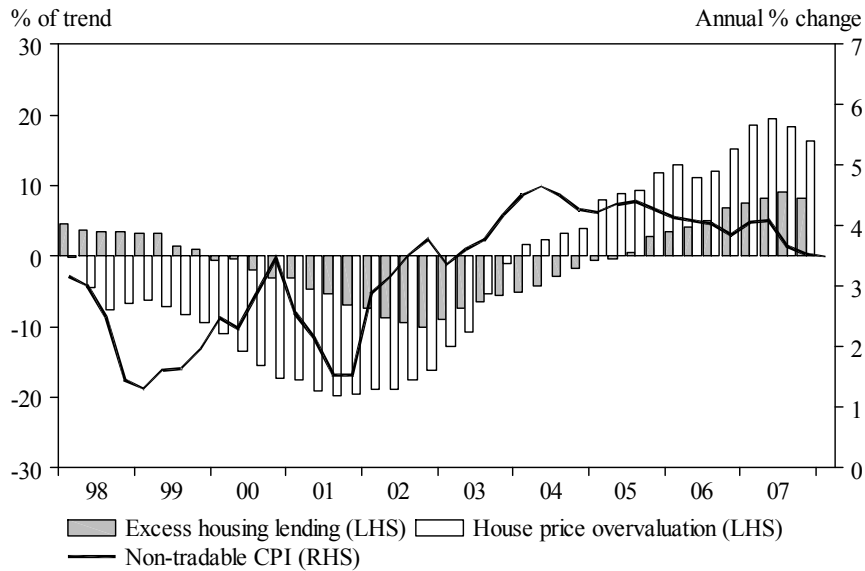


Sources: Quotable Value New Zealand, Statistics New Zealand, author's calculations.

As noted above, Borio and Lowe's indicators are intended to maximise predictive ability for banking crises, rather than for output and inflation, which are more directly relevant for cycle stabilisation purposes. Though Figures 7 and 8 suggest that there is some co-movement between the indicators of excess and inflation and excess household expenditure, different approaches to de-trending might well improve the match. In particular, Borio and Lowe's choice of smoothing parameter (400,000) is very large compared to the 1600 typically used for business cycle analysis on quarterly data, reflecting that banking crises are less frequent events than cyclical fluctuations. Also, an obvious item of further work on the practicability of this kind of indicator would be to test the sensitivity of endpoint estimates to additions of

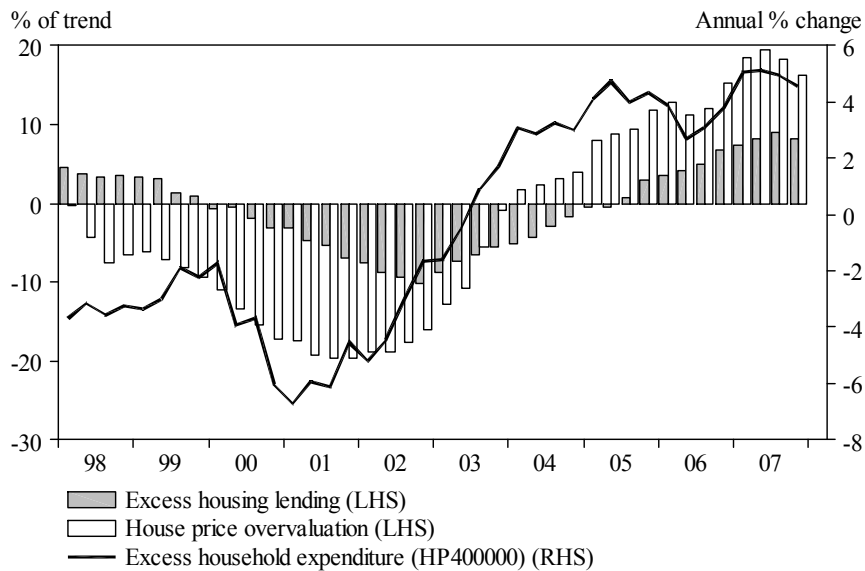
data to the end of the sample, and whether the resulting revisions to estimates would matter in practice.

Figure 7
Housing finance market overheating indicators and non-tradable CPI inflation



Sources: Quotable Value New Zealand, Statistics New Zealand, RBNZ.

