



## **Consultation Paper: Review of bank capital adequacy requirements for housing loans (stage one).**

The Reserve Bank invites submissions on this Consultation Paper by 16 April 2013.

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Please note that a summary of submissions may be published. If you think any part of your submission should properly be withheld on the grounds of commercial sensitivity, or for any other reason, you should indicate this clearly.

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# Introduction

1. The Reserve Bank is undertaking a staged review of bank capital adequacy requirements for residential mortgage loans (housing loans).
2. The first stage of the review focuses on a proposed technical adjustment to the correlation factor of the Basel equation that 'internal models' banks use to calculate their capital requirements. Internal models banks are those banks that are accredited by the Reserve Bank to use their own models in the calculation of their minimum capital requirements in accordance with the requirements laid out in BS2B of the banking supervision handbook.<sup>1</sup>
3. This document consults on a proposal to increase the correlation factor for high loan-to-value ratio (LVR) loans. This means that capital adequacy requirements for high LVR loans would be increased for internal models banks.
4. We are particularly interested in the view of banks and other stakeholders on this proposal, especially with regard to the proposal's effect on banks' capital positions.

# Background

5. The review is being undertaken in the context of the section 68 purpose to promote the maintenance of a sound and efficient financial system in the Reserve Bank of New Zealand Act 1989. The objective of the review is to ensure that the banks' capital requirements for housing loans properly reflect the risk in the sector.
6. The current requirements in BS2B date back to our implementation of the Basel II capital adequacy regime at the beginning of 2008,<sup>2</sup> although there were some adjustments made in 2010-2011 for internal models banks as they implemented improved housing probability of default models. We consider it is now timely to review our approach to housing risk given the time elapsed since our requirements were put in place and given the significance of the sector.
7. In our view, housing loan losses in the New Zealand market are more highly correlated than assumed by the Basel equation. The Basel equation is integral to the framework internal models banks use to calculate their regulatory capital. We consider that the equation gives too much weight to idiosyncratic risk (i.e., that associated with the particular circumstances of the borrower) compared to systemic risk (i.e., that associated with general economic conditions).

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<sup>1</sup> This document is available here: <http://www.rbnz.govt.nz/finstab/banking/regulation/0094291.html>.

<sup>2</sup> More detail about the Basel II regime, the Basel equation, the Reserve Bank's modeling of housing risk and our views on the parameters of the Basel equation is available in: Hoskin, K and Irvine S (2009) 'Quality of bank capital in New Zealand', Reserve Bank of New Zealand Bulletin, 72(3), pp. 5-16.

8. Generally speaking, borrowers with high LVR loans are more exposed to systemic risk and the losses on such loans are more highly correlated than those on low LVR loans. For low LVR loans a combination of systemic and idiosyncratic events may be needed in order to induce a default.
9. We have held the view since the inception of the Basel II regime in New Zealand that the correlation factor for housing is too low. However, unlike for other parameters in the Basel equation such as probability of default (PD) and loss given default (LGD), internal model banks do not estimate the correlation factors using their models. Rather the correlation factor is a fixed number (or percentage) in the Basel II framework and consequently in BS2B.
10. In our initial implementation of Basel II, we compensated for the low correlation factor by requiring an additional margin on bank estimates of PD and LGD. However, as banks' models and estimates have evolved it has become unclear whether the estimates still encompass a sufficient margin for correlation risk. Given that Basel II is now embedded, we consider it would be better to adjust the correlation factor directly rather than via calibration of other parameters.
11. If economic conditions change for the worse, and in view of the current state of the housing market, there is a risk that borrowers most exposed to adverse changes in general economic conditions could all come under pressure at the same time, with a corresponding impact on the quality of banks' housing loan portfolios. This is an important motivation for reviewing the balance between systemic and idiosyncratic risk within banks' housing portfolios.
12. Once the first stage of the review is completed and any changes to the correlation are in place the next stage of the review will take place. This will include consideration of the overall calibration of banks' models, potentially including the calibration of their PD and LGD estimates.

