
ARTICLES

Bank farm capital: does it cost the earth?

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Loans to the rural sector represent a significant exposure for banks in New Zealand. In 2008, under the Basel II capital framework, the Reserve Bank accredited the four major banks in New Zealand to use their own models of relative riskiness in calculating capital requirements for different types of lending. A condition of accreditation was that banks addressed, to the Reserve Bank's satisfaction, weaknesses in their modelling of rural capital exposures and potential losses.

In this article, we explore the work that has been undertaken since accreditation to seek to strengthen the modelling of risk on bank loans to the rural sector. The primary objective of this work was to ensure that the risk weights used in determining regulatory capital requirements are aligned with the underlying relative risk of the exposures. The finalised risk weights for rural lending will be lower than those used under the previous Basle I regime. We also discuss the impact of recent developments in the sector on bank behaviour, and consider the potential impact of the Reserve Bank's new requirements, concluding that any impact should be relatively small.

1 Introduction

Minimum capital requirements are an important element of the Reserve Bank's supervisory framework for registered banks. Banks are required to hold capital against each category of exposure according to the relative riskiness of that type of exposure.

Broadly speaking, this is done by applying different 'risk weights' to different categories of loan. The minimum capital ratio is fixed at 8 percent of risk-weighted assets; so the amount of capital required to be held against each loan is determined by the risk weighting for that type of loan. For every additional dollar lent on an exposure with a 100 percent risk weighting, a bank will be required to hold an additional 8 cents of capital, whereas for a less risky loan with a risk weighting of 50 percent, only 4 cents of additional capital will be required.

In New Zealand, banks' largest exposures are in the housing, business and rural sectors. Whilst the rural sector only accounts for around 15 percent of total exposures, such lending is typically more risky than housing exposures, and thus would generally be expected to carry a higher risk weighting for any given degree of leverage. This is primarily due to the exposure of rural lending to international commodity prices, which are significantly more volatile than

the economy as a whole. It is relatively more important in New Zealand to ensure that farm lending carries the appropriate level of capital, compared to other countries where banks generally have, proportionally, a much lower exposure to the rural sector.

This article provides an outline of the treatment of farm lending within the Reserve Bank's capital framework for registered banks, and discusses possible linkages between prudential capital requirements and bank lending margins. The article proceeds as follows. Section 2 provides a brief description of how farm lending fits into the wider capital frameworks. Section 3 outlines the Reserve Bank's initial proposals for revised farm capital requirements. Section 4 provides a discussion of the development of the new requirements in light of emerging evidence from the sector. Section 5 provides a brief discussion of how regulatory capital requirements interact with banks' pricing decisions, and section 6 provides a brief conclusion.

2 Capital frameworks and the treatment of farm lending

Capital adequacy frameworks developed by the Basel Committee on Banking Supervision (the Basel Committee) have been adopted by virtually all countries with developed banking systems. The original Basel Capital Accord (Basel I) was developed in 1988, and was intended to align

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international capital adequacy requirements. One of the objectives of Basel I was to provide a better link between capital requirements and the credit risks associated with the assets held on banks' balance sheets, although the risk measurement model was rather crude. For example, differential risk weights were adopted for secured housing lending and lending to sovereigns, while all commercial loan exposures – including farm lending – were assigned a common risk weight of 100 percent.

In 2004, the Basel Committee released details of a new framework known as Basel II. This built on the original accord by extending the capital requirements to cover operational risk and market risk. The other major development in Basel II was to increase risk sensitivity of the credit risk capital requirements. Under the simplest option, the risk-weighted assets are calculated according to a set list of types of loans and risk weightings that are applied mechanically. This is known as the standardised approach, and is quite similar to Basel I in terms of calculating capital for credit risks such as farm loans.

Under Basel II, another option is to adopt the more complex internal ratings-based (IRB) approach, which allows banks individually to align their regulatory capital requirement more closely with their respective risk profiles. Banks must hold capital at least equal to 8 percent of risk-weighted assets; the role of modelling is in determining the risk weights for each type of exposure. In New Zealand, banks that wish to adopt this approach must be accredited to do so by the Reserve Bank. If a bank is accredited under this approach, credit risk capital requirements are calculated with reference to the bank's own internal modelling of factors that drive the risk profile of that asset, subject to any minimum requirements that might be specified by the Reserve Bank. These factors include the exposure at default (EAD), the long-run average probability of default (PD), and the loss given default (LGD). Box 1 provides a more detailed explanation of the Basel II credit risk formulas.