Figure 8
Excess housing lending and excess household expenditure



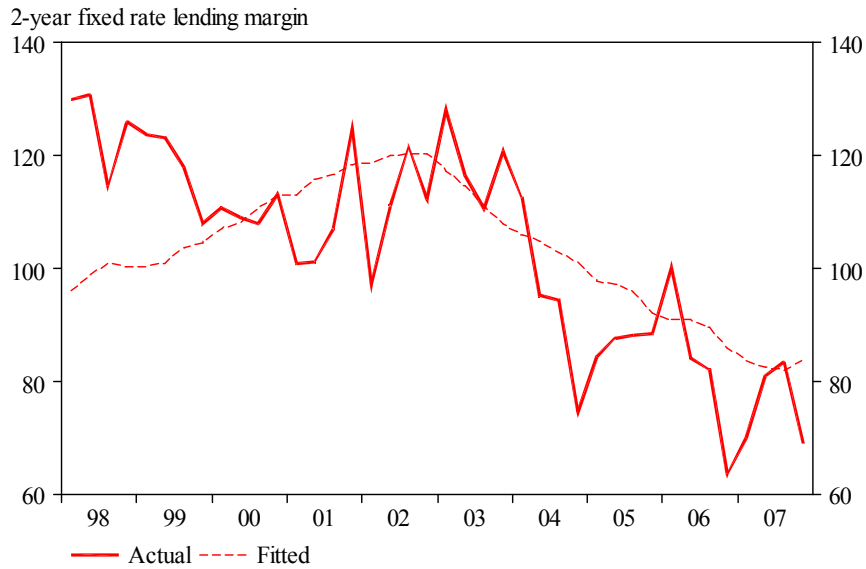
Sources: Quotable Value New Zealand, Statistics New Zealand, RBNZ, author's calculations.

D.2. Estimating the procyclical component of lending margins, and calibrating the anti-procyclicality capital requirement to it

The overheating indicators allow us to estimate (by construction) the procyclical component of the movement in lending margins. Figures 9 and 10 show that a 50:50 weighted index of the two excess indicators shown in Figures 7 and 8 explains a fair proportion of the variance

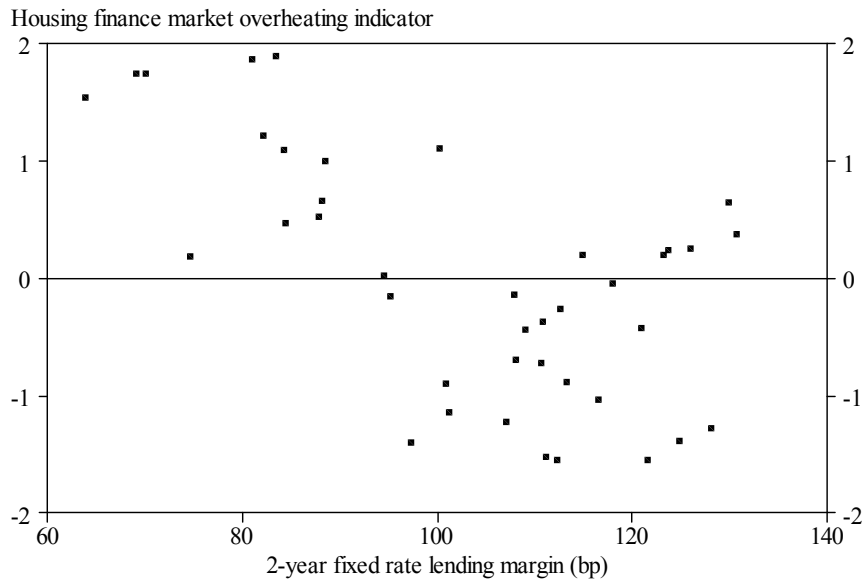
in the lending margin and that the relationship is negative¹⁰, confirming the idea suggested by the house sales co-movement with the lending margin that procyclicality is material. These figures also show that the estimated procyclical component of lending margins moved by around 40 basis points peak-to-trough over the sample period, so the movement in the anti-procyclical capital requirement would have to have an offsetting impact on lending rates of this magnitude.

Figure 9
Estimated procyclical component of lending margin



Source: RBNZ.

Figure 10
Housing finance market overheating indicator and lending margin



Sources: Quotable Value New Zealand, Statistics New Zealand, RBNZ, author's calculations.

¹⁰ estimated by OLS where the lending margin is regressed on the 50:50 weighted index and a constant; $R^2 = 0.39$. The correlation is -0.63 , slightly stronger than that between the lending margin and house sales shown earlier.