## Bank capital requirements

13. Locally incorporated banks are subject to capital requirements set by the Reserve Bank. A bank's capital requirement can be expressed in the form of a risk-weight as a percentage of the bank's exposure (or as a percentage of the balance of the loan). Higher risk-weights mean more capital.
14. Since 2008, the Reserve Bank's capital adequacy requirements have been based on the global regulatory standard known as Basel II.<sup>3</sup> Under Basel II, the precise calculation of

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<sup>3</sup> The Basel III requirements that took effect for New Zealand banks from 1 January 2013 complement, rather than replace the Basel II regime. Ultimately, banks' capital requirements are expressed in the form of a capital ratio (capital divided by risk-weighted assets). Basel III is primarily about the ratio itself (increasing it) and the numerator of the ratio (what counts as capital). Basel II is primarily about how to measure the denominator (risk-weighted assets).

risk-weights for a bank depends on which one of two broad approaches to calculating capital it uses. Under the default approach, a set of risk-weights are prescribed corresponding to broad categories of loan (corporate, housing and so on). This is known as the “Standardised Approach” (the requirements under this approach are set out in BS2A).<sup>4</sup>

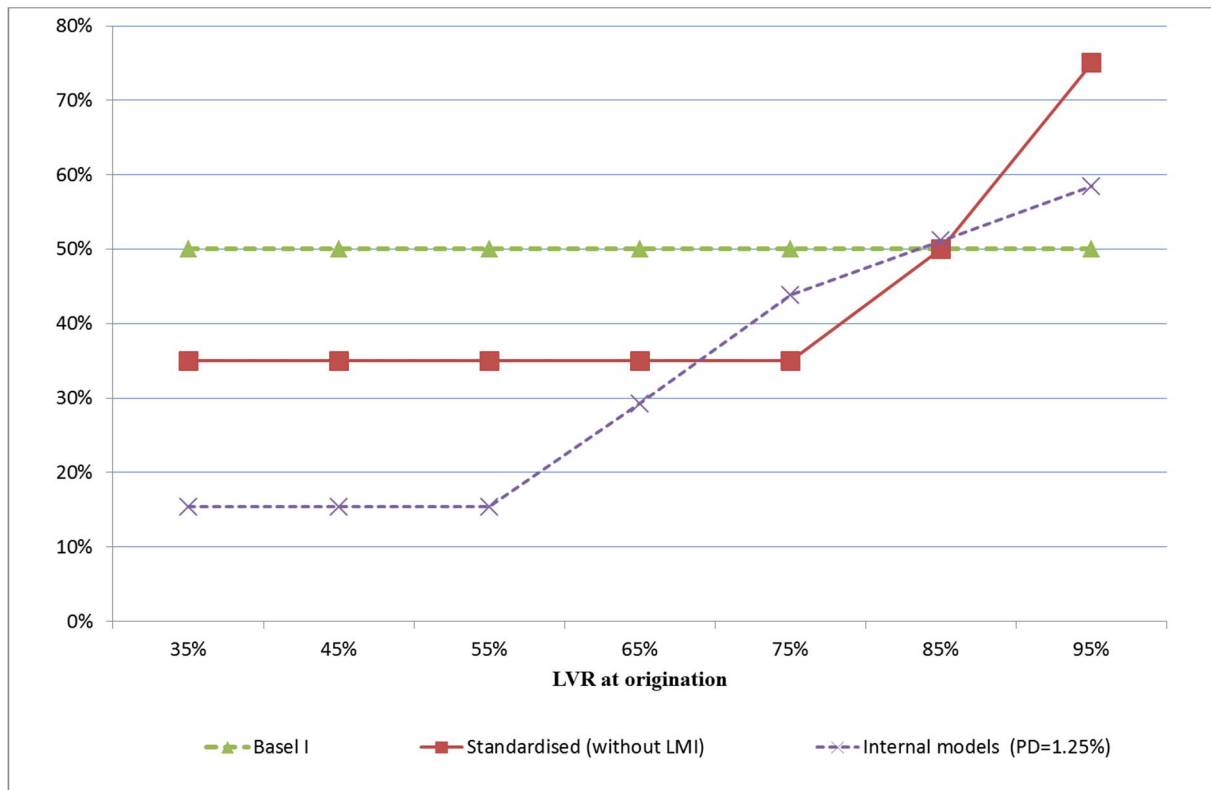
15. The alternative approach, subject to accreditation by the Reserve Bank, is to adopt the internal models approach. Currently, the four largest locally incorporated New Zealand banks use the internal models approach.
16. Under the internal models approach, banks’ own models – which must be approved for use by the Reserve Bank – are used to estimate the value of certain risk parameters that feed into the Basel equation, which in turn generate the appropriate risk-weight.
17. One of the key features of the Basel II framework is to make banks’ capital holdings more risk sensitive than previously under Basel I. For housing loans, Basel II introduced a risk sensitivity that did not exist under the previous Basel I regime in which the same risk-weight applied to all housing loans.
18. The capital requirements for internal models banks are more risk sensitive than for standardised banks. Generally, this means that internal models banks hold more capital than standardised banks for high risk loans and less capital than standardised banks for low risk loans. In practice, for housing loans, the latter effect dominates so that the capital requirements for internal models banks are generally lower than for standardised banks.<sup>5</sup> In principle, this reflects the better systems and controls expected of internal models banks. However, the relativity between standardised and internal models banks is something that will be considered in the next stage of the review.
19. On average the housing risk weights for internal models banks are currently in the range of about 25 percent – 31 percent (for non-defaulted loans), while for standardised banks the average is about 38 percent. Up until 2008, under Basel I, the risk weight for all housing loans was 50 percent.
20. The stylised graph in Figure 1 illustrates the difference in Reserve Bank’s requirements for housing loans under Basel I, and Basel II for standardised and internal models banks, and how these requirements vary across LVR categories. Note that the line shown for internal models banks relates to a representative pool of loans that is assigned a probability of default of 1.25 percent.