The Reserve Bank implemented the Basel II framework in New Zealand in the first quarter of 2008. For the banks using the standardised approach, this did not have any direct implications for the level of capital held against farm lending, as farm loans were assigned a 100 percent risk

weighting under both the Basel I framework and the Basel II standardised approach.²

However, the four largest banks in New Zealand were accredited by the Reserve Bank to use the IRB approach. The accreditation was done on the basis that some areas of modelling – including farm-lending risk – would need to improve. The Reserve Bank was particularly concerned that the banks were not directly modelling key elements of risk. For example, estimates of the key downturn LGD inputs were typically based on the banks' Australian corporate LGDs, which were unlikely to accurately reflect the risks associated with New Zealand farm exposures.

As an interim step, the Reserve Bank required two of the banks with large farm-lending portfolios to increase their LGD assumptions when they switched to the Basel II advanced model. Looking towards a longer term solution, the Reserve Bank also determined that as there was a high degree of commonality of risk drivers across the sector, it would make sense to impose certain industry-wide minimum requirements on IRB bank rural models, and the Reserve Bank undertook to lead modelling work in this area.

Setting appropriate risk weights is not about determining what sort of lending banks should and should not prioritise, but is simply about getting the relative riskiness of different types of lending roughly right, to ensure that each bank holds an appropriate level of capital in aggregate. Where differences in risk weights reflect differences in economic risk, regulatory capital requirements should have no impact on the allocation of credit across sectors.

² **In the capital framework for non-bank deposit takers farm loans may fall under a number of categories, with risk weights ranging from 100 percent to 200 percent depending on the nature of the loan, and any associated security. Full details are available at <http://www.rbnz.govt.nz/finstab/nbd/requirements/3857852.html>**

Box 1

Basel II capital requirements

Under the Basel II model, different asset classes use different equations to calculate the appropriate level of capital. For farm loans, the formula for assessing non-defaulted corporate, sovereign and bank exposures is used. The main inputs into the capital equation are as follows:

- Probability of default (**PD**): the likelihood of a borrower defaulting on a contractual loan. IRB banks determine the long-run average PD. All other things being equal, a higher PD would result in a higher capital requirement.
- Loss given default (**LGD**): the proportion of the loan that the bank expects to lose in the event of a default. IRB banks are expected to determine LGD in an acute downturn. A higher LGD would result in a higher capital requirement.
- Maturity (**M**): the remaining contractual term of the loan. The longer the remaining term of the loan, the more scope for loss, and hence the higher the regulatory capital requirement.
- Correlation (**R**): a measure of how the individual exposures in a portfolio are correlated with other exposures in the portfolio. This provides a measure of how well risk is diversified. The higher this coefficient the more likely it is that there will be larger overall loss when the portfolio is hit with a systematic shock. Each asset class has a set correlation assumption in the Basel model. The higher the degree of correlation assumed, the higher the regulatory capital requirement.
- Firm size adjustment (**S**) (based on turnover, up to \$50m): this adjustment, within the correlation formula, rests on the assumption that smaller firms exhibit lower levels of correlation, and hence a larger proportion of loans to smaller firms reduces, all else equal, the regulatory capital requirement.

These inputs feed into the calculation of the capital requirement (**K**) per dollar of exposure. The full equation, and definitions of the remaining terms, is set out from section 4.134 of the Reserve Bank's banking supervision handbook document BS2B, which can be accessed at: <http://www.rbnz.govt.nz/finstab/banking/regulation/3272068.pdf>

A detailed description of the Basel model specification was published by the Basel Committee in July 2005, and its application to advanced banks in New Zealand is available in document BS2B of the Reserve Bank of New Zealand Banking System Handbook. Full references are contained at the end of this paper.

3 The Reserve Bank's initial proposals

The Reserve Bank began work on calibrating the farm loan inputs in early 2009. One of the primary focuses was on the LGD assumptions.³ When determining LGD inputs for the purposes of assessing capital adequacy requirements, an important input is the severity of downturn that is being assumed. For example, the Basel model is calibrated to a 1 in 1000-year shock. This means that, in principle at

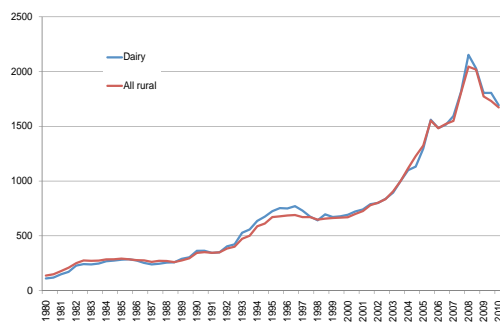
least, a bank is required to hold sufficient capital to meet unexpected losses with a probability of 0.999 over one year.