The most obvious approach to generating this offset is to use the capital requirement to modify the lender's cost of funding housing loans, by changing the proportion of equity (versus debt) funding. If (1) the lender prices as a markup over the cost of funds, (2) the cost of funds is the weighted average of the cost of debt and the cost of equity capital, and (3) a movement in the regulatory minimum capital requirement for a loan translates dollar-for-dollar into a movement in the actual equity capital charge against the loan, then a cycle in the proportion of equity to debt funding amounting to just over 3% of each housing loan in amplitude would be needed to generate 40 basis points of offset, assuming that debt costs (say) 8% p.a. and equity 20% p.a. (3% times (20% minus 8%) = 36 basis points). Basel I prudential capital adequacy rules already require banks to hold 2% of a normal housing loan as equity capital, so the anti-procyclicality capital requirement would be moving through a cycle by an amount considerably greater than the prudential capital requirement. To put it another way, if the anti-procyclicality capital requirement had been added to standard prudential capital requirements over the sample period, total regulatory capital on housing loans would have increased two and a half times from cyclical trough to peak.¹¹

E. THE FEASIBILITY AND LIKELY EFFECTIVENESS OF THE ANTI-PROCYCLICALITY CAPITAL REQUIREMENT

How easy administratively would it be to impose the anti-procyclicality capital requirement, and would the requirement work as intended?

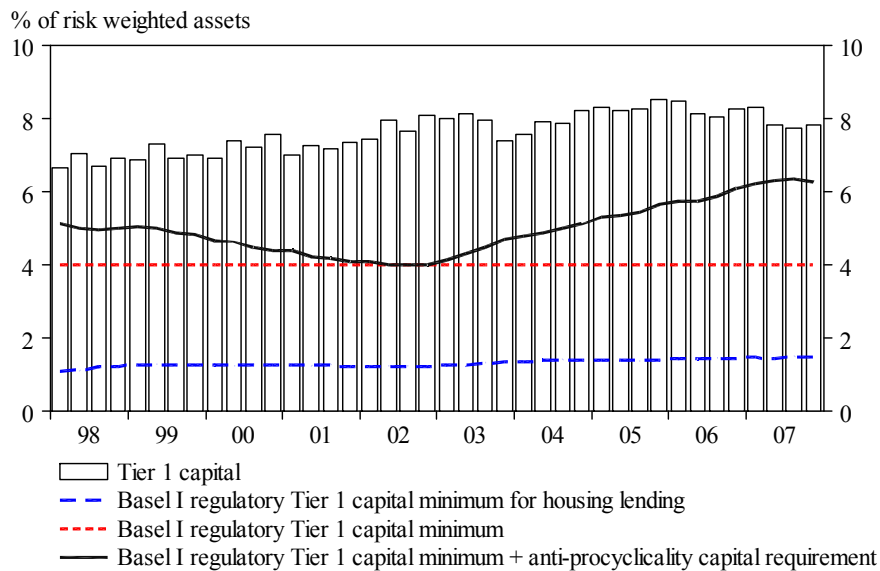
Implementation of the requirement would be fairly easy, because most major lenders already have to report housing loans for prudential capital adequacy purposes. Compliance cost and practicability considerations would therefore be very minor. Much more material concerns are the actual impact the anti-procyclicality requirement would have on lending rates in practice, and whether the impact would stick over time.

On the former concern, the conditions set out in the calibration calculation set out in the previous section are rather strict. The third condition, that a movement in regulatory capital moves the lender's internal capital charge on loans one-for-one, is probably most questionable. The major lenders in New Zealand (like those elsewhere) routinely target capital holdings well in excess of regulatory minima, typically to attain a desired credit rating for the purposes of marketing and more favourable access to deep wholesale funding markets. For example, over the sample period used here, the large retail banks in New Zealand held Tier 1 capital between 7 and 8 per cent of (Basel I) total risk-weighted assets, against the regulatory requirement over the period of 4 per cent. This difference would have been more than enough to absorb even a tripling of the regulatory capital charge on housing lending (which accounts for about a third of regulatory capital). Figure 11 shows the impact of the anti-procyclicality capital requirement on three of the four major housing lenders had the requirement been imposed¹², and that the additional capital requirement would have been well within the capital buffer these lenders held above regulatory minima.

¹¹ The percentage movement in the total regulatory capital requirement through the cycle would have been even larger under Basel II's 35% risk weight for normal housing loans under the Standardised credit risk approach, and the even smaller capital charge for housing loans under the IRB approaches.

¹² The three lenders chosen account for about two thirds of total housing lending in New Zealand. There is a fourth major lender, but for most of the sample period this lender was not incorporated in New Zealand.

Figure 11
Components of capital for three large New Zealand housing lenders



Source: RBNZ.