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<sup>4</sup> This document is available here: <http://www.rbnz.govt.nz/finstab/banking/regulation/0094291.html>.

<sup>5</sup> Differences in underlying risk will also affect the average capital requirement for internal models banks compared to the average requirement for standardised banks.

**Figure 1: Housing risk weights as a percentage of the loan exposure**



21. In Figure 1, a higher correlation for internal models banks' high LVR loans would shift the right-hand end of the purple line upwards (as risk-weights increase for high LVR loans) and the average risk weight for internal models banks would also increase.

## The correlation factor for housing loans

22. The Basel II framework was finalised by the Basel Committee in June 2004. The framework incorporates equations for internal models banks to calculate their minimum capital requirements. The equation for housing includes a correlation factor of 15 percent.<sup>6</sup> At the time this factor was set, it was based on the historical experience of representative bank portfolios, the economic capital of these banks, and the loss rate experience of fixed rate and fixed term residential mortgages in G10 countries.

23. From a New Zealand regulatory perspective the problem we have with the Basel correlation is:

- The balance between the systemic and idiosyncratic risk that the correlation input captures can be significantly different for floating rate (and shorter term fixed) mortgages, than for longer-term fixed mortgages. Floating rate mortgages are subject

<sup>6</sup> See page 82 of Basel II: International Convergence of Capital Measurement and Capital Standards: a Revised Framework June 2004, available on the website of the BIS here: <http://www.bis.org/publ/bcbs107.htm>.

to additional systemic risk that interest rates will increase. Note that floating rate mortgages accounted for about 60 percent of mortgages in New Zealand last year.<sup>7</sup> Data from 2009 show that for at least seven G10 countries fixed rate mortgages are more common than floating rates. However, there are some countries like New Zealand where floating rates are more common (such as Australia, Ireland, Korea and Spain).<sup>8</sup>

- The bank economic capital models that feed into the calculation of the Basel correlation factor may not be the best benchmark for calibrating capital requirements for New Zealand banks. Even at this time, post Global Financial Crisis (GFC), New Zealand bank capital requirements are more conservative than the regulatory requirements for banks in many other jurisdictions. As such it is likely that the economic capital models of many internationally active banks pre-GFC generated substantially less capital for housing loans than we consider is now appropriate for New Zealand banks.
- Historical data, especially data from pre GFC periods, may not sufficiently capture tail-loss events that are more relevant to the calibration of capital requirements.
- As it is fixed, the correlation factor does not change with the systemic risk inherent in the portfolio (this is in contrast to the Basel equation for most other asset classes where correlation varies with PD).