Farm lending risk in New Zealand is now substantially driven by lending to the dairy sector. This sector now constitutes around 65 percent of total agricultural lending and has had an indirect effect on land values, and hence risk, in the sheep and beef sectors, which account for around a further 25 percent of farm lending.

³ The Reserve Bank focused on LGDs, as this was considered the primary weakness in the banks' existing modelling. It was broadly content that the banks' own PD assumptions were reasonable.

One of the key drivers in the evolution of dairy farm lending risk is fluctuations in land prices. There was a very sharp increase in dairy land prices (and rural land prices generally) between 2001 and 2008, as displayed in Figure 1. This increase was partly driven by increases in land productivity being embedded into prices, partly by favourable expectations about future dairy payout prices (notwithstanding the rise in productivity), and perhaps by expectations of continuing capital gains. Banks actively competed for market share in rural lending during this period, and so relatively easy credit conditions helped to fuel the boom in land prices.

Figure 1
Land prices (2003 = 1000)



Source: RBNZ calculations, Quotable Value Ltd.

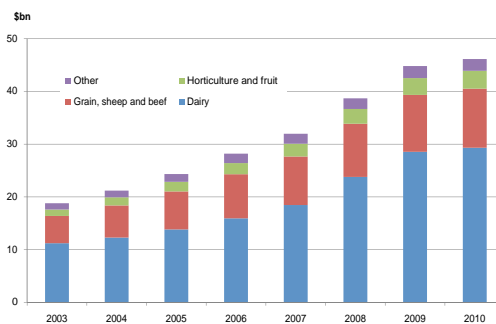
A sharp increase in prices of this nature can have a number of effects. First, it opens up the possibility that existing borrowers will take on more debt, effectively maintaining their original level of leverage. To the extent that prices increase above a long-run sustainable level, additional borrowing of this nature increases the risk that borrowers will be over-exposed when land prices fall back. The alternative is debt levels of existing loans remain much the same, in which case the loan-to- (market) value ratios (LVR) fall as land prices increase. Under the Basel II capital model, this would require banks to hold less capital against existing exposures, potentially fuelling more aggressive lending.⁴ This is an example of the sort of pro-cyclicality concern that the international regulatory community is seeking to address. In practice, during sustained land price booms, the stock of debt tends to rise relative to market value of rural land.

⁴ If LVRs were to fall in this way, PDs would also fall if they were assessed on a point-in-time basis (there are few defaults while a boom is in full swing), hence the requirement for banks to adopt long-run (through-the-cycle) PDs.

During the New Zealand boom, there was an increase in demand for borrowing at high LVRs optimistic farmers and new entrants sought either to increase the size of home farms or buy new or additional farms, or to undertake large conversions. Whilst banks have always held a proportion of high LVR loans on the books to fund new entrants, the market trends – including the drive for market share – around this time resulted in an increase in the proportion of these types of exposure.

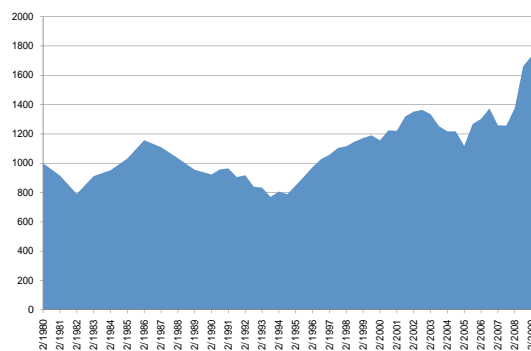
Data also suggests that this increase in high LVR lending was also accompanied by significant growth in aggregate debt (as shown in figure 2) and an increase in the average LVR across the sector (figure 3). This combination of factors made bank lending portfolios vulnerable to shocks to the dairy payout and any subsequent fall in land values.

Figure 2
Agriculture sector credit



Source: RBNZ.

Figure 3
Debt-to-farm price (1980 = 1000)



Source: RBNZ calculations, Quotable Value Ltd.