More optimistically, it is possible that banks might have adjusted their target capital levels in response to movement in the regulatory capital charge (for example, if rating agencies are influenced by the buffer of capital over regulatory minima), but the impact through this kind of channel would most likely be well short of one-for-one. It is also possible that an impact on lending rates might arise if announced changes in capital requirements are used by lenders as a coordinating device for concerted movement in lending rates – but any such impact would probably be short-lived in a competitive market with strong incentives to defect from the arrangement.

Whether or not regulatory capital minima are tightly binding constraints on lenders' capital structures, the first condition, that loans are priced as a simple markup over the cost of funds, is also highly questionable. A lender's loan pricing will in general be jointly determined with other choice variables relating to asset quantities and portfolio composition, and depend on such things as market structure, regulatory constraints, credit risk and risk appetite (Santomero, 1984).

Overall, the large margin of capital typically held above regulatory minima suggests that even fairly substantial changes to those minima, including those of the magnitude contemplated with the anti-procyclicality capital requirement, are unlikely to have more than an indirect and diffuse effect on pricing at the individual loan level. This will be particularly the case in the upswing, when capital is relatively cheap and plentiful (shrinking the gap between the cost of debt and the cost of equity capital, on which the effectiveness of changing the proportion of equity capital funding depends). The trough-to-peak movement in the anti-procyclicality capital requirement of roughly 3% of the value of housing loans, as calculated here, should therefore be interpreted as a lower bound on what might be needed in practice fully to offset the estimated procyclical component of lending margins.

If the calibration of the anti-procyclicality requirement was such that it did in fact bite on lending rates through constraining lenders' capital structures, then concerns about avoidance and disintermediation would certainly be raised. Even the magnitudes of movement in regulatory capital requirements contemplated here are probably of the order that most banks

in mature lending markets would see as onerous. (This concern about avoidance, of course, afflicts any regulation that seeks to constrain the ability to transact.)

The scope for loan pricing to be moved forcibly by a capital requirement will in general be limited by the difference between the external finance premium charged by the lender subject to the requirement and the next smallest premium available from a lender that is not subject to the requirement. This difference is likely to be quite small in the New Zealand market, which is highly developed and open, and already features an array of close substitutes for loans provided by lenders that are or could be subject to capital requirements. The 40 basis points of offset needed from the capital requirement is sizeable compared to the typical spread of mortgage rates available in the market. And, the possibility of housing loans escaping the intermediated credit sector altogether through securitisation places an ultimate limit on how onerous regulation of lenders can be.

Probably the first leakage of loans from lenders subject to a capital requirement viewed as onerous would be to the balance sheets of offshore parent banks (whose subsidiaries account for the vast majority of housing lending in New Zealand), which are subject, in general, to lower (i.e. standard prudential) capital requirements. Local branches of these parent banks could quite easily take over the New Zealand lending business while offering a more or less identical customer experience, but escaping local capital requirements altogether – a development that would be a shot in the foot for local capital regulation generally.

F. CONCLUSIONS

The overall conclusion of this paper is that capital requirements, at least in the very simple form sketched here, should not be relied upon for a substantial dampening of procyclicality in housing lending margins. This is particularly the case in business cycle upswings, when capital is relatively cheap and plentiful. My calculations suggest that rather large regulatory capital movements would have been needed to offset the 20 basis point lending margin compression apparently due to procyclicality in the upswing of the sample period – regulatory capital movements of a magnitude such that avoidance and disintermediation would probably have been a serious risk.

The impact of the requirement in a downswing might be a different story. The flipside of margin compression in upswings is margin expansion and curtailment of lending in downswings, which are potentially more deleterious to economic performance because of the added risk of financial instability in a downswing. The material relaxation of the anti-procyclicality capital requirement going into a downswing might at the margin be successful in preventing financial distress, or the fear of impending financial distress, from generating a credit crunch that would exacerbate the downswing. In effect, the required build-up of a large minimum capital buffer through the upswing would ensure that the lender was protected to some degree from any sharp rise in the cost and availability of capital in the downswing. In this sense, the anti-procyclicality capital requirement might be better as an airbag than as a brake.

This paper has deliberately taken a simple and cursory approach to the assembly of the elements making up the anti-procyclicality capital requirement. The purpose of the paper is to explore whether there is any practical merit in the idea at all. The conclusion is probably yes, under certain circumstances, but not a great deal should be expected. Rough magnitudes suggest disintermediation would be a real risk if the requirement were too ambitious.