24. Since the development of the Basel II requirements, various studies have critiqued the Basel equation including the correlation factor. A small amount of literature exists on the housing correlation factor although it largely pre-dates the GFC. Our assessment of the lessons from the literature is as follows:

- Several studies conclude that the Basel II 15 percent correlation is too conservative. These studies are based largely on ‘normal times’ data (and certainly pre-GFC periods), apply to housing portfolios with different risk characteristics from the housing portfolios of New Zealand banks, or both. For instance the New Zealand housing market is relatively small and highly concentrated, with a relatively large portion located in a single city (Auckland).
- Some studies (pre-GFC) note that it remains unclear whether the Basel correlation sufficiently captures the increase in correlation that would be expected during times of market stress.

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<sup>7</sup> During 2012 floating mortgages accounted for about 60 percent of total mortgages (by value) in New Zealand. Mortgages with fixed rates less than two years accounted for a further 36 percent of the total. Note: (1) figures are time remaining to interest rate reset not original fixed period (2) figures include home loans and also SME loans secured on a house. Source: RBNZ.

<sup>8</sup> See Lea, M (2010) “International comparison of mortgage product offerings”, Research Institute for Housing America”.

- One study that incorporated only high LVR loans (loans with LVR of 80 percent or more) found that the implied correlation for housing loans is between 20 percent and 25 percent for 30 year fixed term mortgages, compared to the 15 percent correlation factor in the Basel equation.
- Another study (post GFC) concluded that the correlation in the Basel equation for residential mortgage exposures with an LVR of 80 percent or higher should be between 20 - 25 percent.
- The Basel II assumption of applying the same correlation values in all countries might not appropriately differentiate the relative risk profiles of banks in different regions.

## **The Reserve Bank's approach to capital requirements**

25. The Reserve Bank's capital adequacy requirements are built on internationally recognised regulatory standards developed by the Basel Committee on Banking Supervision. The Reserve Bank's general approach is to adopt the Basel Committee standards but to adapt them to fit New Zealand conditions as necessary.

26. Following this approach, our Basel II requirements are closely aligned to the Basel II standards, but have some adjustments for New Zealand conditions including the following:

- In the area of housing loans, adjustments to parameters banks input into the Basel equation to ensure that capital is sensitive to LVR and is appropriately calibrated to the New Zealand housing market.
- In the area of farm lending, adjustments to the parameters banks input into the Basel equation to ensure appropriate calibration to potential shifts in farm land prices, and adjustments to the Basel equation itself (the correlation factor) to ensure sufficient weight is given to systemic risk.

27. Our Basel III requirements are also largely aligned with the Basel standards but with some adaptations for New Zealand conditions. For instance we have not adopted the Basel III leverage ratio as we consider it is a poor measure of risk for New Zealand banks.

28. In the areas of housing loan risk the Reserve Bank's assessment of the models used by internal banks, and of how the Basel model equation works, draws on a model of residential mortgage loan losses that the Reserve Bank developed (the model). The model is designed to investigate major loss events in residential housing loan portfolios. The advantages of this model include:



- It produces plausible market stress scenarios. This means the model can provide a useful calibration reference for other models that rely on empirical data that do not necessarily reflect the full economic cycle, especially a severe downturn scenario.
- It reflects the risk characteristics of the New Zealand housing market (such as the importance of floating rate mortgages) and it can be calibrated to the actual risk profiles of New Zealand banks.

29. The Reserve Bank has used this model to inform its view about the calibration of the risk parameters in the Basel equation and the risk sensitivity of housing capital requirements. The outputs of the model helped shape our policy view on the adjustments to the Basel II framework we already have in place as described above.