To assess whether IRB banks were appropriately modelling the amount of capital for rural lending, the Reserve Bank developed a model of dairy farm income and asset prices to generate downturn LGD estimates. Using this model, the Reserve Bank assessed the impact of a shock to the milk

Table 1

The Reserve Bank's initial proposals for LGDs

LVR %	0-30	30-40	40-50	50-60	60-70	70+
Proposed LGDs (as % of exposure)	10	15	22.5	35	45	52.5

solids payout rate that could be considered to be broadly consistent with the solvency standard in the Basel capital framework. On this basis, the three-year average payout was assumed to fall to \$3.90 (a payout that, in real terms, would be low, but not unprecedentedly so), which resulted in a 55 percent fall in farm land prices. Using this price fall, a set of downturn LGDs were generated for various LVRs,⁵ as shown in table 1.

Whilst the Reserve Bank calibrated the model with the Basel standard in mind, it should be noted that the modelling was carried out at the peak of the land price boom, and as such, the 55 percent fall in land prices at that point would only result in the land prices falling back towards the sort of levels recorded ten years previously. However, the LGDs estimated from the Reserve Bank's modelling were still around 30 percent higher than the LGDs that the IRB banks were using at that time to generate the capital requirements for farm lending.

The Reserve Bank also had concerns about the level of sensitivity in the models to contractual maturity, and assumptions on correlations that were embedded into the Basel model calibration.

Most farm lending incorporates the small business concession in the correlation coefficient calculation. This can result in a capital reduction of up to around 20 percent in respect of loans to businesses with a turnover of \$5 million or less. The adjustment to capital calculations might be appropriate in sectors with very heterogeneous small businesses, which are not vulnerable to single-sector systematic shocks. However, farm lending in New Zealand is quite homogeneous, with

most loans being exposed to similar shocks, and hence a portfolio of small farm loans provides relatively limited diversification for banks. The dominant dairy sector, in particular, is vulnerable to shocks to global dairy prices that can have a marked impact on every farm's profitability and eventually on the land values, which in turn affects the value of a bank's security. Accordingly, the Reserve Bank did not consider that there was a justification for retaining a concessional treatment within the rural capital framework. Indeed, given the exceptionally high degree of homogeneity, a case could have been made for increasing the correlation coefficient.

On maturity (the variable 'M' in box 1), the Basel model assumed that an exposure with a contractual term of five years is 60 percent more risky than an equivalent loan with a one-year contractual term. The basic intuition is sound – all else equal, a shorter term exposure provides less time for things to go wrong, and more scope for the lender to take remedial action earlier. However, this calibration was largely based on mark-to-market pricing of traded instruments (such as government securities) in relatively benign times. That pricing experience is not necessarily directly relevant to the measurement of risk in a banking book, and, importantly, relies critically on the assumption that an exposure can be terminated at the point of contractual maturity.

In practice, given the high degree of homogeneity of rural loans, during a severe downturn, all participants in the rural sector will be facing the same stresses, and the market for collateral (farms) tends to become highly illiquid (as happened in the dairy farm market over the last couple of years). As a result, it is highly unlikely that a farmer could repay a loan at maturity by refinancing it with a loan from another bank, and it would be difficult for a large number of farmers to sell up at the same time. Thus – when it matters – the effective, or economic, maturity of the loan will be longer than the contractual maturity. While in principle it may be

⁵ Different LGDs apply to different LVRs as the risk of the lender incurring losses will vary depending on the proportion of debt. If a farmer has only 5 percent of asset value in debt, it would be all but impossible for the lender to lose money. However, at an LVR of 75 percent, it is much more likely that the lender will incur losses in a default. LGDs exceed the level that might be implied solely by the price fall, due to additional factors such as transaction costs.

possible for a single institution to gain a small advantage by writing loans with short maturities and passing on its bad exposures at maturity, it is not possible for the system as a whole to benefit from such an approach, as there simply will not be anybody to take on the exposures.

Furthermore, the calibration of the maturity driver based on contractual term provides an incentive to rewrite contracts with shorter maturities simply to reduce regulatory capital, without in any material way reducing the nature of the economic exposure in a severe stress event. To counteract this effect, the Reserve Bank initially proposed to the IRB banks a minimum maturity of 3.5 years be applied to farm exposures.