Further empirical work that would be needed to establish workability and a favourable cost/benefit ratio has been noted through this paper in various places. To summarise, the further work includes:

- better understanding the housing loan demand curve, the elasticity of housing loan demand to the interest rate, and their behaviour over the cycle – which would illuminate the potential benefits of curbing procyclicality in terms of the ultimate objective of dampening the business cycle;
- estimating the level of intervention on lenders' capital structures that is likely to be tolerated before avoidance and disintermediation become a material concern; and
- development and analysis of better indicators of the cyclical state of the housing finance market, which would be needed to establish the credibility of the indicators before they are used in rule making.

G. REFERENCES

- Bennett, A (2006) "Lending war worry for Bollard", *New Zealand Herald*, October 9
- Bernanke, B and M Gertler (1989) "Agency costs, net worth, and business fluctuations", *American Economic Review* 79(1), 14-31
- Blackmore, M, P Bushnell, T Ng, A Orr, M Reddell, and G Spencer (2006) *Supplementary Stabilisation Instruments: Initial Report to Governor, Reserve Bank of New Zealand and Secretary to the Treasury*, accessed at www.rbnz.govt.nz
- Borio, C and P Lowe (2004) "Securing sustainable price stability: should credit come back from the wilderness?" *BIS Working Paper No. 157*, accessed at www.bis.org
- Borio, C and I Shim (2007) "What can (macro-)prudential policy do to support monetary policy?", *BIS Working Paper No. 242*, accessed at www.bis.org
- Carmichael, J and N Esho (2001) "Asset price bubbles and prudential regulation", *Australian Prudential Regulation Authority Working Paper 2001 – 03*, accessed at www.apra.gov.au
- Craig, R, E Davis and A Pascual (2006) "Sources of procyclicality in East Asian financial systems", in S Gerlach and P Gruenwald (eds.), *Procyclicality of financial systems in Asia*, New York: Palgrave MacMillan
- Dell'Ariccia, G and R Marquez (2006) "Lending booms and lending standards", *Journal of Finance* 61(5), 2511-2546.
- Fisher, C and P Gai (2005) "Financial stability, monetary stability and public policy", *Bank of England Quarterly Bulletin*, Winter, 440-451.
- Goodhart, C (2005a) "Beyond current policy frameworks", *BIS Working Paper No. 189*, accessed at www.bis.org

- Goodhart, C (2005b) “Financial regulation, credit risk and financial stability”, *National Institute Economic Review* 192, 118-127
- Goodhart, C, B Hofmann and M Segoviano (2004) “Bank regulation and macroeconomic fluctuations”, *Oxford Review of Economic Policy* 20(4), 591-615
- Gordy, M and B Howells (2006) “Procyclicality in Basel II: Can we treat the disease without killing the patient?”, *Journal of Financial Intermediation* 15(3), 395-417
- Grenville, S (2006) “Macroeconomic policy challenges: monetary policy”, paper prepared for the Reserve Bank of New Zealand and The Treasury *Macroeconomic policy forum: Testing stabilisation policy limits in a small open economy*, held in Wellington on 12 June 2006, accessed at www.rbnz.govt.nz
- Hodgetts, B, P Briggs and M Smith (2006) “A summary note on the workshop on ‘Housing, saving, and the household balance sheet’, workshop held at the Reserve Bank of New Zealand, Wellington, on 14 November 2006, accessed at www.rbnz.govt.nz
- Hunter, L (2008) “The relationship between monetary and financial stability”, *Reserve Bank of New Zealand Bulletin* 71(2), forthcoming.
- IMF (2008) *World economic outlook: Housing and the business cycle*, accessed at www.imf.org
- Jiménez, G and J Saurina (2005) “Credit cycles, credit risk and prudential regulation”, *Banco de España Working Paper No. 531*, accessed at www.bde.es
- Kiyotaki, N and J Moore (1997) “Credit cycles”, *Journal of Political Economy* 105(2), 211-248
- Rajan, R (1994) “Why bank credit policies fluctuate: a theory and some evidence”, *Quarterly Journal of Economics* 109(2), 399-441
- Reserve Bank of New Zealand (2007a) “A review of economic developments and monetary policy since 2000”, Supporting Paper A2 in *Reserve Bank of New Zealand submission to the Finance and Expenditure Committee’s inquiry into the future monetary policy framework*, accessed at www.rbnz.govt.nz
- Reserve Bank of New Zealand (2007b) “Supplementary Stabilisation Instruments Project and the Macroeconomic Policy Forum”, Supporting Paper A6 in *Reserve Bank of New Zealand submission to the Finance and Expenditure Committee’s inquiry into the future monetary policy framework*, accessed at www.rbnz.govt.nz
- Santomero, A (1984) “Modeling the banking firm: a survey”, *Journal of Money, Credit and Banking* 16(4) Part 2, 576-602.