30. In the areas of correlation, the model implies that the correlation factor should be higher than the Basel requirement of 15 percent and that the correlation factor is a function of LVR and the debt servicing ratio (DSR). We do note however, that the precise correlation is sensitive to changes in various assumptions that underpin the model.

## Bank data

31. We recently analysed data on banks' loss rate, by LVR category, over the period from about 2008 to 2012. This period incorporated a mild economic downturn and so the loss rates observed are not necessarily representative of those that would be experienced during a severe economic downturn.

32. That said, while there was some variation across banks, the data implied that loss rates on high LVR loans generally increased more (in several cases substantially more) during the recent economic downturn than loss rates on lower LVR loans. In our view this provides good support for the proposition that higher LVR loans have more systemic risk than lower LVR loans. To make a more definitive conclusion based on bank data alone we would need to consider data on loss rates during a severe economic downturn.

## Reserve Bank assessment and next steps

33. The Reserve Bank considers there is strong case for adapting the Basel equation for housing to align better with New Zealand conditions by increasing the correlation factor. In coming to this view we have taken account of:

- Our earlier view (which remains) that the basis for setting the correlation factor at 15 percent does not seem to fit well with New Zealand conditions.
- Our established practice to adapt the Basel Committee requirements to New Zealand conditions where necessary.

- Our preliminary view that the estimates banks are using for other Basel parameters are not necessarily sufficiently conservative to compensate for a low correlation factor.
  - The potential increased risk sensitivity it would provide for internal models bank capital – relative to the standardised approach – reflecting the notion that internal models bank capital should be more risk sensitive than standardised bank capital.
  - The literature, which we assess as inconclusive on the appropriate overall housing correlation factor for downturn conditions.
  - Some support in the literature for correlations that are higher than 15 percent for high LVR loans.
  - The findings of the Reserve Bank’s model of housing risk that correlation should on average be significantly above 15 percent and should alter with LVR.
  - Bank data we received on loss rates by LVR category that suggests higher LVR loans are subject to more systemic risk.
34. We therefore propose a further adaptation of the Basel standard by way of a set of alternative correlations for high LVR housing loans. Some alternative scenarios for the correlation factor are set out in Appendix A.
35. We have prepared proposed changes to the capital adequacy requirements for internal models banks as set out in Appendix B of this paper. These proposed changes will apply if – following consultation – our final decision is to impose correlation factors that are different from the Basel standard. We will consult with the internal models banks on proposed new conditions of registration to put into effect any such changes.
36. Before we take final decisions we would like to consider the views of submitters including the internal models banks. We are particularly interested in responses to the consultation questions set out below.

## Consultation questions

37. While we have put forward a series of consultation questions below, we welcome all relevant comments on the proposals.
- Do you consider the Basel correlation factor of 15 percent accurately reflects the true correlation for New Zealand housing portfolios?
  - Do you agree that there is more systemic risk in higher LVR loans? Please explain why you agree or disagree.
  - Please provide the capital impact for your bank of the alternative scenarios set out in Appendix A as at December 2011 and December 2012 (Internal models banks only).

- Setting aside any views on policy settings, do you have other comments on the proposed changes to capital adequacy requirements as set out in Appendix B?

## Selected references

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# Appendix A: Calculation of alternative correlation scenarios

This Appendix sets out some alternative housing correlation factors (see Table 2). While our proposal to adopt alternative correlation factors takes into account a range of considerations, we have used the Reserve Bank model as the basis for generating sets of alternative correlations.

As the correlations implied by the model are sensitive to certain key assumptions about the model's parameters, we have considered alternative correlations. Each set of these correspond to different assumptions about the model's parameters as follows.

## House price changes

Our model assumes potential falls in house prices and house price volatility. One scenario that is consistent with this is a 30 percent fall in average house prices. Our existing capital adequacy standards require that banks model downturn conditions to include a 30 percent fall in house prices.