The Reserve Bank's estimate was that implementing actions to address these various concerns would increase the average farm lending risk weights to around 80-90 percent. That would have represented an increase on the prevailing levels post-Basel II accreditation, but it would still have been slightly below the standardised rate of 100 percent used by other banks that are undertaking rural lending in New Zealand, and below the risk weight that would have applied when the bulk of farm loans were originally advanced (given that banks operated on a 100 percent risk weight for farm lending under Basel 1, for roughly 20 years).

4 Revised farm capital proposals

The Reserve Bank consulted the banks on its initial proposals for a revised treatment of farm exposures in the first half of 2009. After the Reserve Bank conducted its initial analysis of farm lending risk in late 2008, there was a rapid deterioration in the situation facing the dairy sector. Expectations for future milk solids payouts were considerably down on the levels experienced during the height of the boom. As noted, the market for dairy farms effectively seized up. Whilst actual transactions were limited, discussions with banks suggested that, on average, they were factoring in farm price falls of around 25-30 percent in their reassessments of LVRs. The price that would have cleared the market had clearly fallen significantly.

In developing its final proposals, the Reserve Bank had regard to both market developments and feedback received from the banks. Taking account of these points, the final requirements for the farm lending capital treatment are as follows:

- LGD inputs: As land prices began to fall from the peak, banks' own models naturally tended to generate a requirement to hold more capital. This is because some exposures will migrate to higher LVR buckets, increasing the risk weight applied to those loans. Given the emerging market developments, the Reserve Bank considered that it would be prudent to delay the implementation of new requirements to allow time to reassess the impact of lower land prices on banks' existing models.

Around this time, the Reserve Bank was also conducting an exercise to develop an industry-wide stress testing model for the dairy industry (reported in the following article in this issue of the *Bulletin*). Whilst the stress testing model cannot directly be used to estimate capital requirements, this exercise nevertheless provided a useful data source and further insights into the likely resilience of banks' rural portfolios.

In setting the regulatory capital requirements, the Reserve Bank seeks to adopt a through-the-cycle approach, which sets capital requirements at an appropriate level for stages of the business cycle. In practice, though, any through-the-cycle requirement is to some extent calibrated based on the point at which the requirement is set. As the Reserve Bank's initial proposals were set at a time when land prices peaked, it was appropriate to reconsider these in light of market developments

Taking account of these factors, the Reserve Bank generated revised LGD numbers based on a lower, but still significant, downturn land price fall of between 40 and 50 percent. The revised LGD numbers are set out in table 2.

The Reserve Bank considers that, under most conditions, these LGD inputs will generate appropriate levels of regulatory capital. However, whilst these inputs reflect a through-the-cycle approach, it remains open to the Bank

Table 2

The Reserve Bank's revised LGDs

LVR %	0-30	30-40	40-50	50-60	60-70	70+
Proposed LGDs (as % of exposure)	10	15	22.5	32.5	40	42.5

to revisit them, or adopt alternative macro-prudential overlays, should the nature of the risks associated with the rural loan books be assessed to have changed.

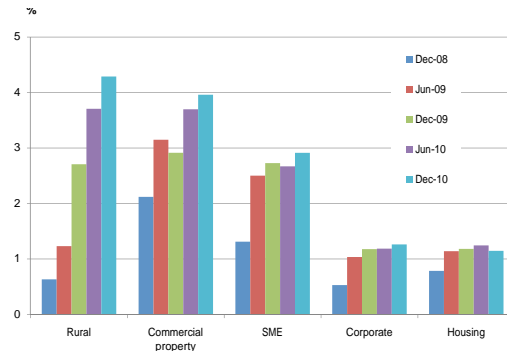
The aim of the new capital requirements is not to further aggravate the position of stressed borrowers at the point of implementation, but to ensure that through time banks hold sufficient capital in New Zealand to cope with the risk of the loans they are making. In practice, little farm lending is originated with an LVR more than 70 percent.

- Correlation coefficients: During the consultation period the Reserve Bank did not identify any reasons not to remove the concessional SME correlation treatment from farm lending. This position was supported by both the stress testing model outputs, which showed that losses in deep stress events were much greater than they would be if the Basel SME model correctly represented the extent to which individual exposures were correlated, and by recent non-performing loan data. Figure 4 shows the impact of the recent downturn on loans across various sectors of the economy. Whilst the sector was experiencing a dairy-led boom at the time the downturn hit, which will explain some of the increased impact, the data does not support a concessional treatment for the rural sector.
- Loan maturities: At the outset of the consultation period, the IRB banks had existing average contractual maturities on rural loans ranging from 2.5 years to 4.0 years. Since then, some banks have been actively reducing the contractual maturity of their exposures in the farm sector.