We consider the international experiences of the GFC are relevant to the calibration of capital for New Zealand banks. In view of this we have included an option where the model is calibrated such that a 40 percent fall in house prices is consistent with the Basel standard. The model implies that there is no material change in correlation for high LVR loans using this option. We expect this is because a fall in house prices of 30 percent would reduce owners' equity in most high LVR loans to nil and so a 40 percent fall would have no additional effect.

## Starting interest rate assumption

The model begins with a starting interest rate and "shocks" it. This parameter is critical because the results of the model are driven partly by percentage changes to the borrower's debt servicing ratio. The base scenario starting interest rate is 7 percent. We have also set this parameter to 6 percent as an alternative scenario to reflect a lower interest rate environment (like the environment we have in New Zealand at present).

## Cure rate assumption

The cure rate is critical as it determines how much we adjust down the implied correlations to account for differences between the model and the Basel definitions of default.<sup>9</sup> The base scenario is a cure rate of 30 percent. Based on data received from banks we have concluded that 30 percent is in the range of actual cure rates experienced, and therefore see no need to change that at this stage.

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<sup>9</sup> Note that within the model a 'cure' occurs when repayments on a loan resume following a default. Loans for which losses are avoided through sale of the house (either by the owner or through recovery action taken by the bank) are not counted as cure.

The alternative correlations we generated also took account of internal models banks' information about the most likely actual distribution of DSR within each LVR category.

Table 1 below sets out the assumptions applied to the model to generate alternative correlations. Table 2 sets out alternative correlations and Table 3 provides the indicative capital impact (average for an internal models bank) of each alternative based on information currently available to the Reserve Bank.

**Table 1: Model assumptions**

	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>
Fall in house prices	30%	40%	30%
Starting interest rate	7%	7%	6%
Cure rate	30%	30%	30%

**Table 2: Alternative correlation factors<sup>10</sup>**

<b>LVR</b>	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>
90% and over	21%	21%	25%
80-89%	20%	20%	23%
Under 80%	15%	15%	15%

**Table 3: Indicative capital impact**

	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>
Estimated average percentage increase in regulatory capital for housing loans	14%	14%	23%

<sup>10</sup> In this table alternative 2 has the same correlation factors as alternative 1 (see discussion above in this appendix on house price changes).

## Appendix B: Proposed changes to the Banking Supervision Handbook

The changes proposed to the Reserve Bank of New Zealand document “Capital Adequacy Framework (Internal Models Based Approach)” (BS2B) are as follows and entail:

- Deletion of some text from section 4.164 (as shown below in track changes).
- New sections 4.164A and 4.164B.

As the proposed new section 4.164B cross references the existing section 4.150A, the existing section 4.150A is also shown below for ease of reference.

Figures for Table 4.12 have not been finalised, although some indicative figures are presented in Appendix A of this paper.

### Retail exposures

4.150A For the purposes of section 4.150, LVR (or loan to value ratio) is defined as the current loan balance as a percentage of the value of the security at the time the loan was originated. The current loan balance includes the EAD amount of any off-balance sheet exposures consistent with sections 4.155 to 4.158.

### Residential mortgage exposure sub-class

4.164 For non-defaulted exposures fully or partly secured<sup>11</sup> by residential mortgages as defined in section 4.7, the formula for calculating risk-weighted assets is:

Risk-weighted assets =

$$K \times 12.5 \times EAD$$

Capital requirement (**K**) =

$$LGD \times N \left[ \left( \frac{1}{\sqrt{1-R}} \times G(PD) \right) + \sqrt{\left( \frac{R}{1-R} \right) \times G(0.999)} \right] - (PD \times LGD)$$

Correlation (**R**) =

0.15

<sup>11</sup> This means that the residential mortgage risk-weight function also applies to the unsecured portion of such residential mortgages.

4.164A For the purposes of section 4.164, Correlation (**R**) is the correlation that corresponds to the loan-to-value ratio set out in Table 4.12.

Table 4.12  
Correlation for residential mortgage exposures

<b>LVR</b>	<b>Correlation (R)</b>
90% and over	X%
80-89%	X%
Under 80%	X%

4.164B For the purposes of section 4.164A, loan-to-value ratio is defined as set out in section 4.150A.