Given its existing concerns about the minimal difference in economic risk in a stress event between otherwise similar loans with different contractual maturities, the Reserve Bank has concluded that it would be

Figure 4

Sectoral impaired and 90-day past due assets (as a percentage of sectoral lending)



Source: RBNZ calculations based on private reporting data from 8 registered banks.

Note: Data are not standardised and definitions may vary across banks

appropriate to neutralise the impact of maturity on the capital treatment of farm loans. Banks now have the option of fixing the maturity of their farm loans at 2.5 years for capital purposes, or using their own estimates of M but subject to a minimum value of 2.5 years.

Making this change raised a wider question about the appropriateness of the Basel model's assumed impact of maturity on other exposures held by New Zealand banks. The Reserve Bank is engaged in a period of consultation with banks to consider this issue further.

The changes outlined above will lead to an increase in the average risk weights applied to farm exposures by New Zealand banks, thereby moderately increasing regulatory capital requirements for rural lending. The banks will see average risk weightings of around 80-90 percent, compared to the 70-80 percent that resulted from the LGD assumptions we had imposed in 2008 on the two largest lenders. Whilst these average risk weights are below the 100 percent risk weight required under Basel I and used by the banks operating under the standardised Basel II models, a lower risk weighting is reasonable, given the greater degree of risk

differentiation inherent in the IRB models. Risk weightings on higher risk rural loans are likely to be above 100 percent, and those on low risk loans will be well below 100 per cent.

5 Impact of changes to regulatory capital requirements

When there is a change in regulatory capital requirements, it is natural to ask whether and, if so, how the capital change will impact on banks' lending margins.

Banks' own cost of funds (debt and equity), their assessment of the riskiness of the loan/sector, and their competitive positioning are and always will be the most important factors that determine the pricing of any loan facility.

During the boom years, pricing on rural loan facilities appeared to be quite aggressive, as various participants in the market sought to build or maintain market share, while rapidly growing the total rural loan book. The rural lending market has changed materially in the last few years: both borrowers and lenders have become much more cautious, each conscious of the fall in farm values, and actual loan losses, seen over the last couple of years. That change – entirely a market phenomenon – appears to have led to an increase in the average lending margin on rural loans.

What of the role of regulatory capital requirements? There is no doubt that banks regard regulatory capital requirements as factors that influence the bank's cost of capital,⁶ and hence that changes in those requirements – at least when they reflect regulatory perceptions of risk that are not shared by banks – can influence the pricing of loan products. There is, however, good reason not to overstate the likely effect. Under Basel I, a single regulatory risk weight was applied to all corporate exposures but, obviously, banks did not price all these loans the same. Informal and, increasingly, formal risk

models were used to guide pricing, such that risky customers typically attracted higher margins.

The situation did not change with the introduction of the Basel II advanced regulatory capital models. While regulatory capital requirements now better match economic risk, banks can continue to use their own risk models, or their assessment of the Basel model inputs, for capital budgeting and internal pricing purposes.⁷

In some instances, work on refining the regulatory regime may have a less formal impact on pricing. The move to more risk-sensitive regulatory models may itself have helped move the industry to more risk-sensitive loan pricing. During the recent rural land boom, which was well under way prior to the introduction of the IRB models, some IRB banks were pursuing market share and, in the process, the margins on what were some of their riskiest exposures – large loans with high LVRs – were driven to levels that might have been inadequate to compensate banks for the risks they were running. One consequence of improving risk differentiation is that margins should better reflect the underlying economic risk of the loan, such that less risky and lower LVR loans attract tighter margins, and similarly, more risky and higher LVR loans are priced at higher margins.⁸

The regulatory regime may also have an impact on pricing if a bank has an internal pricing rule that uses a regulatory measure of risk rather than the bank's own assessment of risk. Box 2 presents an illustration of how revised capital requirements might flow through into prices, illustrating that under these assumptions the likely effects on pricing are relatively small.

Banks will also consider the views of the rating agencies, and often target a desired credit rating. In practice, this

⁶ Although there are some reasons to doubt whether capital requirements affect a firm's weighted cost of capital over the longer term. Under the Modigliani-Miller hypothesis, as the share of a bank's assets financed by capital (as distinct from deposits and other debt instruments) rises, the market should, over time, perceive the banks as becoming less risky (less variance in actual and expected earnings) due to the fall in leverage. If so, the market's required rate of return on equity would fall.

⁷ This is particularly relevant for banks that operate as part of a wider international group. While New Zealand capital requirements affect the amount of capital held within the New Zealand subsidiary, capital requirements for the group will be determined at group level. How the banking group chooses to allocate its group cost of capital across various subsidiaries and different business lines is a matter for that group, and may change over time.

⁸ Any impact of improved differentiation will have taken place against the backdrop of an underlying widening of lending spreads generally across all sectors of the economy following the global financial crisis.

means that banks typically hold capital above the regulatory minimum. For example, one of the major rating agencies, Standard and Poor's, has developed a more explicit model for assessing a bank's capital adequacy that is expected to assign a risk weighting of around 100 percent to New Zealand bank farm loans. If a bank were to hold capital to meet a ratings target based on higher alternative risk weights, then the Reserve Bank's capital requirements would have relatively little impact on that bank's overall assessed cost of capital.

6 Conclusion

After a lengthy process of analysis and consultation, the Reserve Bank has finalised the capital requirements for farm lending. The new requirements will take effect from 30 June 2011, and the impact on the major banks is to take average risk weights back to slightly below the 100% risk weight that applied under Basel I. This article has explained the underlying economic analysis across the components that make up farm lending capital requirements.

It is sometimes argued that the Reserve Bank's capital requirements will have a negative effect on banks' farm lending business, or result in higher margins charged to customers. The impact of individual changes in regulatory capital requirements on the banks' business is often exaggerated, and it is important to distinguish any effects of these regulatory changes from underlying changes in banks' own perceptions of the riskiness and likely returns on rural lending. Developments over recent years have highlighted just how risky rural lending can be and this has been reflected in banks raising margins on rural lending from levels that had become unrealistic during the boom period. This trend was established well before the completion of the current review of regulatory capital requirements.

The Reserve Bank's goal is to ensure that banks, and especially the IRB banks, hold an appropriately conservative amount of capital, reflecting their particular circumstances and portfolios. Recent changes to farm lending capital requirements reinforce this goal and hence promote the longer-term efficiency and soundness of the financial system.

7 References

Basel Committee on Banking Supervision (2005), 'An explanatory note on the Basel II IRB risk weight functions', July.

Reserve Bank of New Zealand, "Capital adequacy framework (internal models based approach)", <http://www.rbnz.govt.nz/finstab/banking/regulation/3272068.pdf>

Reserve Bank of New Zealand, *Financial Stability Reports* at <http://www.rbnz.govt.nz/finstab/fsreport/>

Box 2

Possible impact of regulatory capital changes on loan prices: an illustration

This box illustrates, using a simplified pricing model, the potential effect of the farm regulatory capital changes if they flow through into prices. Note that the inputs into the model are illustrative only and do not purport to represent any bank's actual pricing model or practices.

The model shows the impact of an increase in the average risk weight from 70 percent to 85 percent for

a portfolio as a whole. The impact of this change is modelled on a notional balance sheet containing a single type of exposure. It is assumed that the loan book is funded through capital, at an equity risk premium of 8 percent, with the remainder funded at a single notional deposit interest rate of 5 percent.

In this simplified model, the increase in margins that would result from the increase in the risk weight is only 16 basis points. Furthermore, this calculation assumes that the equity risk premium remains fixed under both risk weightings.

Table 3

Stylised example of potential pricing implications of increased risk weights

Component	70% risk weight (a)	85% risk weight (a)	Change in margin
Cost of equity	0.13	0.13	
Tax	0.28	0.28	
Required return on equity (b)	0.1806	0.1806	
Capital ratio (c)	0.08	0.08	
Assets (d)	1000	1000	
Risk-weighted assets (e = a x d)	700	850	
Capital requirement (f = e x c)	56	68	
Deposits (g = d - f)	944	932	
Required income			
Equity (h = b x f)	10.11	12.28	
Deposits (i = g x 0.05)	47.20	46.60	
Total (j = h + i)	57.31	58.88	
Required rate of return (k = j/d)	5.73%	5.89%	
Margin over deposit rate (k - 5%)	73 basis points.	89 basis points.	16 basis points.